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Standard and Reference Materials for Marine Science

Third Edition

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United States Department of Commerce	National Oceanic and Atmospheric Administration	National Ocean Service
Barbara H. Franklin Secretary	John A. Knauss Under Secretary	W. Stanley Wilson Assistant Administrator

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ACRONYMS

BAS	Bureau of Analysed Samples Ltd. (UK)
BCR	Community Bureau of Reference (Belgium)
CAS	Chemical Abstracts Service
CANMET	Canada Centre for Mineral and Energy Technology (Canada)
CRM	Certified reference material
CSK	Cooperative Study of the Kuroshio and Adjacent Regions Program
GEMSI	Group of Experts on Methods, Standards and Intercalibration
GIPME	Global Investigation of Pollution in the Marine Environment
GESREM	Group of Experts on Standards and References Materials
IAPSO	International Association for Physical Sciences of the Ocean
IAEA	International Atomic Energy Agency
ICES	International Council for the Exploration of the Sea
IOS	Institute of Oceanographic Sciences (UK)
IOC	Intergovernmental Oceanographic Commission
IPT	Instituto de Pesquisas Tecnológicas (Brazil)
LGC	Laboratory of the Government Chemist (UK)
MACSP	Marine Analytical Chemistry Standards Program (Canada)
NIES	National Institute for Environmental Studies (Japan)
NIST	National Institute of Standards and Technology (US)
NRC	National Research Council of Canada (Canada)
NRCCRM	National Research Center for Certified Reference Materials (China)
NWRI	National Water Research Institute (Canada)
OSI	Ocean Scientific International Ltd. (UK)
RM	Reference material
SABS	South Africa Bureau of Standards
SRM	Standard reference material
EPA	Environmental Protection Agency (USA)
USGS	United States Geological Survey (USA)

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Standard and Reference Materials for Marine Science
Third Edition

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ABSTRACT

This is the third edition of the catalog of reference materials suited for use in marine science, originally compiled in 1986 for NOAA, IOC, and UNEP. The catalog lists close to 2,000 reference materials from sixteen producers and contains information about their proper use, sources, availability, and analyte concentrations. Indices are included for elements, isotopes, and organic compounds, as are cross references to CAS registry numbers, alternate names, and chemical structures of selected organic compounds. This catalog is being published independently by both NOAA and IOC/UNEP and is available from NOAA/NOS/ORCA in electronic form.

1. Introduction

The Thirteenth Session of the Assembly of the Intergovernmental Oceanographic Commission (IOC), which met 12-28 March 1985, recognized that the availability and adequacy of standards and certified reference materials are key components in the conduct of intercalibration exercises, regional contaminant assessments, and marine chemistry research in general. The Assembly instructed the Working Committee for the Global Investigation of Pollution in the Marine Environment (GIPME), through the IOC/UNEP [IOC/United Nations Environment Programme Group of Experts on Methods, Standards, and Intercalibration (GEMSI)] to conduct an in-depth study on the matter.

At the Sixth Session of GEMSI, in November 1985, an Ad Hoc Group on the Coordination of International Activities on the Preparation and Distribution of Reference Materials for Marine Chemistry was constituted. The first meeting of the Ad Hoc Group took place in Geneva at the UNEP - Oceans and Coastal Areas Programme Activity Centre, 3-4 June 1985. It was decided at that time to convene a meeting with representatives from a number of national and international agencies and institutions involved in the production of reference materials. This meeting took place in Washington, D.C., 28-30 October 1985. One of the recommendations arising from this meeting was the preparation and maintenance of a publication that assembles and updates all information available on reference materials for use in marine chemistry and marine pollution research and monitoring (IOC, 1985). In response to this recommendation, the Office of Ocean Resources Conservation and Assessment of the National Oceanic and Atmospheric Administration (NOAA) undertook the project. This was accepted by IOC and UNEP, the co-sponsors of GEMSI. The Ad Hoc Group that met in Washington, D.C., subsequently was established as the IOC/UNEP Group of Experts on Standards and References Materials (GESREM). At its first formal meeting (Paris, July 1987), GESREM noted the great value of the catalog and recommended that NOAA periodically update it.

This document is the third edition of the compendium of information originally published in 1986 on various types of reference materials. Included are reference materials of marine and/or estuarine origin, such as the marine mud (MAG-1) prepared by the US Geological Survey (USGS) and the seawater (NASS-4) prepared by the National Research Council of Canada (NRC);

materials used in special situations such as the sewage sludge reference materials (CRM 144 and CRM 146) prepared by the Community Bureau of Reference (BCR); "classic" reference materials such as the bovine liver (SRM 1577b) prepared by the National Institute of Standards and Technology (NIST); and instrument performance materials such as the NIST series of aqueous elemental solutions. The instrument performance materials are of special interest since they span a variety of analytical techniques from scanning electron microscopy to spectrophotometry. Soil reference materials have been added to this edition. Table 1 lists the reference materials included in the catalog that are of strictly marine or estuarine origin. This catalog is being published independently by both NOAA and IOC/UNEP and is available from NOAA/NOS/ORCA in electronic form.

2. Reference Materials Sources, Types, and Use

2.1. Sources

Bureau of Analysed Samples Ltd.
Newham Hall, Newby
Middlesbrough, Cleveland TS8 9EA
ENGLAND

The materials provided by Bureau of Analysed Samples Ltd. (BAS) are prepared under the auspices of an Honorary Advisory Committee and a body of 250 cooperating analysts representing government departments, manufacturers and users. The British Chemical Standard Certified Reference Materials (BCS-CRMs) are analyzed by eight analysts, and a certificate showing the mean values obtained by each analyst and a summary of the methods used is made available with each material. BAS also provides EURONORM certified reference materials which are analyzed by 20 European laboratories and approved by the European Committee for Iron and Steel Standardization.

Canada Centre for Mineral and Energy Technology
555 Booth Street
Ottawa K1A 0G1
CANADA

The Canada Centre for Mineral and Energy Technology (CANMET) Certified Reference Materials Project (CCRMP) identifies, prepares, and certifies compositional reference materials to ensure reliability and quality of chemical measurements carried out by Canadian minerals and metallurgical industries. CCRMP Certified Reference Materials (CRMs) have certified concentrations established from measurements carried out by 10 or more independent laboratories using a variety of methods. Values are certified only if definite standards of consensus between the results of the contributing laboratories are met. The Certification Report provided with each CRM contains information on analytical methods, measurement results, the procedures used to establish the recommended values, estimates of uncertainty, and statistical information by which a user may judge if the results of a method under testing are in accord with consensus results. CANMET CCRMP makes available more than 60 CRMs representative of mineralogical and metallurgical matrices.

Table 1. Reference materials of marine or estuarine origin

Material	Analyte	Source	Matrix
OILS			
CRM 349	Organics	BCR	PCBs in cod liver oil
CRM 350	Organics	BCR	PCBs in mackerel oil
SRM 1588	Organics	NIST	Organics in cod liver oil
ROCKS			
GBW 07249	Elements	NRCCRM	Polymetallic nodule
Nod-A-1	Elements	USGS	Manganese nodule
Nod-P-1	Elements	USGS	Manganese nodule
SEDIMENTS			
BCSS-1	Elements	NRC	Marine sediment
BEST-1	Elements	NRC	Estuarine sediment
CRM 277	Elements	BCR	Trace elements in estuarine sediment
CS-1	Organics	NRC	Polychlorinated biphenyls in coastal sediments
GBW 07313	Elements	NRCCRM	Marine sediment
HS-1	Organics	NRC	Polychlorinated biphenyls in coastal sediments
HS-2	Organics	NRC	Polychlorinated biphenyls in coastal sediments
HS-3	Organics	NRC	Polycyclic aromatic hydrocarbons in marine sediments
HS-4	Organics	NRC	Polycyclic aromatic hydrocarbons in marine sediments
HS-5	Organics	NRC	Polycyclic aromatic hydrocarbons in marine sediments
HS-6	Organics	NRC	Polycyclic aromatic hydrocarbons in marine sediments
IAEA-357	Organics	IAEA	Sediment from coastal "hot spot"
IAEA-367	Isotopes	IAEA	Sediment from the Pacific Ocean
IAEA-368	Isotopes	IAEA	Sediment from the Pacific Ocean
MAG-1	Elements	USGS	Marine sediment
MESS-1	Elements	NRC	Marine sediment
PACS-1	Elements	NRC	Harbour sediment
SD-M-2/TM	Elements	IAEA	Marine sediment
SD-N-2	Isotopes	IAEA	Marine sediment
SES-1	Organics	NRC	Polycyclic aromatic hydrocarbons in estuarine sediment
SRM-1646	Elements	NIST	Estuarine sediment
SRM 1941	Elements Organics	NIST	Organics in marine sediment
TISSUES			
CRM 278	Elements	BCR	Trace elements in mussel tissue
CRM 414	Elements	BCR	Trace elements in plankton
CRM 422	Elements	BCR	Trace elements in cod muscle
DOLT-1	Elements	NRC	Dogfish liver
DORM-1	Elements	NRC	Dogfish muscle
GBW 08571	Elements	NRCCRM	Mussel
IAEA-307	Isotopes	IAEA	Sea plant
IAEA-308	Isotopes	IAEA	Mediterranean seaweeds
IAEA-350	Elements	IAEA	Tuna homogenate
IAEA-351	Organics	IAEA	Tuna homogenate
IAEA-352	Isotopes	IAEA	Tuna homogenate

Table 1. (cont.)

TISSUES (cont.)			
LUTS-1	Elements	NRC	Non-defatted lobster hepatopancreas
MA-A-1/OC	Organics	IAEA	Copepod homogenate
MA-A-1/TM	Elements	IAEA	Copepod homogenate
MA-A-3/OC	Elements	IAEA	Shrimp homogenate
MA-B-3/OC	Organics	IAEA	Fish
MA-B-3/RN	Isotopes	IAEA	Fish
MA-B-3/TM	Elements	IAEA	Fish
MUS-1	Organics	NRC	Domoic acid
NIES 9	Elements	NIES	Sargasso seaweed
NIES 11	Elements	NIES	Fish tissue
SRM 1566a	Elements	NIST	Oyster tissue
SRM 1974	Elements Organics	NIST	Organics in mussel tissue (*Mytilus edulis*)
TORT-1	Elements	NRC	Lobster hepatopancreas
WATERS			
10L series	Other	OSI	Standard seawater for conductivity measurements
30L series	Other	OSI	Standard seawater for conductivity measurements
38L series	Other	OSI	Standard seawater for conductivity measurements
CASS-2	Elements	NRC	Nearshore seawater
CRM 403	Elements	BCR	Trace elements in seawater
CSK-NO2	Other	SAGAMI	Nitrite
CSK-NO3	Other	SAGAMI	Nitrate
CSK-PO4	Other	SAGAMI	Phosphate
CSK-SiO4	Other	SAGAMI	Silicate
GPS	Other	OSI	Standard seawater for conductivity measurements
IAEA-298	Isotopes	IAEA	Pacific Ocean water
NASS-4	Elements	NRC	Open ocean seawater
P series	Other	OSI	Standard seawater for conductivity measurements
SLEW-1	Elements	NRC	Estuarine water
V-SMOW	Isotopes	IAEA	Ocean water

Community Bureau of Reference
Commission of the European Communities
Directorate General for Science
Research and Development
200 rue de la Loi
B-1049 Brussels
BELGIUM

An objective of the Community Bureau of Reference (BCR), a department of the Commission of the European Communities, is the general improvement of the quality of measurements and of the consistency of the results of these measurements throughout the Community (Community Bureau of Reference, 1985). The certified values of BCR reference materials are based on the results of measurements by expert laboratories of the member countries using different methods. The certified value is the mean of all the acceptable results. BCR also produces various types of reference materials, including ores, fertilizers, and soils. The series of polynuclear aromatic hydrocarbons, sewage sludges, and particle size reference materials are described in this catalog.

International Atomic Energy Agency
Analytical Quality Control Service
Laboratory Seibersdorf
P.O. Box 100
A-1400 Vienna, AUSTRIA

The International Atomic Energy Agency (IAEA) has established the Analytical Quality Control Service Program to enable laboratories engaged in the analysis of nuclear materials, radionuclides, and trace elements to check the quality of their work and maintain high standards of analytical performance. Elemental, organic, and radioisotope concentrations are available for IAEA reference materials. Values are based on data acquired during intercalibration exercises by various laboratories. These exercises are accessible to all laboratories and are free of charge. For more information about the exercises, contact Dr. L. Mee at IAEA, Monaco [Δ].

Instituto de Pesquisas Tecnológicas
Agrupamento de Materials de Referência
Cidade Universitária Armando de Salles Oliveira
05508 São Paulo - SP- BRAZIL

The Instituto de Pesquisas Tecnológicas (IPT) is a non-profit corporation established in 1899 and owned by the São Paulo State Government. IPT areas of expertise include engineering, ship and ocean research, applied geology, and chemistry. The Agrupamento de Materials de Referência (Reference Materials Group) makes available many certified reference materials, including ores, steels, refractories and minerals analyzed for major and trace elements. Of these, the clay and limestone reference materials are included in this catalog. All analyses are performed by IPT scientists.

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Teddington, Middlesex TW 11 OLY
UNITED KINGDOM

The Office of Reference Materials of the Laboratory of the Government Chemist (LGC) markets a variety of reference materials produced by LGC and other producers, and operates REMAS (Reference Materials Advisory Service). LGC makes available pesticide samples of certified purity for use in the analysis of technical grade pesticides and formulations, and residue analysis. In recent years, work at LGC on the production of CRMs has expanded to cover calibration standards and matrix reference materials including development of pure pesticides, metal decanoates certified for metal content, environmental radiochemical materials, and others. REMAS is an LGC service providing information on specifications, applications, and availability of LGC reference materials as well as those produced in Europe and America. As part of this service, LGC makes use of the COMAR reference materials database developed by the Laboratoire National d'Essais in Paris. COMAR contains information on more than 7,000 reference materials.

[Δ] IAEA, International Laboratory of Marine Radioactivity, 2 Av. Prince Hereditaire Albert, MC 98000, Monaco.

National Institute for Environmental Studies
Yatabe-machi
Tsukuba, Ibaraki, 305
JAPAN

The National Institute for Environmental Studies (NIES) of Japan has produced a variety of reference materials certified for elemental composition over the past several years (Okamoto and Fuwa, 1985). Certification of reference materials is based on collaborative studies performed by 20-30 qualified participating laboratories. The resulting analytical data are subjected to statistical treatment, and certified values are provided for elements determined by at least three independent analytical techniques.

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

NIST has distributed reference materials for the last 80 years and now provides 50 broad categories of materials ranging from engineering mechanics to cement. The reference materials produced by NIST have certified values determined by at least two independent analytical methods or by one definitive method. NIST also offers a variety of calibration services for such devices as thermometers.

National Research Center for Certified Reference Materials
No. 7, District 11
Heping Street, Chaoyangqu
Beijing 100013
CHINA

The production of CRMs by the National Research Center for Certified Reference Materials is under the supervision of the State Bureau of Technical Supervision of China. The CRMs are prepared by professional research institutes or factories.

National Research Council of Canada
Marine Analytical Chemistry Standards Program
Division of Chemistry
Montreal Road
Ottawa, Ontario K1A OR9
CANADA

National Research Council of Canada
Marine Analytical Chemistry Standards Program
Atlantic Research Laboratory
1411 Oxford Street
Halifax, Nova Scotia B3H 3Z1
CANADA

An important aspect of the National Research Council of Canada's (NRC) Marine Analytical Chemistry Standards Program (MACSP) is the development, production, and distribution of reference materials to support the analysis of marine materials. NRC certified reference materials (CRMs), like the NIST SRMs, have certified values determined by at least two

independent analytical methods. All analyses are performed by NRC scientists. NRC currently offers the only natural water reference materials with certified trace metal content. The four available materials cover river (SLRS-1), estuarine (SLEW-1), coastal (CASS-2) and open ocean (NASS-4) conditions.

National Water Research Institute
Canada Centre for Inland Waters
867 Lakeshore Road, P. O. Box 5050
Burlington, Ontario L7R 4A6
CANADA

One of the functions of the National Water Research Institute (NWRI) is to develop and improve analytical chemistry methods and to design and conduct quality assurance programs. As part of the QA program, NWRI has developed and prepared a series of reference materials (RMs) for water analyses, and CRMs for sediment analyses. They include lake sediment CRMs for PAHs, chlorobenzenes, PCBs and Se. These RMs and CRMs were developed to serve various Canadian national, as well as international, laboratory performance assessments.

Ocean Scientific International Ltd.
Brook Road
Wormley, Godalming
Surrey GU8 5UB
UNITED KINGDOM

The International Association for Physical Sciences of the Ocean (IAPSO) has authorized the Ocean Scientific International Ltd. (OSI) to assume responsibility for the production of the Standard Seawater Service formerly provided by the Institute of Oceanographic Sciences (IOS) at Wormley. Ocean Scientific International Ltd. is on the site of IOS and continues to employ former IOS Standard Seawater Service staff. The calibrated standards produced by this organization are used worldwide for calibration of salinity determination instrumentation. The production of standard seawater operated from Copenhagen until 1975 when this service was assumed by the ISO at the request of IAPSO.

Sagami Chemical Research Center
Nishi-Ohnuma 4-4-1
Sagamihara-shi 229
JAPAN

The Sagami Chemical Research Center of Japan prepared standard solutions of nutrient elements in both saline and fresh water and potassium iodate solutions for dissolved oxygen analysis for use in the Cooperative Study of the Kuroshio and Adjacent Regions Program (CSK) and other international oceanographic programs. These reference materials are available through Wako Chemicals worldwide.◊ A range of nutrient concentrations is available.

◊ Wako Chemicals USA, 1600 Bellwood Rd., Richmond, VA 23237, USA; Wako Chemicals GmbH, Nissanstr. 2, 4040 Neuss 1, Germany; Wako Pure Chemical Industries Ltd., 1-2, Doshomachi 3-Chome, Chuo-Ku, Osaka, Japan.

South Africa Bureau of Standards
Private Bag X191
Pretoria, Transvaal 0001
Republic of South Africa

The South African certified reference materials are produced and issued under the guidance and control of the South African Committee for Certified Reference Materials. This committee was appointed in 1974 by the Council of the South African Bureau of Standards, which is the statutory standards organization in South Africa. The South African Bureau of Standards (SABS) is internationally recognized and is also a member of ISO/REMCO, a committee of the International Organization for Standardization, Geneva, dealing with reference materials. The committee concentrates on the preparation of certified reference materials specific to minerals, ores, and intermediate and final products that are produced by and exported from South Africa and for which no equivalent internationally recognized certified reference materials are available. A complete and comprehensive report, which is obtainable on request, is issued for each certified reference material describing the method of preparation, packaging, analysis, and statistical evaluation of observed analytical results. These reports are available from the Council for Mineral Technology, Private Bag X3015, Randburg, 2125, Republic of South Africa.

US Environmental Protection Agency
Quality Assurance Branch
EMSL-Cincinnati
Cincinnati, OH 45268
USA

Since valid analytical data are dependent upon appropriate use of high quality standards and quality control samples, the U.S. Environmental Protection Agency (EPA) developed a formal quality assurance program for these materials beginning in 1972 to support the Agency's research, monitoring and regulatory activities. This program distributed reference materials for free to the regulating and regulated communities through 1990.

However, in the face of expanding QA needs and limited resources, EPA could no longer distribute reference materials for free. Rather, the Agency signed Cooperative Research and Development Agreements (CRADAs) with commercial firms for the production and wholesale of "EPA Certified" reference materials. The cooperators and the EPA work jointly on research to develop new products which are of interest to the Agency. EPA performs confirmatory analyses, reviews data from the producer and referee laboratory, and must approve each batch prior to sale.

Five CRADAs are in place for: organic quality control samples; calibration standards as organic solutions; calibration standards as organic neats; inorganic quality control samples; and, solid matrix samples. The CRADA cooperators function as wholesalers for the EPA. They are:

Organic Quality Control Samples:

Supelco, Inc.
Supelco Park
Bellefonte, PA 16823-0048, USA

Calibration Standards - Organic Solutions (formally The Toxic and Hazardous Materials Repository):

NSI Environmental Solutions
P. O. Box 12313, 2 Triangle Drive
Research Triangle Park, NC 27709, USA

Calibration Standards - Organic Neats (formally The Pesticide Repository):

ULTRA Scientific
250 Smith Street
North Kingston, RI 02852, USA

Inorganic Quality Control Samples:

SPEX Industries, Inc.
3880 Park Avenue
Edison, NJ 08820, USA

Solid Matrix Quality Control Samples:

Fisher Scientific
711 Forbes Avenue
Pittsburgh, PA 15219

When ordering QC samples or standards from the retailers, please specify "EPA Certified Materials."

US Geological Survey
Branch of Geochemistry
12201 Sunrise Valley Drive
Reston, VA 22092
USA

The US Geological Survey (USGS) has prepared a series of reference materials of geologic origin for inorganic analyses. These materials are composed of powdered rocks collected from various locations in the USA. Detailed mineralogical descriptions are available for these materials. No certified values are available for the USGS standard rocks as in the case of NIST or NRC materials. "Accepted values" for these rocks are based on the results of various analysts and have been compiled in several publications.

2.2. Types

The reference materials are listed in this catalog by type: ashes (including air particulate materials), gases, instrument performance materials (including calibration standards and single element/compound solutions), oils, physical properties (including color and size reference materials), rocks, sediments, sludges, soils, tissues, and waters (natural and simulated). All of the materials described in the catalog are listed in the index. Many other RMs, including a wide variety of alloys, ores, and minerals, are available from the producers described in this catalog. These may be useful to the marine scientist in specialized studies. Please contact the producing organizations for complete listings.

Source, description and preparation, analytes and values, cost, references, and comments are given for each reference material. Elements are listed in order of atomic number. Organic compounds are listed in alphabetical order. Confidence intervals listed are generally at the 95%

Table 2. Distribution of reference materials by source and matrix

Source	Matrix										
	Ashes	Gases	Instr. perf.	Oils	Phys. prop.	Rocks	Sedi-ments	Sludges	Soils	Tissues	Waters
BAS	-	-	-	-	-	3	-	-	-	-	-
BCR	2	-	81	2	17	-	3	3	1	3	1
CANMET	-	-	-	-	-	3	8	-	3	-	-
EPA	3	-	974	6	-	-	-	1	2	1	-
IAEA	-	-	-	-	-	-	11	-	4	11	3
IPT	-	-	-	-	-	8	-	-	-	-	-
LGC	-	-	111	-	8	-	-	-	-	-	-
NIES	1	-	-	-	-	-	1	-	-	2	-
NIST	8	105	190	7	20	12	7	-	5	6	1
NRC	-	-	3	-	-	-	12	-	-	5	5
NRCCRM	2	37	52	-	-	7	10	-	18	2	-
NWRI	-	-	-	-	-	-	14	-	-	-	-
OSI	-	-	-	-	-	-	-	-	-	-	5
SABS	-	-	-	-	-	16	3	-	1	-	-
SAGAMI	-	-	1	-	-	-	-	-	-	-	4
USGS	-	-	-	-	-	15	1	-	-	-	-
Total	16	142	1412	15	45	64	70	4	34	30	19

Table 3. Distribution of reference materials by source and analyte

Source	Analytes					
	Elements	Isotopes	Inorganics	Organics	Others	Total
BAS	3	-	-	-	-	3
BCR	20	-	-	76	17	113
CANMET	14	-	-	-	-	14
EPA	12	-	1	973	1	987
IAEA	9	15	-	5	-	29
IPT	8	-	-	-	-	8
LGC	-	-	-	111	8	119
NIES	4	-	-	-	-	4
NIST	122	43	83	60	53	361
NRC	13	-	-	12	-	25
NRCCRM	81	-	22	25	-	128
NWRI	7	-	-	7	-	14
OSI	-	-	-	-	5	5
SABS	20	-	-	-	-	20
SAGAMI	-	-	5	-	-	5
USGS	16	-	-	-	-	16

NOTE: Several RMs are counted twice as more than one type of analyte is reported for each.

Table 4. Distribution of reference materials by matrix and analyte

Source	Analytes					
	Elements	Isotopes	Inorganics	Organics	Others	Total
ASH	14	-	-	2	-	16
GAS	-	-	97	45	-	142
INST	158	39	9	1172	34	1412
OILS	8	-	-	7	-	15
PHYS	-	-	-	-	45	45
ROCK	64	-	-	-	-	64
SED	44	8	-	18	-	70
SLUD	2	-	-	2	-	4
SOIL	29	4	-	1	-	34
TISS	19	4	-	7	-	30
WAT	6	3	5	-	5	19
TOTAL	343	58	113	1257	84	1851

NOTE: Several RMs are counted twice as more than one type of analyte is reported for each.

significance level and are obtained from the producers' literature. The distribution by type, analyte, and producer of the reference materials described in this catalog are listed in Tables 2, 3, and 4. Registry numbers and alternate names of elements and organic compounds in the catalog are listed in Appendix I and II, and selected structures are shown in Appendix III. Indices are available to facilitate search matrix and analyte combinations.

Reference material users should use the analyte values listed by the producing organizations. These organizations can, at times, change accepted values or issue new ones as appropriate. The values listed in this catalog are to be used only as a reference.

2.3. Use

Until recently, only a few reference materials of marine origin existed, and their use by the marine science community was limited. The use of reference materials is part of good quality assurance practices that include evaluation of instrument performance independent of the methodology used. An excellent discussion of various aspects of quality assurance and of the use of reference materials can be found in Taylor (1985).

When using reference materials, it is important to follow certain guidelines:

- The matrix of the reference material should be as similar as possible to that of the samples. If such reference materials are not available, the user should be aware of possible matrix effects.

- Reference materials should not be used as primary standards. Rather, they should be analyzed as part of the sample set.

- The results of analyses should not be corrected based on recovery results from reference materials. Rather, the results of both samples and reference materials should be reported as part of the data set along with any corrections based on percent recoveries. Such reference material results are invaluable when comparing data sets generated using different analytical methods as they provide a common reference point.

- Sample homogeneity as described by the reference material producer should be taken into account in determining minimum sample size of the reference material.

- Reference materials should be used on a regular basis so changes in the analytical procedure over time can be noted and documented.

- There is a lack of reference materials with low and high concentrations of any given analyte in a matrix. Methodology, therefore, can only be tested at one concentration level, and possible problems at low or high concentrations cannot be documented.

- The concentrations of analytes in a reference material are not necessarily representative of the concentrations of those analytes as they existed at the time of collection. Rather, the analyte levels in the reference materials are representative of the final concentrations after any changes in the original concentrations due to sample processing (e.g., contamination during handling).

- The elemental concentrations listed for the USGS rock standards are based on the analyses of various laboratories over a period of years. The quality of the data varies and the user of such "best" or "consensus" values should be aware of the methodology used in their determination, and, most importantly, the number of individual analytical results used.

3. Sources of non-certified materials

The US National Cancer Institute maintains a repository of reference-grade radio-labelled and unlabeled compounds for cancer research. The repository is operated under contract by the Midwest Research Institute[◊] and the Chemsyn Science Laboratories.[Δ] The repository includes more than 800 chemicals including benzo[a]pyrenes, benz[a]anthracenes, benzofluoran-thenes, benzo[e]pyrenes, chrysenes, heterocyclic PAHs, nitrosamines and other nitroso compounds, aromatic amines, aromatic amine metabolites, aflatoxins, dioxins, pesticides, herbicides, fungicides, pharmaceuticals, chlorinated hydrocarbons, dyes, organometallics, selected inorganic compounds and others. Due to chemical decomposition and radioactive decay, the chemicals are periodically purified or resynthesized. Therefore, the purity of the chemicals may change by the time of shipment. These are not CRMs or SRMs. Unlabeled compounds may be ordered from the Midwest Research Institute, and radiolabeled ones from Chemsyn Science Laboratories.

◊ NCI Chemical Carcinogen Radio Repository, c/o Midwest Research Institute, 425 Volker Blvd., Kansas City, MO 64110, USA.

Δ NCI Chemical Carconigen Radio Repository, c/o Chemsyn Science Laboratories, 13605 W. 96 Terr., Lenexa, KS 66219, USA.

4. Literature on Quality Assurance and Reference Materials

4.1. NIST[Δ]

The NIST Special Publication 829 describes the use of NIST standard reference materials for decisions on performance of analytical chemical methods and laboratories (Becker *et al.*, 1992). The general principles of SRM use are described in NBS Special Publication 260-100 (Taylor, 1985).

4.2. ISO/REMCO[◊]

REMCO is the International Organization for Standardization (ISO) Council Committee on reference materials. The aim of this organization is to carry out and encourage a broad international effort for harmonization and promotion of CRMs and their applications. REMCO has published five guides related to CRMs and quality assurance: ISO Guide 6 (ISO, 1978) discusses information necessary to describe reference materials in standards; ISO Guide 30 (ISO, 1981) lists terms and definitions used in connection with reference materials; ISO Guide 31 (ISO, 1981) recommends content of certificates of reference materials; ISO Guide 33 (ISO, 1989) discusses the use of CRMs; and ISO Guide 35 (ISO, 1989) discusses the certification process including general and statistical principles. Other ISO/REMCO publications of interest are ISO/REMCO 240 on linear calibration using reference materials (ISO, 1992), the proceedings of the symposium on Harmonization of Quality Assurance Systems in Chemical Analysis (ISO/REMCO, 1991) and others.

4.3. UNEP[*]

UNEP makes available a variety of publications on various aspects of quality assurance in environmental analyses (UNEP/IOC/IAEA, in prep., a and b) including reference methods descriptions (UNEP/IOC/IAEA, 1988; UNEP/IOC/FAO/IMO/IAEA, in prep.), chemical contaminant monitoring guidelines (UNEP/IOC/IAEA/FAO, 1989; UNEP/FAO/IOC/ IAEA, 1990), sampling protocols (UNEP/FAO/IAEA, 1984; UNEP/FAO/IOC/IAEA, 1984), and data analyses and interpretation (UNEP/IOC/IAEA, 1990; UNEP/IOC/FAO/IMO/IAEA, in prep.). These publications are available in English, French, or Spanish.

5. Acknowledgements

We wish to thank the organizations that provided the necessary information in the compilation of this catalog. We would especially like to acknowledge the assistance of M. Ambe of Sagami, S. Berman and D. LeBlanc of NRC, B. Brock of Wako Chemicals USA, T. Gills, J. Kane, S. Rasberry, and W. Reed of NIST, B. Griepink of BCR, M. Horvat and L. Mee of IAEA, A. Jones of LGC, M. Leaver of CANMET, R. P. Meeres of BAS, M. Morita of NIES, S. Moro and N. D. S. Pereira of IPT, P. Ridout of OSI, Y. Stokker of NWRI, A. J. Viljoen of SABS, R. Wesselman and J. Winter of USEPA, S. Wilson of USGS, H. Yongzhi of NRCCRM, and P. Rona and J. Calder of NOAA.

This document is dedicated to the memory of Dr. John Taylor, of NIST, who taught many scientists the importance of quality assurance and good laboratory practices.

[Δ] National Institute of Standards and Technology, Gaithersburg, MD 20899, USA.

[◊] ISO Central Secretariat, Case Postale 56, CH-1211 Genève 20, Switzerland.

[*] UNEP Regional Seas, Programme Activity Centre for Oceans and Coastal Areas, PO Box 30552, Nairobi, Kenya.

6. References

Becker, D., R. Christensen, L. Currie, B. Diamondstone, K. Eberhardt, T. Gills, H. Hertz, G. Klouda, J. Moody, R. Parris, R. Schaffer, E. Steel, J. Taylor, R. Watters, and R. Zeisler (1992) Use of NIST standard reference materials for decisions on performance of analytical chemical methods and laboratories. NIST Spec. Pub. 829, 27 pp.

Intergovernmental Oceanographic Commission (1985) Second session of the GEMSI Ad Hoc group on standard reference materials. Summary report. Washington, D.C., 28-30 October, 1985.

International Organization for Standardization (1978) Mention of reference materials in international standards. ISO/REMCO Guide 6. ISO Central Secretariat, 1 rue de Varembé, Case Postale 56, Ch-1211, Genève, Switzerland

International Organization for Standardization (1981) Terms and definitions used in connection with reference materials (Termes et définitions utilisés en rapport avec les matériaux de référence). ISO/REMCO Guide 30. ISO Central Secretariat, 1 rue de Varembé, Case Postale 56, Ch-1211, Genève, Switzerland. 5 pp.

International Organization for Standardization (1981) Contents of certificates of reference materials. ISO/REMCO Guide 31. ISO Central Secretariat, 1 rue de Varembé, Case Postale 56, Ch-1211, Genève, Switzerland. 8 pp.

International Organization for Standardization (1989) Uses of certified reference materials. ISO/REMCO Guide 33. ISO Central Secretariat, 1 rue de Varembé, Case Postale 56, Ch-1211, Genève, Switzerland. 12 pp.

International Organization for Standardization (1989) Certification of reference materials - general and statistical principles. ISO/REMCO Guide 35. ISO Central Secretariat, 1 rue de Varembé, Case Postale 56, Ch-1211, Genève, Switzerland. 32 pp.

International Organization for Standardization (1991) Harmonization of quality assurance systems in chemical analysis. Proc., 4th Symp., Geneva, May 2-3, 1991. ISO/REMCO 240. ISO Central Secretariat, 1 rue de Varembé, Case Postale 56, Ch-1211, Genève, Switzerland.

International Organization for Standardization (1992) Linear calibration using reference materials. ISO/REMCO 240. ISO Central Secretariat, 1 rue de Varembé, Case Postale 56, Ch-1211, Genève, Switzerland. 31 pp.

Okamoto, K., and K. Fuwa (1985) Certified reference materials program at the National Institute for Environmental Studies. Anal. Sciences, 1:206-7.

Simmons, J. D. (ed.) (1989) Calibration services user's guide. NIST Special Publication 250, 186 pp. National Institute of Standards and Technology, Gaithersburg, MD, USA.

Taylor, J.K. (1985) Handbook for SRM users. NBS Special Publication 260-100, 85 pp. National Bureau of Standards, Gaithersburg, MD, USA.

UNEP/FAO/IAEA (1984) Sampling of selected marine organisms and sample preparation for analysis of chlorinated hydrocarbons. UNEP no. 12 (English). UNEP, Programme Activity Centre

for Oceans and Coastal Areas, PO Box 30552, Nairobi, Kenya. (Spanish version published in 1987.)

UNEP/FAO/IOC/IAEA (1984) Sampling selected marine organisms and sample preparation for trace metal analysis. UNEP no. 7 (English). UNEP, Programme Activity Centre for Oceans and Coastal Areas, PO Box 30552, Nairobi, Kenya. (Spanish version published in 1988.)

UNEP/IOC/IAEA (1988) Standard chemical methods for marine environmental monitoring. UNEP no. 50 (English). UNEP, Programme Activity Centre for Oceans and Coastal Areas, PO Box 30552, Nairobi, Kenya.

UNEP/IOC/IAEA/FAO (1989) Contaminant monitoring programmes using marine organisms: quality assurance and good laboratory practice. UNEP no. 57 (English). UNEP, Programme Activity Centre for Oceans and Coastal Areas, PO Box 30552, Nairobi, Kenya.

UNEP/FAO/IOC/IAEA (1990) Guidelines for monitoring chemical contaminants in marine organisms. UNEP no. 6 (English). UNEP, Programme Activity Centre for Oceans and Coastal Areas, PO Box 30552, Nairobi, Kenya.

UNEP/IOC/IAEA (in prep., a) Reagent and laboratory ware clean-up procedures for low-level contaminant monitoring. UNEP no. "QB." UNEP, Programme Activity Centre for Oceans and Coastal Areas, PO Box 30552, Nairobi, Kenya.

UNEP/IOC/IAEA (in prep., b) Quality assurance and good laboratory practice for the measurement of contaminants in marine sediments. UNEP no. "QB." UNEP, Programme Activity Centre for Oceans and Coastal Areas, PO Box 30552, Nairobi, Kenya.

UNEP/IOC/FAO/IMO/IAEA (in prep.) Statistical analysis and interpretation of marine community data. UNEP no. "JA." UNEP, Programme Activity Centre for Oceans and Coastal Areas, PO Box 30552, Nairobi, Kenya.

UNEP/IOC/IAEA (1990) Guidelines for collecting and interpreting data on estuaries. UNEP no. "C" (English). UNEP, Programme Activity Centre for Oceans and Coastal Areas, PO Box 30552, Nairobi, Kenya.

CRM 038

Coal Fly Ash

Source:

Community Bureau of Reference
Commission of the European Communities
Directorate General for Science
Research and Development
200 rue de la Loi
B-1049 Brussels
BELGIUM

Description:

This material consists of fly ash from pulverized coal.

Certified concentrations (µg/g dry weight):

Element	Value	Uncertainty (±)	Element	Value	Uncertainty (±)
Na	3.74	0.15	Zn	581	29
Mn	479	16	As	48.0	2.3
Fe (mg/g)	33.8	0.7	Cd	4.6	0.3
Co	53.8	1.	Hg	2.10	0.15
Cu	176	9	Pb	262	11

Noncertified concentrations (µg/g dry weight unless noted):

Element	Value
V	334
Cr	178
Ni	194
Th	17.3

Order information:

CRM 038 can be purchased for BFR2500 per unit (5 g) respectively. Price includes handling and normal postage and it is subject to change without notice. Please contact BCR at the address shown above.

Reference:

Community Bureau of Reference (BCR) (1992) Reference Materials. Community Bureau of Reference, Commission of the European Communities, Directorate General for Science, Research and Development, 200 rue de la Loi, B-1049 Brussels, Belgium. 75 pp.

CRM 176

City Waste Incineration Ash

Source:

Community Bureau of Reference
Commission of the European Communities
Directorate General for Science
Research and Development
200 rue de la Loi
B-1049 Brussels
BELGIUM

Description:

This material consists of ash from city waste incineration.

Certified concentrations (µg/g dry weight):

Element	Value	Uncertainty (±)	Element	Value	Uncertainty (±)
Cr	863	30	Se	41.2	2.1
Fe	21.3	1.1	Cd	470	9
Co	30.9	1.3	Sb	412	18
Ni	123.5	4.2	Hg	31.4	1.1
Cu	1302	26	Tl	2.85	0.19
Zn	25.77	0.38	Pb	10.87	0.17

Noncertified concentrations (µg/g dry weight unless noted):

Element	Value	Element	Value
Na_2O	58.0	K_2O	54.2
MgO	36.2	CaO	123.1
Al_2O_3	191.9	TiO_2	14.2
SiO_2	300.3	V (µg/g)	43
P_2O_5	12.7	Mn (µg/g)	1.5
S	44.6	As (µg/g)	93.3

Order information:

CRM 176 can be purchased for BFR4000 per unit (30 g). Price includes handling and normal postage and it is subject to change without notice. Please contact BCR at the address shown above.

Reference:

Community Bureau of Reference (BCR) (1992) Reference Materials. Community Bureau of Reference, Commission of the European Communities, Directorate General for Science, Research and Development, 200 rue de la Loi, B-1049 Brussels, Belgium. 75 pp.

EPA SRS001-100

EPA CRADA Fly Ash

Source:

US Environmental Protection Agency
Quality Assurance Research Division
EMSL-Cincinnati
Cincinnati, OH 45268-1525
USA

Available from:

Fisher Scientific
711 Forbes Avenue
Pittsburgh, PA 15219

Description:

This CRADA reference material is designed, produced and verified for purity, homogeneity and stability under a cooperative research and development agreement between Fisher Scientific and the US EPA.

Certified concentrations (µg/g dry weight):

Element	Value
Cr	30
Ni	20
Cu	40
Ba	400

Order information:

This CRM can be purchased from US$175 per unit (100 g). They are available from the wholesale distributor, Fisher Scientific, 711 Forbes Ave., Pittsburgh, PA 15219, USA, as well as from other distributors worldwide. Price subject to change without notice.

Reference:

Fisher Scientific (1992) Solid waste reference sample, SRS001-100, fly ash. Information sheet. Fisher Scientific, 711 Forbes Ave., Pittsburgh, PA 15219, USA

EPA SRS019-50 and SRS203-225

EPA CRADA Municipal Incinerator Ashes

Source:

US Environmental Protection Agency
Quality Assurance Research Division
EMSL-Cincinnati
Cincinnati, OH 45268-1525
USA

Available from:

Fisher Scientific
711 Forbes Avenue
Pittsburgh, PA 15219

Description:

These CRADA reference materials are designed, produced and verified for purity, homogeneity and stability under a cooperative research and development agreement between Fisher Scientific and the US EPA.

Certified concentrations (µg/g dry weight):

SRS019-50 Element	Value	Element	Value	SRS203-225 Element	Value
Mg	6500	As	70	Cr	5
V	30	Se	5	As	5
Cr	50	Ag	8	Se	1
Ni	20	Cd	450	Ag	5
Cu	250	Ba	300	Cd	1
Zn	20000	Pb	4600	Ba	100
				Hg	0.2
				Pb	5

Order information:

SRS019-50 can be purchased for US$140 per unit (50 g), and SRS203-225 for US$190 per unit (225 g). They are available from the wholesale distributor, Fisher Scientific, 711 Forbes Ave., Pittsburgh, PA 15219, USA, as well as from other distributors worldwide. Price subject to change without notice.

References:

Fisher Scientific (1992) Solid waste reference sample, SRS019-50, municipal incinerator ash. Information sheet. Fisher Scientific, 711 Forbes Avenue, Pittsburgh, PA 15219, USA.

Fisher Scientific (1992) Solid waste reference sample, SRS203-225, total characteristic leach procedure, municipal incinerator ash. Information sheet. Fisher Scientific, 711 Forbes Avenue, Pittsburgh, PA 15219, USA.

GBW 08401 - 08402

Coal Fly Ashes

Source:

National Research Center for CRMs
Office of CRMs
No. 7 District 11
Hepingjie, Chaoyangqu
Beijing, 100013
CHINA

Description:

No information available.

Certified concentrations for GBW 08401 (μg/g dry weight unless noted):

Element	Value	Element	Value
GBW 08401		As	11.4
		Se	1.13
Be	10.7	Cd	0.16
V	95	Pb	33.8
Cr	60		
Mn	1178		
Fe (%)	7.65	**GBW 08402**	
Co	33.2		
Cu	53	F	114
Zn	61		

Noncertified concentrations for GBW 08401 (μg/g dry):

Element	Value
Ba	1450
Hg	0.039

Order information:

GBW 08401 is available for US$30 per unit (35 g), and GBW 08402 for US$50 per unit (50 g).. Price subject to change without notice. Please contact NRCCRM at the address above.

Reference:

National Research Center for CRMs (1991) Certified reference materials catalog. State Bureau of Technical Supervision, National Research Center for CRMs, Office of CRMs, Hepingjie, Chaoyangqu, Beijing, China. 86 pp.

NIES 8

Vehicle Exhaust Particulates

Source:

National Institute for Environmental Studies
Yatabe-machi
Tsukuba, Ibaraki, 305
JAPAN

Description:

This material was prepared from particulate matter collected from electrostatic precipitators in very large ventilators connected to a highway tunnel. The collected material was mixed by making a paste with 35% ethanol, air dried, oven dried, ground, sieved, and homogenized in a polyethylene container in a ball-mill apparatus. The material contains approximately 80% C.

Certified concentrations (μg/g unless noted):

Element	Value	Uncertainty (±)	Element	Value	Uncertainty (±)
Na (%)	0.192	0.008	Ni	18.5	1.5
Mg (%)	0.101	0.005	Cu	67	3
Al (%)	0.33	0.02	Zn (%)	0.104	0.005
K (%)	0.115	0.008	As	2.6	0.2
Ca (%)	0.53	0.02	Sr	89	3
V	17	2	Cd	1.1	0.1
Cr	25.5	1.5	Sb	6.0	0.4
Co	3.3	0.3	Pb	219	9

Reference concentrations (μg/g unless noted):

Element	Value	Element	Value
P	510	Cs	0.24
Sc	0.55	La	1.2
Se	1.3	Ce	3.1
Br	56	Sm	0.20
Rb	4.6	Eu	0.05
Mo	6.4	Lu	0.02
Ag	0.20	Th	0.35

Order information:

Please contact Dr. M. Morita at the address shown above for information on availability.

References:

National Institute for Environmental Studies (1987) NIES certified reference material "Vehicle Exhaust Particulates." Information sheet. National Institute for Environmental Studies, Yatabe-machi, Tsukuba, Ibaraki, 305, Japan.

Okamoto, K. (1987) A new certified reference material, vehicle exhaust particulates. Analytical Sciences, 3:(191-2)

SRM 1633a

Trace Elements in Coal Fly Ash

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

The fly ash was obtained from a coal fired power plant and is a product of Pennsylvania and West Virginia, USA, coals. The ash was sieved and blended for two hours.

Certified concentrations (μg/g dry weight unless noted):

Element	Value	Uncertainty (±)	Element	Value	Uncertainty (±)
Na (%)	0.17	0.01	Zn	220	10
Mg(%)	0.455	0.010	As	145	15
Al(%)	14.3	1.0	Se	10.3	0.6
Si(%)	22.8	0.8	Rb	131	2
K(%)	1.88	0.06	Sr	830	30
Ca(%)	1.11	0.01	Cd	1.00	0.15
V	297	6	Sb	6.8	0.4
Cr	196	6	Hg	0.16	0.01
Mn	179	8	Tl	5.7	0.2
Fe(%)	9.4	0.1	Pb	72.4	0.4
Ni	127	4	Th	24.7	0.3
Cu	118	3	U	10.2	0.1

Noncertified concentrations (μg/g dry weight unless noted):

Element	Value	Element	Value	Element	Value
Be	12	Co	46	Ba	0.15
S(%)	0.18	Ga	58	Ce	180
Ti(%)	0.8	Mo	29	Eu	4
Sc	40	Cs	11	Hf	8

Order information:

SRM 1633a can be purchased for US$179 per unit (75-g bottle). Price subject to change without notice. Please contact NIST at the address shown above.

Reference:

National Institute of Standards and Technology (1985) SRM 1633a. Trace elements in coal fly ash. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

SRM 1648

Urban Particulate Matter

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

This material was prepared from urban particulate matter collected in the St. Louis, Missouri, USA, area using filter bags. The collected particulate matter was sieved, blended and bottled. The material was collected over a period of 12 months and is, therefore, time integrated.

Certified concentrations (μg/g dry weight unless noted):

Element	Value	Uncertainty (±)	Element	Value	Uncertainty (±)
Na (%)	0.425	0.002	Cu	609	27
Al (%)	3.42	0.11	Zn (%)	0.479	0.014
K (%)	1.05	0.01	As	115	10
V	140	3	Se	27	1
Cr	403	12	Cd	75	7
Fe (%)	3.91	0.10	Pb (%)	0.655	0.008
Ni	82	3	U	5.5	0.1

Noncertified concentrations (μg/g dry weight unless noted):

Element	Value	Element	Value
Mg (%)	0.8	Sb	45
S (%)	5.0	Cs	3
Cl (%)	0.45	Ba	737
Sc	7	La	42
Ti (%)	0.40	Ce	55
Mn	860	Sm	4.4
Co	18	Eu	0.8
Br	500	Hf	4.4
Rb	52	W	4.8
Ag	6	Th	7.4
In	1.0		

Order information:

SRM 1648 can be purchased for US$183 per unit (2-g vials). Price subject to change without notice. Please contact NIST at the address shown above.

SRM 1648 (cont.)

Reference:

National Institute of Standards and Technology (1982) SRM 1648. Urban particulate matter. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

SRM 1649

Urban Dust/Organics

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

This material was prepared from urban particulate matter collected in the St. Louis, Missouri, USA, area using filter bags. The collected particulate matter was sieved, blended and bottled. The material was collected over a period of 12 months and is, therefore, time integrated. Fluorescent conditions for liquid chromatography determination of selected PAHs in this SRM and reference values for mutagenic activity are listed in the Certificate of Analysis.

Certified concentrations (μg/g):

Compound	Value	Uncertainty (±)
Benz[a]anthracene	2.6	0.3
Benzo[a]pyrene	2.9	0.5
Benzo[ghi]perylene	4.5	1.1
Indeno[1,2,3-cd]perylene	3.3	0.5
Fluoranthene	7.1	0.5

Noncertified concentrations (μg/g unless noted):

Element	Value	Uncertainty (±)	Element	Value	Uncertainty (±)
S (%)	3.27	0.08	Cd	18	3
Cl (%)	0.282	0.014	Sn	56	26
Sc	8.73	0.08	Sb	29.9	0.7
Cr	211	3	Cs	2.85	0.10
Co	16.4	0.3	Ba	569	35
Fe (%)	3.00	0.02	La	33.3	0.3
Zn (%)	0.167	0.003	Ce	51.6	1.1
As	67.0	1.4	Sm	4.71	0.05
Se	25.6	0.5	Eu	0.87	0.04
Br (%)	0.119	0.001	Hf	4.41	0.10
Pb	47	5	W	3.8	0.9
Mo	14	3	Th	6.63	0.14
Ag	3.5	0.3	U	2.65	0.16

SRM 1649 (cont.)

Compound	Value	Uncertainty (±)
Leacheable anions	**Value**	**Uncertainty (±)**
Sulfate	9.40	0.22
Nitrate	0.68	0.04
Phosphate	0.32	0.03
Chloride	0.086	0.004
Organic compounds		
Benzo[e]pyrene	3.3	0.2
Benzo[b]fluoranthene	6.2	0.3
Benzo[k]fluoranthene	2.1	0.1
Chrysene	3.7	0.2
Dibenz[a,h]anthracene	0.41	0.07
Perylene	0.65	0.02
Phenanthrene	4.5	0.3
Pyrene	6.2	0.2
Triphenylene	1.7	0.1

Order information:

SRM 1649 can be purchased for US$239 per unit (10 g). Price subject to change without notice. Please contact NIST at the address shown above.

Reference:

National Institute of Standards and Technology (1992) SRM 1649. Urban dust/organics. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

SRM 1650

Diesel Particulate Matter

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

This material was collected from the heat exchangers of a dilution tube facility following 200 engine hours of particle accumulation. More than one four-cycle diesel engine, operating under a variety of conditions, was used to generate the particulate material. reference values for mutagenic activity are listed in the Certificate of Analysis.

Certified concentrations (μg/g):

Compound	Value	Uncertainty (±)
1-Nitropyrene	19	2
Benz[a]anthracene	6.5	1.1
Benzo[a]pyrene	1.2	0.3
Benzo[ghi]perylene	2.4	0.6
Fluoranthene	51	4
Pyrene	48	4

Noncertified concentrations (μg/g):

Compound	Value	Compound	Value
2-Nitrofluorene	0.2	Benzo[e]pyrene	9.6
6-Nitrobenzo[a]pyrene	1.6	Chrysene	22
7-Nitrobenz[a]anthracene	2.8	Indeno[1,2,3-cd]pyrene	2.3
9-Fluorenone	33	Perylene	0.13
Benzo[k]fluoranthene	2.1	Phenanthrene	71

Order information:

SRM 1650 can be purchased for US$383 per unit (5 vials). Price subject to change without notice. Please contact NIST at the address shown above.

Reference:

National Institute of Standards and Technology (1991) SRM 1650. Diesel particulate matter. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

SRM 2689 - 2691

Coal Fly Ashes

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

Fly ashes were obtained from three different coal-fired power plants and are products of Kentucky, Colorado and Wyoming, USA, coals. Coarse particles found in the ash, mostly quartz and partially burned fragments, were ground to pass through a No. 100 (150 µm) sieve and blended back into the rest of the ash. The material was then homogenized in a ribbon blender and hermetically sealed in glass vials under controlled temperature and humidity conditions. These SRMs are intended for use in the evaluation of analytical methods and techniques used in the classification of coal fly ash and for the determination of constituent elements in coal fly ash and/or materials of similar matrix.

SRM					
2689		2690		2691	

Certified concentrations (weight percent):

Element	Value	Uncertainty (±)	Value	Uncertainty (±)	Value	Uncertainty (±)
Na	0.25	0.03	0.24	0.02	1.09	0.05
Mg	0.61	0.05	1.53	0.05	3.12	0.08
Al	12.94	0.21	12.35	0.28	9.81	0.39
Si	24.06	0.08	25.85	0.17	16.83	0.12
P	0.10	0.01	0.52	0.01	0.51	0.02
S	-	-	0.15	0.01	0.83	0.05
K	2.20	0.03	1.04	0.04	0.34	0.01
Ca	2.18	0.06	5.71	0.13	18.45	0.32
Ti	0.75	0.01	0.52	0.01	0.90	0.02
Fe	9.32	0.06	3.57	0.06	4.42	0.03

Noncertified concentrations (weight percent):

Element	Value	Value	Value
Mn	0.03	0.03	0.02
Sr	0.07	0.20	0.27
Ba	0.08	0.65	0.66

Source and description of raw materials:

Coal type	Bituminous	Sub-bituminous	Sub-bituminous
Mine	Western Kentucky	Craig, Colorado	Gillette, Wyoming
Btu/lb	12,000	9,700	8,800
Ash (wt. %)	12	5.3	4.8
S (wt. %)	1.5	0.3	0.3

Order information:

Each of these SRMs can be purchased for US$151 per unit (3 10-g vials). Price subject to change without notice. Please contact NIST at the address shown above.

Reference:

National Institute of Standards and Technology (1986) SRM 2689, 2690, and 2691. Coal fly ashes. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

GBW 08101 through 08132

Gases in Nitrogen

Source:

National Research Center for CRMs
Office of CRMs
No. 7 District 11
Hepingjie, Chaoyangqu
Beijing, 100013
CHINA

Description:

No information available.

Nominal concentrations (μmol/mol unless noted):

Methane in nitrogen

GBW 08101	10
GBW 08102	50
GBW 08103	100
GBW 08104	500
GBW 08105	1000

Carbon monoxide in nitrogen

GBW 08106	10
GBW 08107	50
GBW 08108	100
GBW 08109	500
GBW 08110	1000

Carbon dioxide in nitrogen

GBW 08111	10
GBW 08112	50
GBW 08113	100
GBW 08114	500
GBW 08115	1000

Nitrogen monoxide in nitrogen

GBW 08116	50 - 200

Oxygen in nitrogen

GBW 08117	21 mole percent

Carbon dioxide in nitrogen

GBW 08118	1 mole percent

Hydrogen sulfide in nitrogen

GBW 08122	100 - 300

Sulfur hexafluoride in nitrogen

GBW 08124	5000 ~ 6000

Ethane in air

GBW 08125	1 - 10
GBW 08126	10 - 10000

Ethylene in air

GBW 08127	1 - 10
GBW 08128	10 - 10000

Propane in air

GBW 08129	1 - 10
GBW 08130	10 - 10000

Organic gases in air

GBW 08131	Ethane	1000
	Methane	1000
	Propane	1000
	Ethylene	10
	Isobutane	10
GBW 08132	Ethane	500
	Methane	500
	Propane	10
	Propylene	10

GBW 08101 through 08132 (cont.)

Order information:

These CRMs are available for between US$300 and 1000 per cylinder (4 L except for GBW 08122 which is available in an 8 L cylinder). Price subject to change without notice. Please contact NRCCRM at the address above.

References:

National Research Center for CRMs (1991) Certified reference materials catalog. State Bureau of Technical Supervision, National Research Center for CRMs, Office of CRMs, Hepingjie, Chaoyangqu, Beijing, China. 86 pp.

National Research Center for CRMs (1992) Catalog of certified reference materials (addendum to catalog 1991). State Bureau of Technical Supervision, National Research Center for CRMs, Office of CRMs, Hepingjie, Chaoyangqu, Beijing, China. 11 pp.

GBW 08119 through 08123

Gases in Air or Argon

Source:

National Research Center for CRMs
Office of CRMs
No. 7 District 11
Hepingjie, Chaoyangqu
Beijing, 100013
CHINA

Description:

No information available.

Nominal concentrations (μmol/mol unless noted):

Methane in air
GBW 08119 1 - 100

Carbon monoxide in air
GBW 08120 5 - 50

Methane in argon
GBW 08121 10

Methane in air
GBW 08123 0.5 ~ 3. mole percent

Order information:

These CRMs are available for between US$300 and 350 per cylinder (4 L). Price subject to change without notice. Please contact NRCCRM at the address above.

References:

National Research Center for CRMs (1991) Certified reference materials catalog. State Bureau of Technical Supervision, National Research Center for CRMs, Office of CRMs, Hepingjie, Chaoyangqu, Beijing, China. 86 pp.

National Research Center for CRMs (1992) Catalog of certified reference materials (addendum to catalog 1991). State Bureau of Technical Supervision, National Research Center for CRMs, Office of CRMs, Hepingjie, Chaoyangqu, Beijing, China. 11 pp.

GBW 08201 - 08205

Gas Permeation Tubes

Source:

National Research Center for CRMs
Office of CRMs
No. 7 District 11
Hepingjie, Chaoyangqu
Beijing, 100013
CHINA

Description:

No information available.

Permeation rates (μg/min at 25°C):

CRM	Compound	Value	Cost
GBW 08201	Sulfur dioxide	0.37 - 1.4	300
GBW 08202	Nitrogen dioxide	0.6 -2.0	300
GBW 08203	Hydrogen sulfide	0.1 - 1.0	320
GBW 08204	Ammonia	0.1 -1.0	320
GBW 08205	Chlorine	0.2 - 2	300

Order information:

Prices for each CRM are listed above and are subject to change without notice. Please contact NRCCRM at the address above.

Reference:

National Research Center for CRMs (1992) Catalog of certified reference materials (addendum to catalog 1991). State Bureau of Technical Supervision, National Research Center for CRMs, Office of CRMs, Hepingjie, Chaoyangqu, Beijing, China. 11 pp.

SRM 1625 through 1629a

Gas Permeation Tubes

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

These SRMs are used in the preparation of mixtures of known gaseous content for calibrating air pollution monitoring apparatus. Each permeation tube is individually calibrated and certified permeation rates are reported for temperatures in the range of 20° to 30°C.

SRM	Gas	Approximate permeation rate (μg/min) at 25°C
1625	SO_2	2.8
1626	SO_2	1.4
1627	SO_2	0.56
1629a	NO_2	1.0

Order information:

These SRMs can be purchased for US$238 to 290 per unit respectively. Price subject to change without notice. Please contact NIST at the address shown above.

References:

National Institute of Standards and Technology (1991) SRM 1625. Sulfur dioxide permeation tube. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1991) SRM 1627. Sulfur dioxide permeation tube. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1991) SRM 1626. Sulfur dioxide permeation tube. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1992) SRM 1629a. Nitrogen dioxide permeation device. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

SRM 1658a through 2751

Gases in Air

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

These SRMs are intended primarily for the calibration of instruments used for the determination of gases in mobile source emissions and related uses. They are supplied in aluminum cylinders with deliverable volumes of 0.85 m^3 (30 cubic ft.) at NTP. Each cylinder is individually analyzed and the certified value provided in each Certificate of Analysis.

Certified concentrations of methane and propane (μmole/mole):

Methane in air		
SRM 1658a		1
SRM 1659a		10
Methane and propane in air		
SRM 1660a	Methane	4
	Propane	1
Propane in air		
SRM 1665b		3
SRM 1666b		10
SRM 1667b		50
SRM 1668b		100
SRM 1669b		500

Carbon dioxide and nitrous oxide in air		
SRM 2607	CO_2	340
	N_2O	300
SRM 2608	CO_2	340
	N_2O	300
SRM 2609	CO_2	380
	N_2O	330
SRM 2610	CO_2	380
	N_2O	330

Carbon monoxide in air	
SRM 2612a	10
SRM 2613a	20
SRM 2614a	45
Nitrogen dioxide in air	
SRM 2655	1000
SRM 2656	2500
Methane in air	
SRM 2750	50
SRM 2751	100

Order information:

These SRMs can be purchased for between US$700 and 3000 per cylinder. Price subject to change without notice. Please contact NIST at the address shown above.

References:

National Institute of Standards and Technology (1990) SRM 2750. Methane in air. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1990) SRM 2751. Methane in air. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1992) SRM 1665b. Propane in air. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1992) SRM 1666b. Propane in air. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1992) SRM 1667b. Propane in air. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1992) SRM 1669b. Propane in air. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

Trahey, N. M. (ed.) (1992) NIST Standard Reference Materials Catalog 1992-93. NIST Spec. Pub. 260, 162 pp. National Institute of Standards and Technology, Gaithersburg, MD, USA.

SRM 1661a through 2745

Gases in Nitrogen

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

These SRMs are intended primarily for the calibration of instruments used for the determination of gases in mobile source emissions and related uses. They are supplied in aluminum cylinders with deliverable volumes between 0.85 m^3 (30 cubic ft.) and 3.7 m^3 (130 cubic ft.) at NTP. Each cylinder is individually analyzed and the certified value provided in each Certificate of Analysis.

Nominal concentrations (μmole/mole unless noted):

Sulfur dioxide in nitrogen

SRM 1693a	50
SRM 1694a	100
SRM 1661a	500
SRM 1662a	1000
SRM 1663a	1500
SRM 1664a	2500
SRM 1696	3500

Carbon dioxide in nitrogen

SRM 2632a	300
SRM 2619a	0.5 mole percent
SRM 2620a	1.0 mole percent
SRM 2621a	1.5 mole percent
SRM 2622a	2.0 mole percent
SRM 2623a	2.5 mole percent
SRM 2624a	3.0 mole percent
SRM 2625a	3.5 mole percent
SRM 2626a	4.0 mole percent
SRM 1674b	7.0 mole percent
SRM 1675b	14.0 mole percent
SRM 2745	16 mole percent

Carbon monoxide in nitrogen

SRM 1677c	10
SRM 1678c	50
SRM 1679c	100
SRM 1680b	500
SRM 1681b	1000
SRM 2635a	25
SRM 2636a	250
SRM 2637a	2500
SRM 2638a	5000
SRM 2639a	1 mole percent
SRM 2640a	2 mole percent
SRM 2641a	4 mole percent
SRM 2642a	8 mole percent
SRM 2740	10 mole percent
SRM 2741	13 mole percent

Nitric oxide in nitrogen

SRM 2627a	5
SRM 2628a	10
SRM 2629a	20
SRM 1683b	50
SRM 1684b	100
SRM 1685b	250
SRM 1686b	500
SRM 2735	800
SRM 1687b	1000
SRM 2630	1500
SRM 2736	2000
SRM 2631	3000

SRM 1661a through 2745 (cont.)

Volatile toxic organics in nitrogen (nmole/mole)

SRM 1804	Vinyl chloride	5
	1,3-Butadiene	5
	Bromomethane	5
	Trichlorofluoromethane	5
	Dichloromethane	5
	Chloroform	5
	1,2-Dichloroethane	5
	1,1,1-Trichloroethane	5
	Benzene	5
	Carbon tetrachloride	5
	1,2-Dichloropropane	5
	Trichloroethylene	5
	Toluene	5
	1,2-Dibromoethane	5
	Tetrachloroethylene	5
	Chlorobenzene	5
	Ethylbenzene	5
	o-Xylene	5

Benzene in nitrogen

SRM 1805	0.25
SRM 1806	10

Tetrachloroethylene in nitrogen

SRM 1808	0.25
SRM 1809	10

Aromatic organic gases in nitrogen

SRM 1811	Benzene	0.25
	Toluene	0.25
	Chlorobenzene	0.25
	Bromobenzene	0.25
SRM 1812	Benzene	10
	Toluene	10
	Chlorobenzene	10
	Bromobenzene	10

Aliphatic organic gases in nitrogen

SRM 1813	Carbon tetrachloride	0.25
	Chloroform	0.25
	Tetrachloroethylene	0.25
	Vinyl chloride	0.25
SRM 1814	Carbon tetrachloride	10
	Chloroform	10
	Tetrachloethylene	10
	Vinyl chloride	10

Propane in nitrogen

SRM 2643a	100
SRM 2644a	250
SRM 2645a	500
SRM 2646a	1000
SRM 2647a	2500
SRM 2648a	5000
SRM 2649a	1.0 mole percent
SRM 2650	2.0 mole percent

Propane and oxygen in nitrogen

SRM 2651	Propane	0.01
	Oxygen	5.0
SRM 2652	Propane	0.01
	Oxygen	10.0

Oxygen in nitrogen

SRM 2657a	2
SRM 2658a	10
SRM 2659a	21

Hydrogen sulfide in nitrogen

SRM 2730	5
SRM 2731	20

Carbon dioxide, carbon monoxide and propane in nitrogen

SRM 2725	CO	1.6 mole percent
	C_3H_8	600
SRM 2726	CO	8 mole percent
	C_3H_8	3000
SRM 2727	CO_2	11 mole percent
	CO	1.6 mole percent
	C_3H_8	600
SRM 2728	CO_2	14 mole percent
	CO	1.6 mole percent
	C_3H_8	3000

Order information:

These SRMs can be purchased for between US$600 and US$2314 per cylinder. Not all prices were available at the time of this writing. Please contact NIST at the address shown above.

References:

National Institute of Standards and Technology (1990) Certificate, SRM 2632a, Carbon dioxide in nitrogen. National Institute of Standards and Technology, Gaithersburg, MD, USA.

SRM 1661a through 2745 (cont.)

National Institute of Standards and Technology (1990) Certificate, SRM 2649a, Propane in nitrogen. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1990) SRM 2735. Nitric oxide in nitrogen. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1990) SRM 2736. Nitric oxide in nitrogen. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1990) Certificate, SRM 2745, Carbon dioxide in nitrogen. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1992) SRM 1663a. Sulfur dioxide in nitrogen. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1992) SRM 1679c. Carbon monoxide in nitrogen. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1992) SRM 1681b. Carbon monoxide in nitrogen. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1992) SRM 1685b. Nitric oxide in nitrogen. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1992) SRM 1686b. Nitric oxide in nitrogen. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1992) SRM 1687b. Nitric oxide in nitrogen. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1992) SRM 1693a. Sulfur dioxide in nitrogen. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1992) SRM 1694a. Sulfur dioxide in nitrogen. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1992) SRM 1696. Sulfur dioxide in nitrogen. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1992) SRM 2619a. Carbon dioxide in nitrogen. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1992) SRM 2620a. Carbon dioxide in nitrogen. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1992) SRM 2623a. Carbon dioxide in nitrogen. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1992) SRM 2627a. Nitric oxide in nitrogen. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1992) SRM 2628a. Nitric oxide in nitrogen. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1992) SRM 2629a. Nitric oxide in nitrogen. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1992) SRM 2636a. Carbon monoxide in nitrogen. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1992) SRM 2637a. Carbon monoxide in nitrogen. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1992) SRM 2638a. Carbon monoxide in nitrogen. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1992) SRM 2639a. Carbon monoxide in nitrogen. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1992) SRM 2727, Carbon dioxide, carbon monoxide and propane in nitrogen. Certificate of Analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1992) SRM 2728. Carbon dioxide, carbon monoxide and propane in nitrogen. Certificate of Analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

Trahey, N. M. (ed.) (1992) NIST Standard Reference Materials Catalog 1992-93. NIST Spec. Pub. 260, 162 pp. National Institute of Standards and Technology, Gaithersburg, MD, USA.

A13-01 - A13-14

Spectrochemical Materials

Source:

Office of Reference Materials
Laboratory of the Government Chemist
Queen's Road, Teddington
Middlesex TW11 0LY
ENGLAND

Description:

These CRMs are intended for use in the analysis of low concentrations of metals in oils and similar organic matrices using techniques that require oil-based calibrating solutions. These materials consist of stable solids (decanoates or chelates) with certified metal content. The certificates of analysis include recommended methods of preparing 100 ppm solutions by dissolving the solid in a solubiliser (naphthenic acid or 2-ethylhexanoic acid and xylene) and adding a diluent (such as white spirit, dioctyl sebacate or a mineral oil).

Available compounds:

Compound	LGC number	Metal content (mg/g)
Aluminum tris(ethyl acetoacetonate)	A13-01	66
Barium (II) decanoate	A13-02	285
Cadmium (II) decanoate	A13-03	247
Calcium (II) decanoate	A13-04	105
Chromium (III) decanoate	A13-07	107
Cobalt (II) decanoate	A13-05	144
Copper (II) decanoate	A13-06	159
Iron (III) decanoate	A13-08	101
Lead (II) decanoate	A13-09	377
Magnesium (II) decanoate	A13-10	66
Manganese (II) decanoate	A13-11	136
Nickel (II) decanoate	A13-12	154
Silver decanoate	A13-13	386
Vanadyl bis(acetoacetonate)	A13-16	192
Zinc (II) decanoate	A13-14	162

Order information:

These CRMs can be purchased for £35 per unit (5 gram vials). Price subject to change without notice. Please contact LGC at the address shown above.

Reference:

Laboratory of the Government Chemist (1991) Certified Reference Materials. Issue No. 2. Office of Reference Materials, Laboratory of the Government Chemist, Queen's Road, Teddington, Middlesex TW11 0LY, England.

CLB-1 - CLB-2

Mixtures in Iso-octane of Individual Chlorinated Biphenyl (PCB) Compounds

Source:

National Research Council of Canada
Institute for Marine Biosciences
Marine Analytical Chemistry Standards Program
1411 Oxford Street
Halifax, Nova Scotia B3H 2Z1
CANADA

Description:

CLB-1 is a set of four mixtures of pure, synthetic chlorinated biphenyls (PCBs) in isooctane. The set includes 51 compounds, and composition of each mixture has been selected to assure easy chromatographic resolution of the components. To help assess the resolution of the separation, each mixture contains a pair of congeners which elute closely. CLB-1-D contains the group of PCBs which were tentatively determined in CRM HS-1 and HS-2. CLB-2 is a solution of all ^{13}C-labelled 2,2',4,4',5,5'-hexachlorobiphenyl (IUPAC 153) in iso-octane. This material is intended for use in quantitative analysis of PCBs using GC/MS techniques.

Certified concentrations of PCB congeners (µg/mL; * are resolution testing pairs):

CLB-1-A

PCB	Value	PCB		Value
18	11.8	86	*	2.9
31	6.6	87	*	3.8
40	4.9	121		3.1
44	5.9	153		2.1
49	7.6	156		1.5
54	16.6	159		1.2
77	5.5	209		1.7

CLB-1-B

PCB	Value			
		154		6.2
15	91.9	173	*	2.3
52	15.2	182		3.8
60	3.9	202	*	3.6
103	10.8	205		3.2
105	4	207		3.8
128	4.9	208		2.4
143	5.7	209		2.8
PCB	Value			

CLB-1 - CLB-2 (cont.)

CLB-1-C

PCB		Value	PCB		Value
15		138.5	189		4.7
114		6.3	191		5
129		8.3	199	*	4.8
137		8.3	201	*	7
153		7.4	203	*	5.1
171	*	5.2	206		6.7
183		6.6	209		5.1
185		3.5			

CLB-1-D

PCB	Value	PCB		Value
15	76.7	180		2.8
101	8.9	187		3.2
118	3.9	194		2.4
138	4.2	195		2.6
141	2.8	196	*	3.3
151	5	201	*	3.6
153	3.3	209		2.7
170	3			

CLB-2

PCB	Value
153	23.1 ± 0.3

Order information:

CLB-1 can be purchased for C$105 per unit (set of 4 1-mL ampoules), and CLB-2 for C$200 per unit (set of 4 1-mL ampoules). Price subject to change without notice. Please contact NRCC at the address above.

References:

Ballschmiter, K., and M. Zell (1980) Analysis of polychlorinated biphenyls (PCB) by glass capillary gas chromatography. Fresenius Z. Anal. Chem., 302:20-31.

National Research Council Canada (1992) CLB-1. Mixtures in iso-octane of individual chlorinated biphenyl (PCB) compounds. Description sheet. National Research Council Canada, Marine Analytical Standards Program, Halifax, Nova Scotia, B3H 3Z1, Canada.

National Research Council Canada (1992) CLB-2. Solution in iso-octane of ^{13}C-labelled 2,2',4,4',5,5'-hexachlorobiphenyl. Description sheet. National Research Council Canada, Marine Analytical Standards Program, Halifax, Nova Scotia, B3H 3Z1, Canada.

CRM 034 through 183

Organic Compounds for Elemental Analysis

Source:

Community Bureau of Reference
Commission of the European Communities
Directorate General for Science
Research and Development
200 rue de la Loi
B-1049 Brussels
BELGIUM

Description:

Homogeneity has been demonstrated at the 1 mg level. No further information available.

Certified concentrations (µg/g dry weight):

	Element	Value	Uncertainty (±)
CRM 034	bis(Diethyltinchloride) oxide ($C_8H_{20}Cl_2OSn_2$)		
	C	218.1	0.4
	H	45.4	0.3
	Cl	160.8	0.5
	O	36.8	0.6
	Sn	538.0	0.7
CRM 035	Triphenylleadimidazole ($C_{21}H_{18}N_2Pb$)		
	C	498.7	0.5
	H	36.1	0.4
	N	54.9	0.3
	Pb	409.6	0.7
CRM 036	Mercurisuccinimide ($C_8H_8HgN_2O_4$)		
	C	242.3	0.4
	H	20.3	0.3
	N	70.6	0.4
	O	161.1	0.6
	Hg	505.7	0.6
CRM 071	N-(4-Bromophenyl)-N-(2-chloro-4-nitrophenyl) thiourea ($C_{13}H_9BrClN_3O_2S$)		
	C	403.9	0.3
	H	23.7	0.3
	Br	206.5	0.4
	Cl	91.7	0.5
	N	108.5	0.5
	O	82.8	0.4
	S	83.0	0.5

CRM 034 through 183 (cont.)

	Element	Value	Uncertainty (±)
CRM 072	N-(4-Chloro-4-nitrophenyl)-N-(4-iodophenyl) thiourea ($C_{13}H_9ClIN_3O_2S$)		
	C	361.3	1.0
	H	21.0	0.4
	Cl	81.1	0.8
	I	293.2	0.8
	N	96.5	0.6
	O	73.3	0.6
	S	73.5	0.5
CRM 073	1-[1-(4-Bromophenylmethyl)-4-piperidinyl]-5-chloro-2-(trifluoromethyl)-1H-benzimidazole ($C_{20}H_{18}BrClF_3N_3$)		
	C	507.9	0.5
	H	38.4	0.2
	Br	169.0	0.5
	Cl	74.9	0.7
	F	120.7	0.4
	N	88.8	0.5
CRM 127	Tetramethylammonium tetraphenylborate		
	C	855.0	0.6
	H	82.1	0.3
	N	35.5	0.4
	B	27.4	0.1
CRM 183	Bis(triphenylphosphine)-copper-trifluoromethanesulfonate		
	C	602.9	0.4
	H	41.2	0.3
	F	77.1	0.6
	S	43.5	0.7
	P	84.2	0.6
	Cu	85.4	0.6

Order information:

These CRMs can be purchased for BFR2000 per unit (1 - 5 g). Price includes handling and normal postage and it is subject to change without notice. Please contact BCR at the address shown above.

Reference:

Community Bureau of Reference (BCR) (1992) Reference Materials. Community Bureau of Reference, Commission of the European Communities, Directorate General for Science, Research and Development, 200 rue de la Loi, B-1049 Brussels, Belgium. 75 pp.

CRM 046 through 370

Polycyclic Aromatic Hydrocarbons

Source:

Community Bureau of Reference
Commission of the European Communities
Directorate General for Science
Research and Development
200 rue de la Loi
B-1049 Brussels
BELGIUM

Description:

These standards are representative of the many polycyclic aromatic compounds present in the environment which are known or suspected to be carcinogenic. The certified purity of these materials ranges from 99.0 to 99.8%. The standards are available in units of 100 mg of homogeneous powder in screw-capped amber vials unless noted.

Standards of certified purity:

Polycyclic aromatic hydrocarbons (100 mg vials)

CRM 046	Benzo[b]chrysene
CRM 047	Benzo[b]fluoranthene
CRM 048	Benzo[k]fluoranthene
CRM 049	Benzo[j]fluoranthene
CRM 050	Benzo[e]pyrene
CRM 051R	Benzo[a]pyrene
CRM 052	Benzo[ghi]perylene
CRM 053	Indeno[1,2,3-cd]pyrene
CRM 077	1-Methylchrysene
CRM 078	2-Methylchrysene
CRM 079	3-Methylchrysene
CRM 080	4-Methylchrysene
CRM 081R	5-Methylchrysene
CRM 082	6-Methylchrysene
CRM 091	Anthanthrene
CRM 092	10-Azabenzo[a]pyrene
CRM 093	1-Methylbenz[a]anthracene
CRM 094	Dibenz[a,c]anthracene
CRM 095	Dibenz[a,j]anthracene
CRM 096	Dibenzo[a,l]pyrene
CRM 097	Benzo[a]fluoranthene
CRM 133	Dibenzo[a,e]pyrene
CRM 134	Benzo[c]phenanthrene
CRM 135	Benzo[b]naphtho[2,1-d]thiophene
CRM 136	Benzo[b]naphtho[2,3-d]thiophene
CRM 137	Benzo[b]naphtho[1,2-d]thiophene
CRM 138	Dibenz[a,h]anthracene
CRM 139	Benzo[ghi]fluoranthene
CRM 140	Benzo[c]chrysene
CRM 153	Dibenz[a,h]acridine
CRM 154	Dibenz[a,j]acridine
CRM 155	Dibenz[a,c]acridine
CRM 156	Dibenz[c,h]acridine
CRM 157	Benz[a]acridine
CRM 158	Benz[c]acridine
CRM 159	Dibenzo[a,h]pyrene
CRM 160	Fluoranthene
CRM 168	1-Nitropyrene
CRM 177	Pyrene

CRM 046 through 343 (cont.)

Nitro-polycyclic aromatic hydrcarbons

20 mg vials

CRM 152	Dibenz[a,i]acridine
CRM 265	Dibenzo[a,e]fluoranthene
CRM 266	7H-Dibenzo[c,g]carbazole
CRM 267	Indeno[1,2,3-cd]fluoranthene
CRM 268	Dibenzo[a,i]pyrene
CRM 269	Chrysene
CRM 270	Triphenylene
CRM 271	Benz[a]anthracene
CRM 272	Coronene

10 mg vials

CRM 305	1-Nitropyrene
CRM 306	1-Nitronaphthalene
CRM 307	2-Nitronaphthalene
CRM 308	9-Nitroanthracene
CRM 309	6-Nitrochrysene
CRM 310	3-Nitrofluoranthene
CRM 311	6-Nitrobenzo[a]pyrene
CRM 312	2-Nitro-7-methoxy=-naphtho[2,1-b]furan

Polychlorinated biphenyls (25 mg vials)

CRM 289	2,4'-Dichlorobiphenyl
CRM 290	2,3,3'-Trichlorobiphenyl
CRM 291	2,4,4'-Trichlorobiphenyl
CRM 292	3,3',4-Trichlorobiphenyl
CRM 293	2,2',5,5',-Tetrachloro=-biphenyl
CRM 294	2,2',4,5,5',-Pentachloro=-biphenyl
CRM 295	2,3',4,4',5-Pentachloro=-biphenyl
CRM 296	2,2',3,4,4',5-Hexachlo=-robiphenyl
CRM 297	2,2',4,4',5,5'-Hexachlo=-robiphenyl
CRM 298	2,2',3,4,4',5,5'-Heptachlo=-robiphenyl

Oxygenated polycyclic aromatic hydrocarbons (10 mg vials)

CRM 337	Dibenzo[b,d]furan
CRM 338	4H-Cyclopenta[def]phe=-nanthrene-4-one
CRM 339	Benzo[c,d]pyren-6-one
CRM 340	Benzo[b]naphto[1,2-d]furan
CRM 341	Benzo[b]naphto[2,1-d]furan
CRM 342	Benzo[a]fluorenone
CRM 343	3-Hydroxybenzo[a]pyrene

Order information:

Prices vary for these CRMs, ranging from BFR10000 to 30000 per vial. Price includes handling and normal postage and it is subject to change without notice. Please contact BCR at the address shown above for prices and availability.

Reference:

Community Bureau of Reference (BCR) (1992) Reference Materials. Community Bureau of Reference, Commission of the European Communities, Directorate General for Science, Research and Development, 200 rue de la Loi, B-1049 Brussels, Belgium. 75 pp.

CRM 365

Polychlorinated Biphenyls in Iso-octane

Source:

Community Bureau of Reference
Commission of the European Communities
Directorate General for Science
Research and Development
200 rue de la Loi
B-1049 Brussels
BELGIUM

Description:

No information available.

Certified concentrations (µg/g):

Congener	Value	Uncertainty (±)	Congener	Value	Uncertainty (±)
PCB 8	11.4	0.3	PCB 101	14.4	0.6
PCB 20	15.2	0.9	PCB 118	14.9	0.8
PCB 28	24.8	1.1	PCB 138	8.6	0.6
PCB 35	14.3	0.8	PCB 153	14.2	0.6
PCB 52	14.8	0.6	PCB 180	15.2	0.6

Order information:

CRM 365 can be purchased for BFR4000 per unit (2 2-mL vials). Price includes handling and normal postage and it is subject to change without notice. Please contact BCR at the address shown above.

Reference:

Community Bureau of Reference (BCR) (1992) Reference Materials. Community Bureau of Reference, Commission of the European Communities, Directorate General for Science, Research and Development, 200 rue de la Loi, B-1049 Brussels, Belgium. 75 pp.

CSK Potassium Iodate

Potassium Iodate

Source:

Sagami Chemical Research Center
Nishi-Ohnuma 4-4-1
Sagamihara-shi 229
JAPAN

Available from:

Wako Chemicals USA
1600 Bellwood Rd.
Richmond, VA 23237
USA

Wako Chemicals GmbH
Nissanstr. 2, 4040 Neuss 1
WEST GERMANY

Wako Pure Chemical Industries Ltd.
1-2, Doshomachi 3-Chome
Chuo-Ku, Osaka
JAPAN

Description:

The standard solution of 0.01000 N potassium iodate (KIO_3) for use in the analysis of dissolved oxygen is prepared by Wako under the supervision of the Sagami Chemical Research Center of Japan. The solution has the highest accuracy and stability possible. The solutions are sealed in glass bottles and sterilized. These standard solutions were used in the Cooperative Study of the Kuroshio and Adjacent Regions (CSK) Program of UNESCO/IOC, 1965-1979, and in other programs.

Order information:

CSK potassium iodate solution can be purchased for US$95 per unit (300 mL) from Wako USA. Price subject to change without notice. Prices from Wako West Germany and Wako Japan not available.

References:

Ambe, M., J. Kajiwara, T. Yoshihara, and K. Sugawara (1975) Preparation of the standard solutions of nitrate and their application to seawater and freshwater. J. Oceanogr. Soc. Japan, 31:85-92.

Ambe, M. (1978) Note of the experience in the preparation of CSK standard solutions and the ICES-SCOR Intercalibration Experiment, 1969-1970. Mar. Chem., 6:171-8.

Sagami Chemical Research Center (1988?) General guide to the use of CSK standard solutions, No.1. Sagami Chemical Research Center, Sagamihara, Kanagawa Prefecture, Japan.

DACS-1

Domoic Acid

Source:

National Research Council of Canada
Marine Analytical Chemistry Standards Program
Institute for Marine Biosciences
1411 Oxford Street
Halifax, Nova Scotia B3H 2Z1
CANADA

Description:

Domoic acid was the causative agent of amnesic shellfish poisoning from the ingestion of toxic mussels in Canada in 1987. A major research effort was undertaken by NRCC on the chemistry and determination of domoic acid (1989), and a description of the analytical methodology used during the shellfish poisoning episode can be found in Quilliam and Wright (1989).

Domoic acid concentration (μg/mL):

89 μg/mL in acetonitrile/water mixture (1:9 v/v).

Order information:

DACS-1 can be purchased for US$150 per unit (set of 4 5-mL ampoules). Price subject to change without notice. Please contact NRCC at the address above.

References:

National Research Council Canada (1991) DACS-1. Domoic acid calibration solution. Information sheet. National Research Council Canada, Marine Analytical Standards Program, Halifax, Nova Scotia, Canada.

National Research Council Canada (1989) MACSP Update. Instrument calibration solution for domoic acid, DACS-1. Information sheet. National Research Council Canada, Institute for Environmental Chemistry, Ottawa, Canada.

Quilliam, M. A., and J. L. C. Wright (1989) The amnesic shellfish poisoning mystery. Anal. Chem., 61(18):1053A-60A.

EPA C-027 through C-158

EPA CRADA Multicomponent Standards

Source:

US Environmental Protection Agency
Quality Assurance Research Division
EMSL-Cincinnati
Cincinnati, OH 45268-1525
USA

Available from:

NSI Environmental Solutions
P. O. Box 12313, 2 Triangle Drive
Research Triangle Park, NC 27709, USA

Description:

These CRADA calibration standards and organic solutions are designed, produced and verified for purity, homogeneity and stability under a cooperative research and development agreement between NSI Environmental Solutions and the US EPA.

Available solutions:

C-027 BETX mix
- Benzene
- Ethylbenzene
- Toluene
- Total xylenes
- o-Xylene
- m-Xylene
- p-Xylene

C-028 TCLP volatiles mix
- Benzene
- Carbon tetrachloride
- Chlorobenzene
- Chloroform
- 1,4-Dichlorobenzene
- 1,2-Dichloroethane
- 1,1-Dichloroethylene
- Methyl ethyl ketone
- Tetrachloroethylene
- Trichloroethylene

C-075 Basic extractables
- 4-Chloroaniline
- o-Nitroaniline
- m-Nitroaniline
- p-Nitroaniline

C-092 Volatile compounds VI
- Benzene
- Ethylbenzene
- o-Xylene
- Styrene
- Toluene

C-093 Pesticides mix
- Aldrin
- alpha-BHC
- beta-BHC
- delta-BHC
- gamma-BHC
- 4,4'-DDD
- 4,4'-DDE
- 4,4'-DDT
- Dieldrin
- Endosulfan I
- Endosulfan II
- Endosulfan sulfate
- Endrin
- Endrin aldehyde
- Endrin ketone
- Heptachlor
- Heptachlor epoxide
- p,p'-Methoxychlor

C-098H PNA mix
- Acenaphthene
- Acenaphthylene
- Anthracene
- Benz[a]anthracene
- Benzo[a]pyrene
- Benzo[b]fluoranthene
- Benzo[k]fluoranthene
- Benzo[ghi]perylene
- Chrysene
- Dibenz[a,h]anthracene
- Fluoranthene
- Fluorene
- Indeno[1,2,3-cd]pyrene
- Naphthalene
- Phenanthrene
- Pyrene

C-098L PNA mix
- Acenaphthene
- Acenaphthylene
- Anthracene
- Benz[a]anthracene
- Benzo[a]pyrene
- Benzo[b]fluoranthene
- Benzo[k]fluoranthene
- Benzo[ghi]perylene
- Chrysene
- Dibenz[a,h]anthracene
- Fluoranthene
- Fluorene
- Indeno[1,2,3-cd]pyrene
- Naphthalene
- Phenanthrene
- Pyrene

C-109H Volatiles VA
- Acetone
- 2-Hexanone
- Methyl ethyl ketone
- 4-Methyl-2-pentanone

C-109L Volatiles VA
- Acetone
- 2-Hexanone
- Methyl ethyl ketone
- 4-Methyl-2-pentanone

C-131 Organic acids surrogate
- 2-Fluorophenol
- Phenol-d_5
- 2,4,6-Tribromophenol

C-133L Volatile 500 mix
- 2-Chlorotoluene
- 1,2-Dibromoethane
- cis-1,2-Dichloroethylene
- Hexachlorobutadiene
- Naphthalene
- Styrene
- 1,2,3-Trichloropropane
- 1,2,4-Trimethylbenzene
- m-Xylene

C-133H Volatile 500 mix
- 2-Chlorotoluene
- 1,2-Dibromoethane
- cis-1,2-Dichloroethylene
- Hexachlorobutadiene
- Naphthalene
- Styrene
- 1,2,3-Trichloropropane
- 1,2,4-Trimethylbenzene
- m-Xylene

C-134H Volatile 200 mix
- Benzene
- Chlorobenzene
- 1,2-Dichlorobenzene
- 1,3-Dichlorobenzene
- 1,4-Dichlorobenzene
- Ethylbenzene
- Tetrachloroethylene
- Toluene
- Trichloroethylene

C-134L Volatile 200 mix
- Benzene
- Chlorobenzene
- 1,2-Dichlorobenzene
- 1,3-Dichlorobenzene
- 1,4-Dichlorobenzene
- Ethylbenzene
- Tetrachloroethylene
- Toluene
- Trichloroethylene

C-135 Volatile 300B mix
- Dichlorodifluoromethane
- Vinyl chloride

C-137 Volatile 300A mix
- Bromomethane
- Chloroethane
- Chloromethane
- Fluorotrichloromethane

C-138L Volatile 600 mix
- n-Butylbenzene
- tert-Butylbenzene
- 1,2-Dibromo-3-chloropropane
- 1,3-Dichloropropane
- 1,1-Dichloropropylene
- 4-Isopropyltoluene
- n-Propylbenzene
- 1,1,1,2-Tetrachloroethane
- 1,3,5-Trimethylbenzene
- p-Xylene

C-138H Volatile 600 mix
- n-Butylbenzene
- tert-Butylbenzene
- 1,2-Dibromo-3-chloropropane
- 1,3-Dichloropropane
- 1,1-Dichloropropylene
- 4-Isopropyltoluene
- n-Propylbenzene
- 1,1,1,2-Tetrachloroethane
- 1,3,5-Trimethylbenzene
- p-Xylene

C-139H Volatile 100 mix
- Bromoform
- Carbon tetrachloride
- Chloroform
- Chlorodibromomethane
- Dichlorobromomethane
- 1,1-Dichloroethane
- 1,2-Dichloroethane
- 1,1-Dichloroethylene
- trans-1,2-Dichloroethylene
- Dichloromethane
- 1,2-Dichloropropane
- cis-1,3-Dichloro-1-propene
- trans-1,3-Dichloro-1-propene
- 1,1,2,2-Tetrachloroethane
- 1,1,1-Trichloroethane
- 1,1,2-Trichloroethane

C-139L Volatile 100 mix
- Bromoform
- Carbon tetrachloride
- Chloroform
- Chlorodibromomethane
- Dichlorobromomethane
- 1,1-Dichloroethane
- 1,2-Dichloroethane
- 1,1-Dichloroethylene
- trans-1,2-Dichloroethylene
- Dichloromethane
- 1,2-Dichloropropane
- cis-1,3-Dichloro-1-propene
- trans-1,3-Dichloro-1-propene
- 1,1,2,2-Tetrachloroethane
- 1,1,1-Trichloroethane
- 1,1,2-Trichloroethane

C-140L Volatile 400 mix
- Bromobenzene
- Bromochloromethane
- sec-Butylbenzene
- 4-Chlorotoluene
- Dibromomethane
- 2,2-Dichloropropane
- Isopropylbenzene
- 1,2,3-Trichlorobenzene
- 1,2,4-Trichlorobenzene
- m-Xylene

C-140H Volatile 400 mix
- Bromobenzene
- Bromochloromethane
- sec-Butylbenzene
- 4-Chlorotoluene
- Dibromomethane
- 2,2-Dichloropropane
- Isopropylbenzene
- 1,2,3-Trichlorobenzene
- 1,2,4-Trichlorobenzene
- m-Xylene

C-141 Volatile 700 mix
- Acrolein
- Acrylonitrile

C-142 Volatile 800 mix
- Allyl alcohol
- Allyl chloride
- 2-Chloroethanol
- 3-Chloropropionitrile
- 1,3-Dichloro-2-propanol
- Ethyl methacrylate
- Malononitrile
- Methacrylonitrile
- 2-Methyl-1-propanol
- Propargyl alcohol

C-143 TCLP pesticides mix
- Endrin
- Heptachlor
- Heptachlor epoxide
- gamma-BHC
- p,p'-Methoxychlor

C-146 Phthalates mix
- Butyl benzyl phthalate
- Di-n-butyl phthalate
- Diethyl phthalate
- Di-n-octyl phthalate
- Dimethyl phthalate
- bis(2-Ethylhexyl)phthalate

C-147 Carbamates mix
- Aldicarb
- Aldicarb sulfone
- Aldicarb sulfoxide
- Carbaryl
- Carbofuran
- 3-Hydroxycarbofuran
- Methiocarb
- Methomyl
- Oxamyl
- Propoxur

C-148 Phenols mix
- 2-Chlorophenol
- 4-Chloro-3-methylphenol
- 2,4-Dichlorophenol
- 2,4-Dimethylphenol
- 2,4-Dinitrophenol
- 4,6-Dinitro-2-methylphenol
- Pentachlorophenol
- Phenol
- 2-Nitrophenol
- 4-Nitrophenol
- 2,4,6-Trichlorophenol

C-149 Haloethers mix
- 4-Bromophenyl phenyl ether
- bis(2-Chloroisopropyl)ether
- bis(2-Chloroethoxy)ether
- bis(2-Chloroethoxy)methane
- bis(2-Chloroethyl)ether
- 4-Chlorophenyl phenyl ether

C-150 Chlorinated hydrocarbons mix
- 2-Chloronaphthalene
- 1,2-Dichlorobenzene
- 1,3-Dichlorobenzene
- 1,4-Dichlorobenzene
- Hexachlorobenzene
- Hexachlorobutadiene
- Hexachlorocyclopentadiene
- Hexachloroethane
- 1,2,4-Trichlorobenzene

C-151 TCLP acids mix
- o-Cresol
- m-Cresol
- p-Cresol
- Pentachlorophenol
- 2,4,5-Trichlorophenol
- 2,4,6-Trichlorophenol

C-152 Base/neutrals mix
- 2,4-Dinitrotoluene
- 2,6-Dinitrotoluene
- Isophorone
- Nitrobenzene
- N-Nitrosodimethylamine
- N-Nitrosodiphenylamine
- N-Nitrosodi-n-propylamine

C-153 Nitroaromatics and isophorone mix
- 2,4-Dinitritoluene
- 2,6-Dinitrotoluene
- Isophorone
- Nitrobenzene

C-154 Nitrosamines mix
- N-Nitrosodimethylamine
- N-Nitrosodiphenylamine
- N-Nitrosodi-n-propylamine

C-155 TCLP base/neutrals mix
- 1,4-Dichlorobenzene
- 2,4-Dinitrotoluene
- Hexachlorobenzene
- Hexachlorobutadiene
- Hexachloroethane
- Nitrobenzene
- Pyridine

C-156 TCLP herbicides mix
- 2,4-Dichlorophenoxy acetic acid
- Silvex

C-157 Internal standards mix
- Chlorobenzene-d_5
- 1,4-Dichlorobenzene-d_4
- p-Difluorobenzene

C-158 Surrogates mix
- 4-Bromofluorobenzene
- Dibromofluoromethane
- Toluene-d_8

C-027 through C-158 (cont.)

Order information:

These CRMs can be purchased from US$45 to US$90 per 1.5-mL ampoule. They are available from the wholesale distributor, NSI Environmental Solutions, P. O. Box 12313, 2 Triangle Drive, Research Triangle Park, NC 27709, USA, as well as from other distributors worldwide. Price subject to change without notice.

Reference:

NSI Environmental Solutions (1992) EPA - Certified organic solutions standards. NSI Environmental Solutions, P. O. Box 12313, 2 Triangle Drive, Research Triangle Park, NC 27709, USA. 142 pp.

EPA CPCB-006 through CPCB-490

EPA CRADA Polychlorinated Biphenyl Congeners

Source:

US Environmental Protection Agency
Quality Assurance Research Division
EMSL-Cincinnati
Cincinnati, OH 45268-1525
USA

Available from:

ULTRA Scientific
250 Smith Street
North Kingston, RI 02852, USA

Description:

These CRADA calibration standards and organic neats are designed, produced and verified for purity, homogeneity and stability under a cooperative research and development agreement between ULTRA Scientific and the US EPA. The congeners are synthesized by ULTRA.

Available compounds (Cost is $35 unless noted. Quantities are 5 mg unless noted or as follows: ◊ - 10 mg; = 20 mg; Δ - 25 mg; + 50 mg.):

CPCB	Cost/Amt.		Compound
006	20	+	2-Chlorobiphenyl
007	47	◊	3-Chlorobiphenyl
008	20	+	4-Chlorobiphenyl
009	50	Δ	2,2'-Dichlorobiphenyl
012	50	Δ	2,3-Dichlorobiphenyl
101	40		2,3'-Dichlorobiphenyl
013	36	Δ	2,4-Dichlorobiphenyl
089	85	Δ	2,4'-Dichlorobiphenyl
014	36	+	2,5-Dichlorobiphenyl
015	36	Δ	2,6-Dichlorobiphenyl
010	44	+	3,3'-Dichlorobiphenyl
016	36	+	3,4-Dichlorobiphenyl
112	80		3,4'-Dichlorobiphenyl
017	47	+	3,5-Dichlorobiphenyl
011	Δ	◊	4,4'-Dichlorobiphenyl
092	50		2,2',3-Trichlorobiphenyl
021	60	Δ	2,2',5-Trichlorobiphenyl
139	80		2,2',6-Trichlorobiphenyl
104	44		2,3,3'-Trichlorobiphenyl
018	64	Δ	2,3,4-Trichlorobiphenyl
118	80		2,3,4'-Trichlorobiphenyl
083	85	◊	2,3,6-Trichlorobiphenyl
121	80		2,3',4-Trichlorobiphenyl
022	70	Δ	2,3',5-Trichlorobiphenyl
120	80		2,3',6-Trichlorobiphenyl

EPA CPCB-006 through CPCB-7120 (cont.)

CPCB	Cost/Amt.		Compound
084	73	◊	2,4,4'-Trichlorobiphenyl
019	56	+	2,4,5-Trichlorobiphenyl
020	64	+	2,4,6-Trichlorobiphenyl
023	70	Δ	2,4',5-Trichlorobiphenyl
062	32	◊	2',3,4-Trichlorobiphenyl
123	80		2',3,5-Trichlorobiphenyl
107	80		3,3',4-Trichlorobiphenyl
122	80		3,3',5-Trichlorobiphenyl
119	80		3,4,4'-Trichlorobiphenyl
124	80		3,4,5-Trichlorobiphenyl
125	80		3,4',5-Trichlorobiphenyl
065	75	+	2,2',3,3'-Tetrachlorobiphenyl
105	85		2,2',3,4'-Tetrachlorobiphenyl
029	85	Δ	2,2',3,5'-Tetrachlorobiphenyl
035	76	+	2,2',4,4'-Tetrachlorobiphenyl
136	80		2,2',4,5-Tetrachlorobiphenyl
030	64	+	2,2',4,5'-Tetrachlorobiphenyl
024	44	◊	2,2',4,6-Tetrachlorobiphenyl
031	32	◊	2,2',5,5'-Tetrachlorobiphenyl
032	47	Δ	2,2',5,6'-Tetrachlorobiphenyl
066	70	+	2,2',6,6'-Tetrachlorobiphenyl
126	80		2,3,3',4-Tetrachlorobiphenyl
128	67		2,3,3',5'-Tetrachlorobiphenyl
093	47		2,3,4,4'-Tetrachlorobiphenyl
027	56	+	2,3,4,5-Tetrachlorobiphenyl
028	52	Δ	2,3,5,6-Tetrachlorobiphenyl
086	85	=	2,3',4,4'-Tetrachlorobiphenyl
025	56	◊	2,3',4,6-Tetrachlorobiphenyl
033	32	◊	2,3',4',5-Tetrachlorobiphenyl
034	44	Δ	2,3',5,5'-Tetrachlorobiphenyl
138	80		2,4,4',5-Tetrachlorobiphenyl
026	56	◊	2,4,4',6-Tetrachlorobiphenyl
036	40	Δ	3,3',4,4'-Tetrachlorobiphenyl
127	80		3,3',4,5-Tetrachlorobiphenyl
129	80		3,3',4,5'-Tetrachlorobiphenyl
091	70		3,3',5,5'-Tetrachlorobiphenyl
096	80		3,4,4',5-Tetrachlorobiphenyl
097	88		2,2',3,3',4-Pentachlorobiphenyl
038	88	◊	2,2',3,4,5-Pentachlorobiphenyl
099	70	◊	2,2',3,4,5'-Pentachlorobiphenyl
041	67		2,2',3,4,6-Pentachlorobiphenyl
069	88		2,2',3,5,6-Pentachlorobiphenyl
130	80		2,2',3,5',6-Pentachlorobiphenyl
087	67	◊	2,2',3',4,5-Pentachlorobiphenyl
141	80		2,2',3',4,6-Pentachlorobiphenyl
042	100		2,2',4,4',6-Pentachlorobiphenyl
039	47	◊	2,2',4,5,5'-Pentachlorobiphenyl
040	67	◊	2,2',4,5',6-Pentachlorobiphenyl
043	76		2,2',4,6,6'-Pentachlorobiphenyl
098	80		2,3,3',4,4'-Pentachlorobiphenyl
131	80		2,3,3',4,5'-Pentachlorobiphenyl
133	95		2,3,3',4',6-Pentachlorobiphenyl
070	100		2,3,3',5,6-Pentachlorobiphenyl

EPA CPCB-006 through CPCB-7120 (cont.)

CPCB	Cost/Amt.		Compound
108	110		2,3,4,4',5-Pentachlorobiphenyl
071	67		2,3,4,4',6-Pentachlorobiphenyl
037	40	◊	2,3,4,5,6-Pentachlorobiphenyl
106	73		2,3',4,4',5-Pentachlorobiphenyl
044	76		2,3',4,4',6-Pentachlorobiphenyl
045	64		2,3',4,5',6-Pentachlorobiphenyl
117	110		2',3,3',4,5-Pentachlorobiphenyl
134	80		2',3,4,5,5'-Pentachlorobiphenyl
102	80		3,3',4,4',5-Pentachlorobiphenyl
132	80		3,3',4,5,5'-Pentachlorobiphenyl
049	85	=	2,2',3,3',4,4'-Hexachlorobiphenyl
052	100		2,2',3,3',4,5-Hexachlorobiphenyl
114	130		2,2',3,3',5,5'-Hexachlorobiphenyl
067	88	=	2,2',3,3',6,6'-Hexachlorobiphenyl
053	76		2,2',3,4,4',5-Hexachlorobiphenyl
088	73		2,2',3,4,4',5'-Hexachlorobiphenyl
056	100		2,2',3,4,4',6-Hexachlorobiphenyl
050	73		2,2',3,4,5,5'-Hexachlorobiphenyl
054	76		2,2',3,4,5,6'-Hexachlorobiphenyl
051	70		2,2',3,5,5',6-Hexachlorobiphenyl
047	60	◊	2,2',4,4',5,5'-Hexachlorobiphenyl
048	76		2,2',4,4',5,6'-Hexachlorobiphenyl
046	88	+	2,2',4,4',6,6'-Hexachlorobiphenyl
055	76		2,3,3',4,4',5-Hexachlorobiphenyl
109	110		2,3,3',4,4',6-Hexachlorobiphenyl
113	110		2,3,3',4,5,5'-Hexachlorobiphenyl
115	110		2,3,4,4',5,6-Hexachlorobiphenyl
100	70	◊	2,3',4,4',5,5'-Hexachlorobiphenyl
490	70		3,3',4,4',5,5'-Hexachlorobiphenyl
110	110		2,2',3,3',4,4',5-Heptachlorobiphenyl
072	88		2,2',3,3',4,4',6-Heptachlorobiphenyl
094	70		2,2',3,4,4',5,5'-Heptachlorobiphenyl
077	100		2,2',3,4',5,6,6'-Heptachlorobiphenyl
073	60		2,3,3',4,4',5,5'-Heptachlorobiphenyl
057	85		2,3,3',4,4',5,6-Heptachlorobiphenyl
116	73		2,2',3,3',4,4',5,5'-Octachlorobiphenyl
111	110		2,2',3,3',4,4',5,6-Octachlorobiphenyl
103	73		2,2',3,4,4',5,6-Heptachlorobiphenyl
137	100		2,2',3,4,4',5',6-Heptachlorobiphenyl
135	80		2,2',3,4,5,5',6-Heptachlorobiphenyl
058	67		2,2',3,4,5,6,6'-Heptachlorobiphenyl
074	100		2,2',3,4',5,5',6-Heptachlorobiphenyl
075	100		2,2',3,3',4,5,5',6-Octachlorobiphenyl
095	100		2,2',3,3',4,5,6,6'-Octachlorobiphenyl
082	76		2,2',3,3',4,5',6,6'-Octachlorobiphenyl
068	67		2,2',3,3',5,5',6,6'-Octachlorobiphenyl
078	100		2,2',3,4,4',5,6,6'-Octachlorobiphenyl
140	100		2,3,3',4,4',5,5',6-Octachlorobiphenyl
059	95		2,2',3,3',4,4',5,5',6-Nonachlorobiphenyl
080	73		2,2',3,3',4,4',5,6,6'-Nonachlorobiphenyl
081	76		2,2',3,3',4,5,5',6,6'-Nonachlorobiphenyl
060	20	◊	Decachlorobiphenyl

Order information:

These CRMs can be purchased for the amounts listed above in US dollars. They are available from the wholesale distributor, ULTRA Scientific, 250 Smith St., North Kingstown, RI 02852, USA, as well as from other distributors worldwide. Price subject to change without notice.

Reference:

ULTRA Scientific (1992) CRADA Standards, Pesticides and PCBs. ULTRA Scientific, 250 Smith St., North Kingstown, RI 02852, USA. 16 pp.

EPA CR-0020 through CR-7120

EPA CRADA Pesticides

Source:

US Environmental Protection Agency
Quality Assurance Research Division
EMSL-Cincinnati
Cincinnati, OH 45268-1525
USA

Available from:

ULTRA Scientific
250 Smith Street
North Kingston, RI 02852, USA

Description:

These CRADA calibration standards and organic neats are designed, produced and verified for purity, homogeneity and stability under a cooperative research and development agreement between ULTRA Scientific and the US EPA.

Available compounds (Cost is $35 unless noted. Quantities are noted as follows: ◊ - 10 mg; = 20 mg; Δ - 25 mg; + 50 mg.):

CR	Cost/amt.	Compound
0025	◊	Acephate
4160	Δ	Alachlor
0060	Δ	Aldicarb
0062	60 ◊	Aldicarb sulfone
0080	Δ	Aldrin
0100	Δ	Allethrin
0110	60 ◊	Amdro
0120	Δ	Ametryne
0186	60 ◊	4-Amino-5-chloropyridaz-= 6-one
0171	60 ◊	2-Aminobenzimidazole
0180	Δ	Aminocarb
0195	Δ	Amitraz
0200	Δ	Amitrole
0220	Δ	Amobam
0230	Δ	Ancymidol
0250	Δ	Anthraquinone
0260	Δ	ANTU
5700	Δ	Aroclor 1016
5701	◊	Aroclor 1221
5702	◊	Aroclor 1232
5703	Δ	Aroclor 1242
5704	◊	Aroclor 1248
5705	Δ	Aroclor 1254
5706	◊	Aroclor 1260
5707	◊	Aroclor 1262
5708	◊	Aroclor 1268
0300	Δ	Aspon
0310	Δ	Asulam
0320	◊	Atraton
0420	Δ	Atrazine
3840	Δ	Azinphosethyl
3820	Δ	Azinphosmethyl
0340	Δ	Azobenzene
0400	Δ	Barban
0472	Δ	Bendiocarb
0480	Δ	Benefin
0500	◊	Benomyl
0520	◊	Bensulide
0425	Δ	Bentazon
0577	60 ◊	Benzadox
0578	60 ◊	Benzoylprop ethyl
0580	Δ	Benzyl benzoate
0620	◊	alpha-BHC
0640	◊	beta-BHC
0660	◊	delta-BHC
0680	Δ	gamma-BHC
0600	Δ	BHC mixed
0733	Δ	Bifenox
0735	Δ	S-Bioallethrin

CR	Cost/amt.		Compound
0734		Δ	Bioallethrin
0740		Δ	Biphenyl
0761		Δ	Blazer, acid
0780	60	◊	Bomyl
0791		Δ	BPMC
0800		Δ	Bromacil
0816		◊	Bromadilone
0822	60	◊	4-Bromo-2,5-dichlorophenol
0840		◊	Bromophos
0860		◊	Bromophos ethyl
0872	60	◊	Bromopropylate
0820		Δ	Bromoxynil
0916		Δ	Bunema
0922		Δ	Butachlor
0926	60	◊	Buthidazole
0933	60	◊	Butralin
0940		Δ	Butylate
0961	60	◊	Cacodylic acid
0980	60	Δ	Calcium arsenate
1000		Δ	Captafol
1020		Δ	Captan
1060		Δ	Carbaryl
1071		Δ	Carbendazim
1074		◊	Carbetamide
1041	60	◊	3-Hydroxycarbofuran
1040		Δ	Carbofuran
1042	60	◊	3-Ketocarbofuran phenol
1043	60	◊	Carbofuran phenol
1080		Δ	Carbophenothion
1100		Δ	Carboxin
1140		Δ	CDAA
0140		Δ	Chloramben
1180		Δ	Chloranil
1188		Δ	Chlorbromuron
1200		Δ	Chlordane
1220	60	◊	alpha-Chlordane
1240	60	◊	gamma-Chlordane
1280	60	◊	Chlordecone
1260	60	◊	Chlordene
1261	60	◊	alpha-Chlordene
1263	60	◊	gamma-Chlordene
1480		Δ	Chlordimeform
1300		Δ	Chlorfenvinphos
1316		◊	Chlormephos
1360		Δ	Chlorobenzilate
1380		Δ	Chloroneb
1425		◊	Chlorophacinone
1462		Δ	Chloropicrin
1640		Δ	Chlorothalonil
1420		Δ	Chlorpropham
2900		Δ	Chlorpyriphos
2902		Δ	Chlorpyriphos methyl
1512		◊	Chlorloluron

CR	Cost/amt.		Compound
3720		Δ	Coumafuryl
1540		Δ	Coumaphos
1543	60	◊	CPMC
1500		Δ	Crotoxyphos
6020		Δ	Crufomate
1546		Δ	Cryolite
1552		Δ	Cyanazine
1580	60	◊	Cyanophos
1591		◊	Cycloate
1600		Δ	Cycloheximide
1612		◊	Cypermethrin
1615	60	Δ	Cyprazine
1621	60	Δ	Cythioate
2940		Δ	2,4-D
2960		Δ	2,4-D Butoxyethanol ester ether
2980		Δ	2,4-D, Butyl esters, mixed
2985		Δ	2,4-D, Diethanolamine salt, formulation
2990		Δ	2,4-D, Dimethylamine salt, formulation
2996		Δ	2,4-D, 2-Ethylhexyl ester
3000		Δ	2,4-D, Isobutyl ester, mixed
3040		Δ	2,4-D, Isopropyl ester
3020		Δ	2,4-D, mixed Isooctyl ester
3060		Δ	2,4-D, Propylene glycol butyl ester ether
3070		Δ	2,4-D, Sodium salt
1660		Δ	Dalapon
1681		Δ	Daminozide
3080		Δ	2,4-DB
3100	60	Δ	2,4-DB, Butyl ester
3120		Δ	2,4-DB, Isobutyl ester
1720		Δ	DCPA
1740		◊	p,p'-DDA
1750		Δ	DDD, mixed
1760		Δ	o,p'-DDD
1780		Δ	p,p'-DDD
1800		Δ	p,p'-DDD olefin
1860		Δ	p,p'-DDE
1880		Δ	DDT, mixed isomers
1920		Δ	p,p'-DDT
1940		Δ	DEF
1930		Δ	Deltamethrin
1983		◊	Demeton, mixed isomers
2006		Δ	Desmedipham
2040		Δ	Diallate
2060		Δ	Diaphene
2080		Δ	Diazinon
2090		Δ	Dibromochloropropane
2112		Δ	Dibutyl chlorendate
2120		Δ	Dibutyl phthalate
2140		Δ	Dicamba

CR	Cost/amt.		Compound
2200		Δ	Dichlobenil
2220		Δ	Dichlofenthion
2180		Δ	Dichlone
2260		Δ	Dichloran
2280		Δ	o-Dichlorobenzene
2300		Δ	p-Dichlorobenzene
2305		Δ	Dichloropropene, mixed isomers
2308		Δ	Dichlorosalicylic acid
2309		Δ	Dichlorprop
2320		Δ	Dichlorvos
2330		Δ	Diclofop methyl
2340	60	◊	Dicofol
2380	60	◊	Dieldrin
2386		◊	Diethyl phosphate
2391		◊	Difenoxuron
2395		Δ	Difenzoquat
2406	60	◊	Diflubenzuron
2416	60	◊	Dimethirimol
2420		◊	Dimethoate
2458		◊	Dimethyl phosphate
2460		Δ	Dimethyl phthalate
2551	60	◊	Dinitramine
2560		Δ	Dinocap
2760		Δ	Dinoseb
2566		◊	Dinoseb acetate
2570	60	◊	Diothyl
2600		◊	Diphacinone
2620		Δ	Diphenamid
2640		Δ	Diphenyl mercury
2653		◊	Dipropetryne
2660		Δ	Diquat dibromide
2720		Δ	Disulfoton
2730		◊	Ditalimphos
2721		◊	Dithianon
2740		Δ	Diuron
2770		Δ	DNOC
2780		Δ	Dodine
2792	60	Δ	Drazoxolon
2860		Δ	DSMA
3160		◊	Edifenphos
3200	60	◊	Endosulfan I
3220	60	◊	Endosulfan II
3180		Δ	Endosulfan mixed isomers
3240		Δ	Endothall, acid
3260		◊	Endrin
3261	60	◊	Endrin aldehyde
3262	60	◊	Endrin ketone
3280		Δ	EPN
3300		Δ	EPTC
6590	60	◊	Ethazol
3330		Δ	Ethephon
3335		◊	Ethiolate
3340		Δ	Ethion
3359		◊	Ethirimol
3373		◊	Ethofumesate
5880		Δ	Ethoprop
5380		Δ	Ethylan
3380		Δ	Ethylhexanediol
3400		Δ	Ethylmercury chloride
3412		◊	Etrimfos
3420		Δ	EXD
3440		Δ	Famphur
3460		Δ	Fenac
2020		Δ	Fenaminosulf
3470		◊	Fenamiphos
7013		Δ	Fenbutatin-oxide
3500		Δ	Fensulfothion
3520		Δ	Fenthion
3527		Δ	Fentin acetate
3532		Δ	Fentin chloride
3540		◊	Fentin hydroxide
3555		Δ	Fenvalerate
3600		Δ	Ferbam
0407		◊	Fluchloralin
3620		Δ	Fluometuron
3623	60	◊	Fluoridamid
3630		◊	Flurecol, n-butyl ester
3660		Δ	Folpet
2910		Δ	Fonotos
3680		Δ	Formetanate-HCl
3722		◊	Formothion
4156		Δ	Fosamine ammonium
3790		◊	Gibberellic acid
3796		Δ	Glyoxime
3801		Δ	Glyphosphate
3802	60	◊	Glyphosine
5720		◊	Halowax 1000
5721		◊	Halowax 1001
5722		◊	Halowax 1013
5723		◊	Halowax 1014
5724		◊	Halowax 1051
5725		◊	Halowax 1099
3860		Δ	Heptachlor
3880	60	◊	Heptachlor epoxide
3885		◊	Heptenophos
3920		Δ	Hexachlorobenzene
3940		Δ	Hexachlorophene
7001		Δ	Hexazinone
3960	60	◊	1-Hydroxychlordene
4011	60	◊	IBP
4103		◊	Iodofenphos
4040		Δ	Ioxynil
4045		Δ	Isodrin
4050		Δ	Isofenphos
4062		◊	Isoprocarb

EPA CR-0020 through CR-7120 (cont.)

CR	Cost/amt.		Compound
4070		Δ	Isopropalin
4080		◊	Isoproturon
6420		◊	Karbutilate
4166	60	◊	Lamprecide
4180		Δ	Lead arsenate
4185		Δ	Lenacil
4190		Δ	Leptophos
4191	60	◊	Leptophos oxygen analog
4220		Δ	Lethane 384
4240		Δ	Linuron
4260		Δ	Malathion
4280		Δ	MH
4300		Δ	Maneb
4340		Δ	MCPA
4360		Δ	MCPA, Isooctyl ester
4380		Δ	MCPB
4400		Δ	MCPP
4420	60	Δ	MCPP, Isooctyl ester
4441	60	◊	Mecarbam
4446	60	◊	Mefluidide
1630		Δ	Mephosfolan
3640		Δ	Merphos
6620		Δ	Metham
4750		◊	Methamidophos
4490		Δ	Methanearsonic acid
4496	60	◊	Methazole
6340		Δ	Methidathion
4500		Δ	Methiocarb
4520		Δ	Methomyl
4531		Δ	Methoprene
4540		Δ	Methoxychlor mixed isomers
4541		Δ	p,p'-Methoxychlor
4560		Δ	Methylmercury chloride
4572		Δ	Methylmercury iodide
4580		Δ	Methyl parathion
4612		Δ	Metobromuron
4620		Δ	Metolachlor
4631		◊	Metoxuron
4634		Δ	Metribuzin
4640		Δ	Mevinphos
7080	60	◊	Mexacarbate
4720		Δ	Mirex
4740		Δ	Molinate
4747		◊	Monalide
0360		Δ	Monocrotophos
4751		◊	Monolinuron
4760		Δ	Monuron
4780		Δ	Monuron TCA
4820		Δ	MSMA
4860		Δ	Naled
4880		Δ	Naphthalene acetamide
4900		Δ	Naphthalene acetic acid
4925		Δ	1-Naphthol
2010		Δ	Napropamide
4920	60	Δ	Naptalam sodium salt
4940		Δ	Neburon
4970		◊	Niclosamide
5020		Δ	Nitrolin
5031		Δ	Nitrapyrin
5040	60	◊	Nitrofen
5060		Δ	4-Nitrophenol
5148		◊	Oryzalin
5149	60	◊	Oryzalin, dimethyl
5176		Δ	Oxadiazon
4521	60	◊	Oxamino methomyl
5187	60	◊	Oxamino oxamyl
5200	60	◊	Oxychlordane
5220		◊	Oxydemeton methyl
5230		Δ	Oxyfluorfen
4800		Δ	Oxythioquinox
5240		Δ	Paraquat dichloride
5245		Δ	Parathion-ethyl
5280		Δ	PCNB
5260		Δ	PCP
5300		◊	Pebulate
5331		Δ	Pendimethalin
5366	60	◊	Perfluidone
5373		◊	Permethrin, mixed isomers
5410		◊	Phenmedipham
5420		Δ	Phenothiazine
5680		Δ	Phenylmercury acetate
5460		◊	Phenylmercury borate
5480		Δ	Phenylmercury chloride
5485		Δ	Phenylmercury hydroxide
5487		Δ	Phenylmercury iodide
5490		Δ	o-Phenylphenol
5500		Δ	Phorate
5502	60	◊	Phorate sulfoxide
5520		Δ	Phosalone
1610		Δ	Phosfolan
4000		Δ	Phosmet
4001	60	◊	Phosmet oxygen analog
5580		Δ	Phosphamidon
5600		◊	Picloram
5640		Δ	Piperalin
5620		◊	Piperonyl butoxide
5632		Δ	Pirimicarb
5642		Δ	Pirimphos-ethyl
5643		Δ	Pirimphos-methyl
5670		Δ	Plantvax
5728	60	◊	Potassium azide
5731	60	◊	Potassium diethyl dithiophosphate
5732	60	◊	Potassium diethyl thiophosphate

EPA CR-0020 through CR-7120 (cont.)

CR	Cost/amt.		Compound
5733	60	◊	Potassium dimethyl dithiophosphate
5734	60	◊	Potassium dimethyl thiophosphate
5739		Δ	Procyazine
5742		◊	Profenophos
5746		Δ	Profluralin
5752		◊	Promecarb
5760		Δ	Prometon
5780		Δ	Prometryn
4090		Δ	Pronamide
5840		Δ	Propanil
5160		Δ	Propargite
5800		Δ	Propazine
5860		Δ	Propham
0440		Δ	Propoxur
5882		Δ	Protect
5905		◊	Pyracarbolid
5925		Δ	Pyrazon
5932		◊	Pyrazophos
5940		◊	Pyrethrins, mixed
5966		◊	Quinalphos
6022	60	◊	Release
6055		◊	Resmethrin
5980		Δ	Ronnel
6000		Δ	Rotenone
6050	60	◊	Salithion
6068	60	◊	Sethoxydim
6100		Δ	Siduron
6120		Δ	Silvex
6140	60	◊	Silvex, Propylene glycol butyl ester ether
6160		◊	Simazine
6172		Δ	Sodium azide
2800	60	◊	Sodium o-phenylphenate
2820	60	◊	Sodium pentachlorophenate
6240	60	◊	Strobane
6350		Δ	Sulprophos
6840		Δ	2,4,5-T
6860	60	◊	2,4,5-T Butoxyethanol ester ether
6870	60	◊	2,4,5-T Butyl ester
6880	60	◊	2,4,5-T Isooctyl ester
6885	60	◊	2,4,5-T Propylene glycol butyl ester ether
6900	60	◊	2,4,5-TB
6435		Δ	Tecnazene
0020		Δ	Temephos
6560		Δ	Terbacil
6573		Δ	Terbufos
6589		◊	Terbutylazine
3980		Δ	Terbutryn
3740		Δ	Tetrachlorvinphos
6600		Δ	Tetradifon
6608		◊	Tetramethrin
6630		◊	Tetrasul
6640		Δ	Thanite
6660		◊	Thiabendazole
6661		◊	Thidiazuron
0570		◊	Thiobencarb
6663		◊	Thiofanox
6665	60	◊	Thiometon
6670		Δ	Thiophanate
6671		Δ	Thiophanate methyl
6680		Δ	Thiram
6700		◊	Tolylfluanid
6740		Δ	Toxaphene
6770		Δ	Triallate
6777		◊	Triazophos
6780		Δ	Trichlorfon
6438		Δ	Trichloroacetic acid
6890		Δ	2,4,5-Trichlorophenol
6786		Δ	Triclopyr
6792		◊	Tridemorph
6796	60	◊	Trietazine
6800		Δ	Trifluralin
6822		Δ	Triforine
7020		Δ	Vernolate
7060		Δ	Warfarin
7120		Δ	Zineb
7100		Δ	Ziram

Order information:

These CRMs can be purchased for the amounts listed above in US dollars. They are available from the wholesale distributor, ULTRA Scientific, 250 Smith St., North Kingstown, RI 02852, USA, as well as from other distributors worldwide. Price subject to change without notice.

Reference:

ULTRA Scientific (1992) CRADA Standards, Pesticides and PCBs. ULTRA Scientific, 250 Smith St., North Kingstown, RI 02852, USA. 16 pp.

EPA NSI 0001 - 1211

EPA CRADA Single Compound Standards

Source:

US Environmental Protection Agency
Quality Assurance Research Division
EMSL-Cincinnati
Cincinnati, OH 45268-1525
USA

Available from:

NSI Environmental Solutions
P. O. Box 12313, 2 Triangle Drive
Research Triangle Park, NC 27709, USA

Description:

These CRADA calibration standards and organic neats are designed, produced and verified for purity, homogeneity and stability under a cooperative research and development agreement between NSI Environmental Solutions and the US EPA.

Available solutions (1 mg/mL in methanol for US$32 unless noted: Δ - acetonitrile, ◊ - acetone, u - isooctane, t - 2-propanol, n - dioxane, p - cyclohexanone):

NSI	Compound	Solvent	Conc.	Cost
0335	1,1,1,2-Tetrachloroethane			
1181	1,1,1-Trichloroacetone	◊		
0010	1,1,1-Trichloroethane			
0014	1,1,2,2-Tetrachloroethane			
0013	1,1,2-Trichloroethane			
1166	1,1-Dichloro-1-propene		5	
0012	1,1-Dichloroethane			
0027	1,1-Dichloroethylene			
0177	1,2,3,4-Tetrachlorobenzene	Δ	2.5	
0225	1,2,3,4-Tetrachlorobenzene		2.5	
0175	1,2,3-Trichlorobenzene		5, 1	
0368	1,2,3-Trichloropropane		5, 1	
0007	1,2,4-Trichlorobenzene			
1107	1,2,4-Trimethylbenzene		5	
0993	1,2-Dibromo-3-chloropropane		5, 1	
0171	1,2-Dibromoethane			
0023	1,2-Dichlorobenzene			
0776	1,2-Dichlorobenzene-d_4		0.15	
0009	1,2-Dichloroethane			
0030	1,2-Dichloropropane			
0286	1,2-Epoxybutane	Δ	5	
0308	1,2-Epoxypropane	Δ		
0524	1,2-Propanediol	Δ		
0577	1,2:3,4-Diepoxybutane	Δ		

EPA NSI 0001 - 1211 (cont.)

NSI	Compound	Solvent	Conc.	Cost
0176	1,3,5-Trichlorobenzene		5	
1103	1,3,5-Trimethylbenzene		5	
0928	1,3-Dichloro-2-propanol		5	
0214	1,3-Dichlorobenzene			
1109	1,3-Dichloropropane		5	
0218	1,3-Dichloropropylene (cis & trans)		5	
0527	1,3-Dinitrobenzene		5	
0403	1,3-Propane sultone	Δ		
0025	1,4-Dichlorobenzene			
0196	1,4-Dichlorobutane-d_8		0.15	
0355	1,4-Naphthoquinone	Δ		
0275	1,4-Phenylenediamine	Δ		
0384	1-(o-Chlorophenyl)-2-thiourea	Δ		
0292	1-Acetul-2-thiourea	Δ		
0195	1-Fluoronaphthalene	◊	0.100	
0419	1-Naphthylamine			
0519	1-Nicotine			
0458	1-Nitrosopiperidine		5	
0657	1-Propanamine			
1167	2,2-Dichloropropane		5	
0222	2,3,5-Trichlorophenol		5	
0181	2,3,6-Trichlorophenol			
0170	2,3-Dichloro-1-propene		5	
0179	2,4,5-Trichlorophenol		5	
0370	2,4,5-Trichlorophenoxy acetic acid	Δ		
0019	2,4,6-Trichlorophenol			
0932	2,4-Diaminotoluene			
0029	2,4-Dichlorophenol		5	
0330	2,4-Dichlorophenoxy acetic acid	Δ	5	
0149	2,4-Dichlorotoluene		5	
0224	2,4-Dimethylphenol		5	
0190	2,4-Dimethylphenol-3,5,6-d_3	◊	0.1	33
0057	2,4-Dinitrophenol			
0033	2,4-Dinitrotoluene		5, 1	
0302	2,6-Dichlorophenol		5, 1	
0034	2,6-Dinitrotoluene		5	
0017	2-Chloroethyl vinyl ether			
0018	2-Chloronaphthalene			35
0022	2-Chlorophenol			
0116	2-Chlorophenol-d_4			49
0150	2-Chlorotoluene		5, 1	
0299	2-Fluoroacetamide	Δ	5	
0194	2-Fluorobiphenyl	◊	0.1	
0193	2-Fluorophenol	◊	0.1	
0336	2-Hexanone			
0659	2-Methyl-1-propanol		5	
0562	2-Methylnaphthalene	Δ		
0565	2-Naphthylamine			
0055	2-Nitrophenol		5	
0688	2-Picoline		5	
0026	3,3'-Dichlorobenzidine (as dihydrochloride)			
0182	3-Chlorophenol		5	

EPA NSI 0001 - 1211 (cont.)

NSI	Compound	Solvent	Conc.	Cost
0375	3-Chloropropionitrile			
0151	3-Chlorotoluene		5	
0662	3-Nitrophenol		5	
0092	4,4'-DDD		5	
0091	4,4'-DDE			
0124	4,4'-DDT		5, 1	35
0234	4,4'-Dibromooctafluorobiphenyl	◊	0.1	
0322	4,4'-Methylene bis(2-chloroaniline)		5	35
0058	4,6-Dinitro-2-methylphenol		5	
0578	4-Aminobiphenyl			
0297	4-Aminopyridine		5	
0233	4-Bromofluorobenzene		0.15	
0039	4-Bromophenyl phenyl ether		5	
0020	4-Chloro-3-methylphenol		5, 1	
0305	4-Chloroaniline		5	
0183	4-Chlorophenol		5	
0038	4-Chlorophenyl phenyl ether		5, 1	
0152	4-Chlorotoluene		5	
0429	4-Dimethylaminoazobenzene		5	
1108	4-Isopropyltoluene		5	
0349	4-Methyl-2-pentanone		5, 1	
0056	4-Nitrophenol			
0344	5-Nitro-o-toluidine		5	
0567	7,12-Dimethylbenz[a]anthracene			
0001	Acenaphthene		5, 1	
0075	Acenaphthylene		5	
0284	Acetone			
0473	Acetonitrile	t	5, 1	
0411	Acetophenone		5	
0002	Acrolein		5	
0270	Acrylamide			
0003	Acrylonitrile		10, 1	
1089	Alachlor			
0954	Aldicarb	Δ		40
0995	Aldicarb sulfone	Δ		40
0996	Aldicarb sulfoxide	Δ		49
0220	Aldrin		5, 1	35
0475	Allyl alcohol			
0476	Allyl chloride			
0847	alpha,alpha-Dimethylphenethylamine	Δ		
0100	alpha-BHC		2.5	35
0903	alpha-Chlordane			40
0542	Aniline		5	
0076	Anthracene	◊		
1090	Atrazine			
0512	Benzal chloride	Δ		
0004	Benzene			
0005	Benzidine (as dihydrochloride)		5, 1	
0070	Benzo[a]anthracene			
0071	Benzo[a]pyrene	◊		
0072	Benzo[b]fluoranthene	◊	2.5	35
0077	Benzo[ghii]perylene	n		40
0199	Benzo[ghi]perylene-$^{13}C_{12}$	◊	0.1	229

EPA NSI 0001 - 1211 (cont.)

NSI	Compound	Solvent	Conc.	Cost
0073	Benzo[k]fluoranthene	◊		33
0541	Benzoic acid	Δ	5	
0701	Benzonitrile	Δ		
0291	Benzotrichloride	Δ		
0326	Benzyl alcohol	Δ		
0169	Benzyl chloride	Δ	5	
0101	beta-BHC	◊		33
0041	bis(2-Chloroethoxy) methane		5	
0016	bis(2-Chloroethyl) ether			
0040	bis(2-Chloroisopropyl) ether		5	
0064	bis(2-Ethylhexyl) phthalate		5, 1	
1211	bis(2-Ethylhexyl)adipate	Δ		
0406	Bromobenzene		5	
1186	Bromochloroacetonitrile	◊		
0136	Bromochloromethane			
0212	Bromoform			
0044	Bromomethane	Δ	1.075	40
0522	Brucine	Δ		
0065	Butyl benzyl phthalate			
0715	Carbofuran		5	33
0363	Carbon disulfide		5, 1	
0360	Carbon tetrachloride		5, 1	
1179	Chloral hydrate	◊		
0566	Chlorambucil	Δ	5	
0089	Chlordane			
0006	Chlorobenzene			
0574	Chlorobenzilate	Δ		
0200	Chlorodibromomethane			
0015	Chloroethane			
0021	Chloroform			
0043	Chloromethane			40
0074	Chrysene	◊		
0173	cis-1,2-Dichloroethylene			
0479	Crotonaldehyde			
0675	Cyclohaxanone	Δ		
1091	Dalapon	Δ		
0103	delta-BHC			43
0066	Di-n-butyl phthalate		5, 1	
0067	Di-n-octyl phthalate		5, 1	
0067	Diallate	Δ		
0231	Dibenz[a,h]anthracene	n		33
0261	Dibenzofuran		5	
1097	Dibromomethane		5	
0255	Dibutyl ether		5	
0670	Dichlone	Δ		
0486	Dichloroacetonitrile	Δ		
0046	Dichlorobromomethane		5	33
0346	Dichlorodifluoromethane		0.922	
0042	Dichloromethane			
0318	Dicyclohexyl phthalate	Δ		
0088	Dieldrin			
0285	Diethyl ether		5	
0068	Diethyl phthalate		5, 1	

EPA NSI 0001 - 1211 (cont.)

NSI	Compound	Solvent	Conc.	Cost
0689	Diethylamine	Δ		
0540	Diethylstilbestrol	Δ		
0345	Dimethoate	Δ		
0069	Dimethyl phthalate		5, 1	
0862	Dinex			
0455	Dinoseb	Δ		
0263	Diphenylamine		5	
0654	Disulfuton	Δ		
0093	Endosulfan I	n		40
0094	Endosulfan II	n		40
0095	Endosulfan sulfate			40
0622	Endothall	-	-	-
0096	Endrin			35
0097	Endrin aldehyde			40
1036	Endrin ketone	Δ		40
0258	Epichlorohydrin	Δ	5	
0704	Ethyl acrylate	Δ		
0687	Ethyl methacrylate			
0456	Ethyl methanesulfonate	Δ		
0560	Ethyl parathion	Δ		
0036	Ethylbenzene			
0358	Ethylenediamine			
0329	Ethylenethiourea		5	
0727	Famphur	Δ		40
0037	Fluoranthene		5, 1	
0078	Fluorene		5, 1	
0232	Fluorobenzene		0.15	
0047	Fluorotrichloromethane			
0671	Furan			
0102	gamma-BHC			
0797	gamma-Chlordane	Δ		40
0472	Halowax-1		5	
0471	Halowax-1001		5	
0470	Halowax-1099		5	
0098	Heptachlor			
0099	Heptachlor epoxide			40
0008	Hexachlorobenzene	◊		
0050	Hexachlorobutadiene			
0051	Hexachlorocyclopentadiene		5, 1	
0011	Hexachloroethane			
0323	Hexachlorophene		5	
0364	Hexachloropropene			
0081	Indeno[1,2,3-cd]pyrene	◊	0.5	40
0395	Indomethacin	Δ		
0856	Isodrin		5	
0052	Isophorone			
0669	Isopropylbenzene		5	
0499	Isosafrole			
0573	Kepone	p		40
0251	m-Cresol		5	
0325	m-Nitroaniline		5	
0202	m-Xylene			
0337	Malononitrile		5	

EPA NSI 0001 - 1211 (cont.)

NSI	Compound	Solvent	Conc.	Cost
0568	Melphalan			30
0686	Methacrylonitrile			
0545	Methapyrilene hydrochloride			
0784	Methomyl	Δ		
0311	Methyl ethyl ketone		5	
0439	Methyl methacrylate			
0431	Methyl methanesulfonate	Δ		
0572	Methyl parathion	Δ		
0378	Methyl thiouracil			
0219	Mirex	◊		
0548	N,N-Dimethylformamide		5	
0708	n-Butyl acetate	Δ		
1105	n-Butylbenzene		5	
0974	N-Nitro-N-methyl ethylamine			
0061	N-Nitrosodi-n-propylamine		5, 1	33
0404	N-Nitrosodibutylamine		5, 1	
0334	N-Nitrosodiethylamine			
0059	N-Nitrosodimethylamine		5	
0060	N-Nitrosodiphenylamine		5, 1	
0485	N-Nitrosomorpholine		5	38
0298	N-Nitrosopyrrolidine		5, 1	
1112	n-Propylbenzene		5	
0053	Naphthalene			
0054	Nitrobenzene		5	
0250	o-Cresol		5	
0324	o-Nitroaniline		5	
0294	o-Toluidine hydrochlorine		2	
0201	o-Xylene			
0716	Oxamyl	Δ		
0952	p,p'-Methoxychlor			
0674	p-Benzoquininone	Δ		
0252	p-Cresol		5	
0480	p-Dioxane		10, 1	
0342	p-Nitroaniline		5	
0203	p-Xylene			
0125	PCB-1016	u	5, 1	35
0126	PCB-1221	u		
0107	PCB-12		5, 1	49
0132	PCB-1242	u	3, 1, 0.5	
0108	PCB-1248	u	5	52
0135	PCB-1254	u	3, 1, 0.5	
0129	PCB-1260	u	3, 1, 0.5	
0130	PCB-1262	u	5	35
0131	PCB-1268	u	2.5	41
0260	Pentachlorobenzene			
0300	Pentachloroethane		5	
0159	Pentachloronitrobenzene			
0062	Pentachlorophenol			
0191	Pentachlorophenol-$^{13}C_6$	◊	0.1	38
0295	Phenacetin		5, 1	
0079	Phenanthrene			
0188	Phenanthrene-d_{10}		0.15	
0063	Phenol		5	

EPA NSI 0001 - 1211 (cont.)

NSI	Compound	Solvent	Conc.	Cost
0189	Phenol-d_5	◊	0.1	
0192	Phthalic acid, dimethyl-d_6 ester	◊	0.15	
0293	Phthalic anhydride	Δ		
0713	Picloram	Δ		
0543	Propargyl alcohol	p		
0673	Propionic acid	Δ	5	
0338	Propionitrile		5, 1	
0082	Pyrene			
0271	Pyridine		10, 1	
0660	Quinoline	Δ		
0559	Reserpine	Δ		
0700	Resorcinol		5	
0366	Safrole		5	
1104	sec-Butylbenzene		5	
0552	Silvex	Δ		
1094	Simazine		0.5	
0570	Strychnine	Δ		
0257	Styrene		5, 1	
1106	tert-Butylbenzene		5	
0083	Tetrachloroethylene		5, 1	
0685	Tetrahydrofuran			
0379	Tetramethylthiuram disulfude			
0513	Thioacetamide	Δ		
0341	Thiosemicarbazole	Δ		
0294	Thiourea		5	
0084	Toluene			
0111	Toxaphene			
0028	trans-1,2-Dichloroethylene			
0085	Trichloroethylene			
0702	Triethylamine	Δ	0.925	
0306	Urethane		5	
0327	Vinyl acetate	Δ		
0536	Vinyl chloride			40

Order information:

These CRMs can be purchased for the amounts listed above in US dollars. They are available from the wholesale distributor, NSI Environmental Solutions, P. O. Box 12313, 2 Triangle Drive, Research Triangle Park, NC 27709, USA, as well as from other distributors worldwide. Price subject to change without notice.

Reference:

NSI Environmental Solutions (1992) EPA - Certified organic solutions standards. NSI Environmental Solutions, P. O. Box 12313, 2 Triangle Drive, Research Triangle Park, NC 27709, USA. 142 pp.

EPA Organic QC Samples

EPA CRADA Organic QC Samples

Source:

US Environmental Protection Agency
Quality Assurance Research Division
EMSL-Cincinnati
Cincinnati, OH 45268-1525
USA

Available from:

Supelco, Inc.
Supelco Park
Bellefonte, PA 16823-0048, USA

Description:

These CRADA reference materials are quality control samples designed, produced and verified for purity, homogeneity and stability under a cooperative research and development agreement between Supelco Inc. and the US EPA.

Available solutions (50 µg/mL of each component in methanol unless noted):

Discretionary Aromatic Volatiles Mix (VOB):

n-Butylbenzene	Naphthalene
sec-Butylbenzene	n-Propylbenzene
tert-Butylbenzene	1,2,3-Trichlorobenzene
Hexachlorobutadiene	1,2,4-Trichlorobenzene
Isopropylbenzene	1,2,4-Trimethylbenzene
p-Isopropyltoluene	1,3,5-Trimethylbenzene

Volatile Organic Contaminants Mix 1 (VOC-1):

Bromobenzene	2,2-Dichloropropane
4-Chlorotoluene	1,1-Dichloropropylene
Dibromomethane	Styrene
1,2-Dibromoethane	p-Xylene
1,2-Dibromo-3-chloropropane	

Volatile Organic Contaminants Mix 2 (VOC-2):

Bromochloromethane	o-Xylene
1,3-Dichloropropane	2-Chlorotoluene
1,2,3-Trichloropropane	
cis-1,2-Dichloroethylene	
1,1,1,2-Tetrachloroethane	

Trihalomethanes Mix (TRI):

Bromoform	4 µg/mL
Chloroform	2 µg/mL
Chlorodibromomethane	6 µg/mL
Dichlorobromomethane	2 µg/mL

Volatiles Mix 1 (VOA-1):

Carbon tetrachloride	Chlorobenzene
1,3-Dichlorobenzene	1,4-Dichlorobenzene
1,2-Dichloroethane	1,1-Dichloroethylene
Ethylbenzene	1,1,2-Trichloroethane
1,2-Dichloropropane	Tetrachloroethylene
trans-1,2-Dichloroethylene	

Volatiles Mix 2 (VOA-2):

Bromoform	Chloroform
1,1,1-Trichloroethane	Benzene
Dibromochloromethane	1,2-Dichlorobenzene
1,1-Dichloroethane	Methylene chloride
Toluene	Trichloroethylene
Bromodichloromethane	
1,1,2,2-Tetrachloroethane	

GC/MS Acids Mix (GAC) (100 µg/mL):

2-Chlorophenol	2-Nitrophenol
2,4-Dichlorophenol	2,4-Dimethylphenol
2,4-Dinitrophenol	4-Nitrophenol
Pentachlorophenol	Phenol
2,4,6-Trichlorophenol	
4-Chloro-3-methylphenol	
2-Methyl-4,6-Dinitrophenol	

EPA Organic QC Samples (cont.)

GC/MS Base/Neutrals Mix 1 (GBN-1) (100 µg/mL):

Benz[a]anthracene	Benzo[k]fluoranthene
Diethyl phthalate	1,2,4-Trichlorobenzene
2-Chloronaphthalene	Dibutyl phthalate
1,2-Dichlorobenzene	1,3-Dichlorobenzene
2,4-Dinitrotoluene	2,6-Dinitrotoluene
Phenanthrene	Pyrene
Di-n-octyl phthalate	Hexachlorobenzene
Hexachlorobutadiene	Isophorone

N-Nitrosodi-n-propylamine
bis(2-Chloroethoxy)methane
bis(2-Chloroethyl)ether

GC/MS Base/Neutrals Mix 2 (GBN-2) (100 µg/mL)

Anthracene	Benzo[b]fluoranthene
Benzo[ghi]perylene	Benzo[a]pyrene
Acenaphthene	Chrysene
Dibenz[a,h]anthracene	1,4-Dichlorobenzene
Dimethyl phthalate	Nitrobenzene
Fluoranthene	Fluorene
Hexachloroethane	Naphthalene

Butyl benzyl phthalate
4-Chlorophenylphenyl ether
4-Bromophenylphenyl ether
bis(2-Ethylhexyl)phthalate

Phthalate Esters Mix (PHE) (in acetone):

Butyl benzyl phthalate	10 µg/mL
Diethyl phthalate	25 µg/mL
Dimethyl phthalate	25 µg/mL
Di-n-butyl phthalate	25 µg/mL
Di-n-octyl phthalate	50 µg/mL
bis(2-Ethylhexyl)phthalate	50 µg/mL

Nitroaromatics/Isophorone Mix (NAI) (in acetone):

2,4-Dinitrotoluene	100 µg/mL
Isophorone	25 µg/mL
2,6-Dinitrotoluene	50 µg/mL
Nitrobenzene	80 µg/mL

Polynuclear Aromatic Hydrocarbons Mix 1 (PNA-1) (in acetonitrile):

Acenaphthene	100 µg/mL
Anthracene	100 µg/mL
Benzo[k]fluoranthene	5 µg/mL
Chrysene	10 µg/mL
Indeno[1,2,3-cd]pyrene	10 µg/mL
Naphthalene	100 µg/mL
Pyrene	10 µg/mL

Polynuclear Aromatic Hydrocarbons Mix 2 (PNA-2) (in acetonitrile):

Acenaphthylene	100 µg/mL
Benzo[a]pyrene	10 µg/mL
Benz[a]anthracene	10 µg/mL
Dibenz[a,h]anthracene	10 µg/mL
Benzo[b]fluoranthene	10 µg/mL
Fluoranthene	10 µg/mL
Benzo[ghi]perylene	10 µg/mL
Phenanthrene	100 µg/mL

Haloethers Mix (HAL) (n acetone):
4-Bromophenyl phenyl ether
bis(2-Chloroisopropyl)ether
bis(2-Chloroethoxy)methane
4-Chlorophenylphenyl ether
bis(2-Chloroethyl)ether

EDB/DBCP Mix (EDB) (3.125 µg/mL each in methanol):
1,2-Dibromoethane
1,2-Dibromo-3-chloropropane

GC/MS Pesticides Mix 1 (GPE-1) (in acetone):

alpha-BHC	Endrin
gamma-BHC	Heptachlor
4,4'-DDD	Dieldrin

Heptachlor epoxide

GC/MS Pesticides Mix 2 (GPE-2) (in acetone):

Aldrin	4,4'-DDT
beta-BHC	Endosulfan I
4,4'-DDE	Endosulfan II

Chlorinated Hydrocarbon Pesticides Mix 1 (CHP-1) (in acetone):

Aldrin	2 µg/mL
Dieldrin	2 µg/mL
4,4'-DDD	10 µg/mL
4,4'-DDE	2 µg/mL
4,4'-DDT	10 µg/mL
Heptachlor	2 µg/mL

Chlorinated Hydrocarbon Pesticides Mix 3 (CHP-3) (in acetone):

alpha-BHC	2 µg/mL
beta-BHC	2 µg/mL
Endrin aldehyde	10 µg/mL
Endosulfan I	2 µg/mL
Endosulfan II	10 µg/mL
Heptachlor epoxide	2 µg/mL

EPA Organic QC Samples (cont.)

Toxaphene (CL2) (in acetone):

Toxaphene	50 µg/mL

Chlordane (CP2) (in acetone):

Chlordane	50 µg/mL

Chlorinated Hydrocarbon Pesticides Mix (CL1) (in acetone):

Endrin	5 µg/mL
Methoxychlor	75 µg/mL
Lindane	5 µg/mL

Chlorophenoxy Herbicides Mix (HER) (5 µg/mL):

2,4-D	2,4,5-TP

EP Leachate Pesticides Mix (EPH) (in acetone):

2,4-D	5000 µg/mL
Endrin	10 µg/mL
Lindane	200 µg/mL
Methoxychlor	5000 µg/mL
2,4,5-TP	500 µg/mL

Aroclor PCB Mixes In Oils (45 - 50 µg/mL): (C - capacitor oil; H - hydraulic oil; T - transformer oil)

Aroclor 1016C (PO1)	Aroclor 1254 C (PO7)
Aroclor 1016H (PO2)	Aroclor 1254 H (PO8)
Aroclor 1016T (PO3)	Aroclor 1254 T (PO9)
Aroclor 1242C (PO4)	Aroclor 1260 C (P10)
Aroclor 1242H (PO5)	Aroclor 1260 H (P11)
Aroclor 1242T (PO6)	Aroclor 1260 T (P12)

PCB Mixes In Acetone (50 µg/mL in acetone):

Aroclor 1016 (PC1)	Aroclor 1248 (PC5)
Aroclor 1221 (PC2)	Aroclor 1254 (PC6)
Aroclor 1232 (PC3)	Aroclor 1260 (PC7)
Aroclor 1242 (PC4)	

PCB Congeners Mix (PCG) (3 µg/g in isooctane):

2-Chlorobiphenyl
2,4'-Dichlorobiphenyl
2,2',5-Trichlorobiphenyl
2,4,4'-Trichlorobiphenyl
2,4,5-Trichlorobiphenyl
2,2',3,5'-Tetrachlorobiphenyl
2,2',4,6-Tetrachlorobiphenyl
2,2',5,5'-Tetrachlorobiphenyl
2,3',4,4'-Tetrachlorobiphenyl
3,3',4,4'-Tetrachlorobiphenyl
2,2',3,4,5'-Pentachlorobiphenyl
2,2',4,5,5'-Pentachlorobiphenyl
2,2',4,6,6'-Pentachlorobiphenyl
2,3,3',4,4'-Pentachlorobiphenyl
2,3',4,4',5-Pentachlorobiphenyl
3,3',4,4',5-Pentachlorobiphenyl
2,2',3,3',4,4'-Hexachlorobiphenyl
2,2',3,4,4',5'-Hexachlorobiphenyl
2,2',4,4',5,5'-Hexachlorobipnenyl
2,2',4,4',5,6'-Hexachlorobiphenyl
2,2',3,3',4,4',5-Heptachlorobiphenyl
2,2',3,4,4',5,5'-Heptachlorobiphenyl
2,2',3,4',5,5',6-Heptachlorobiphenyl
2,2',3,4',5,6,6'-Heptachlorobiphenyl
2,2',3,3',4,4',5,6-Octachlorobiphenyl
2,2',3,3',4,5',6,6'-Octachlorobiphenyl
2,2',3,3',4,4',5,5',6-Nonachlorobiphenyl
2,2',3,3',4,4',5,5',6,6'-Decachlorobiphenyl

Order information:

These CRMs can be purchased for between US$70 to $75 per unit (4 1-mL vials). They are available from the wholesale distributor, Supelco, Inc., Supelco Park, Bellefonte, PA 16823, USA, as well as from other distributors worldwide. Price subject to change without notice.

EPA QCS Inorganic Solutions

EPA CRADA Inorganic QC Samples

Source:

US Environmental Protection Agency
Quality Assurance Research Division
EMSL-Cincinnati
Cincinnati, OH 45268-1525
USA

Available from:

SPEX Industries, Inc.
3880 Park Avenue
Edison, NJ 08820, USA

Description:

These CRADA inorganic quality control samples are designed, produced and verified for purity, homogeneity and stability under a cooperative research and development agreement between SPEX Industries and the US EPA.

Available solutions (µg/L):

QCS-DEM 1 21-mL ampoule
QCS-DEM is a sample concentrate to be used in measuring biological oxygen demand (BOD), chemical oxygen demand (COD) and total organic carbon (TOC) using the EPA methods listed below. Its performance in seawater media has been tested by the EPA Quality Assurance Research Division, Cincinnati, OH.

Dextrose, 0.25% and L-glutamic acid, 0.25 %.
BOD EPA method 405.1; COD, EPA methods 410.1, 410.2, 410.3 and 410.4; and TOC, EPA methods 415.1 and 415.2.

QCS-TMAA 5% HNO_3 3 21-mL ampoules
Trace metals by atomic absorption (AA) quality control sample set

Element	Value	Element	Value	Element	Value
Sample 1		Sample 2		Sample 3	
Cr	5	Be	1	Na	100
Cu	5	Al	10	Mg	50
As	5	V	10	K	100
Se	5	Mn	1	Ca	500
Ag	1	Fe	5	Fe	200
Cd	0.5	Co	5	Zn	50
Ba	10	Ni	3	Ba	500
Hg	0.2	Mo	3		
Pb	5	Sb	10		
		Tl	5		

EPA QCS Inorganic Solutions (cont.)

QCS-TMWS 5% HNO_3 1 21-mL ampoule
Trace metals - Water supply

Element	Value	Element	Value
Cr	30	Ag	25
As	20	Ba	300
Se	5	Hg	3
Cd	4	Pb	20

QCS-ICP 5% HNO_3 2 21-mL ampoules
Inductively coupled plasma (ICP) quality control sample set

Element	Value	Element	Value	Element	Value
Sample 1		Ni	10	Sample 2	
Be	10	Cu	10	B	100
Mg	10	Zn	10	Na	100
Ca	10	As	10	Al	100
Ti	10	Se	10	Si	50
V	10	Mo	10	K	1000
Cr	10	Cd	10	Ba	100
Mn	10	Sb	10	Ag	100
Fe	10	Tl	10		
Co	10	Pb	10		

Order information:

QCS-DEM, QCS-TMAA, QCS-TMWS and QCS-ICP can be purchased for US$43, 143, 52 and 143 per unit respectively. They are available from the wholesale distributor, SPEX Industries, Inc., Chemical Sales Dept., 3880 Park Ave., Edison, NJ 08820, USA, as well as from other distributors worldwide. Price subject to change without notice.

Reference:

SPEX Industries, Inc. (1992) SPEX inorganic quality control samples. SPEX Industries, Inc., Chemical Sales Dept., 3880 Park Ave., Edison, NJ 08820, USA.

EPA QCS Nutrient Solutions

EPA CRADA Nutrient QC Samples

Source:

US Environmental Protection Agency
Quality Assurance Research Division
EMSL-Cincinnati
Cincinnati, OH 45268-1525
USA

Available from:

SPEX Industries, Inc.
3880 Park Avenue
Edison, NJ 08820, USA

Description:

These CRADA quality control samples are designed, produced and verified for purity, homogeneity and stability under a cooperative research and development agreement between SPEX Industries and the US EPA.

Available solutions (weight percent):

QCS-NUT Nutrients — Water — 2 21-mL ampoules

Component	Value	Component	Value
Sample 1		Sample 2	
NH_4Cl	0.08	Glycine	0.27
KNO_3	0.15	Sodium B-glycero-phosphate	0.15
K_3PO_4	0.02		

Order information:

QCS-NUT can be purchased for US$58 per unit. They are available from the wholesale distributor, SPEX Industries, Inc., Chemical Sales Dept., 3880 Park Ave., Edison, NJ 08820, USA, as well as from other distributors worldwide. Price subject to change without notice.

Reference:

SPEX Industries, Inc. (1992) SPEX inorganic quality control samples. SPEX Industries, Inc., Chemical Sales Dept., 3880 Park Ave., Edison, NJ 08820, USA.

EPA QCS Phenolics Solutions

EPA CRADA Phenolics QC Samples

Source:

US Environmental Protection Agency
Quality Assurance Research Division
EMSL-Cincinnati
Cincinnati, OH 45268-1525
USA

Available from:

SPEX Industries, Inc.
3880 Park Avenue
Edison, NJ 08820, USA

Description:

These CRADA quality control samples are designed, produced and verified for purity, homogeneity and stability under a cooperative research and development agreement between SPEX Industries and the US EPA.

Available solutions (weight percent):

QCS-PHEN Water 2 21-mL ampoules
Phenolics

Component	Value	Component	Value
Sample 1		Sample 2	
Phenol	0.0005	Phenol	0.0005
		2-Chlorophenol	0.0003
		2,4-Dichlorophenol	0.0004
		2,4-Dinitrophenol	0.0005

Order information:

QCS-PHEN can be purchased for US$60 per unit. They are available from the wholesale distributor, SPEX Industries, Inc., Chemical Sales Dept., 3880 Park Ave., Edison, NJ 08820, USA, as well as from other distributors worldwide. Price subject to change without notice.

Reference:

SPEX Industries, Inc. (1992) SPEX inorganic quality control samples. SPEX Industries, Inc., Chemical Sales Dept., 3880 Park Ave., Edison, NJ 08820, USA.

GBW 06104 - 06408

Organic Compounds

Source:

National Research Center for CRMs
Office of CRMs
No. 7 District 11
Hepingjie, Chaoyangqu
Beijing, 100013
CHINA

Description:

No information available.

Available compounds:

Compound	NRCCRM number	Purity (mole percent)	Price (US$)
Benzene	GBW 06104	99.95	40
alpha-BHC	GBW 06401	99.9	45
beta-BHC	GBW 06402	99.2	45
gamma-BHC	GBW 06403	99.97	45
delta-BHC	GBW 06404	99.9	45
p,p'-DDT	GBW 06405	100	55
o,p'-DDT	GBW 06406	99.5	45
p,p'-DDE	GBW 06407	99.9	45
p,p'-DDD	GBW 06408	99.7	45

Order information:

These CRMs are available in 5 g quantities. Price subject to change without notice. Please contact NRCCRM at the address above.

Reference:

National Research Center for CRMs (1992) Catalog of certified reference materials (addendum to catalog 1991). State Bureau of Technical Supervision, National Research Center for CRMs, Office of CRMs, Hepingjie, Chaoyangqu, Beijing, China. 11 pp.

GBW 07501 - 07514

Minerals for Electron Microprobe Analyses

Source:

National Research Center for CRMs
Office of CRMs
No. 7 District 11
Hepingjie, Chaoyangqu
Beijing, 100013
CHINA

Description:

No further information available.

Certified concentrations (μg/g):

CRM	Mineral	Element	Value
GBW 07501	Galena		
	Pb 86.35	S	13.44
GBW 07502	Sphalerite		
	S 32.76	Zn	66.33
GBW 07503	Cinnabar		
	Hg 13.63	86.00	
GBW 07504	Barite		
	BaO 65.56	SO_3	34.28
GBW 07505	Cerusite		
	PbO 86.36	CO_2	(16.82)
GBW 07506	Scheelite		
	WO_3 80.45	CaO	19.39
GBW 07507	Mangano-columbite		
	NbO_5 53.74	Ta_2O_3	25.92
	FeO 6.65	MnO	12.47

CRM	Mineral	Element	Value
GBW 07508	Cadmium telluride		
	Cd 46.87	Te	53.39
GBW 07509	Cadmium selenide		
	Cd 58.48	Se	40.88
GBW 07510	Gallium arsenide		
	Ga 48.07	As	51.95
GBW 07511	Zinc selenide		
	Se 54.44	Zn	45.38
GBW 07512	Indium antimonide		
	In 48.59	Sb	51.45
GBW 07513	Indium phosphide		
	In 78.51	P	21.12
GBW 07514	Indium arsenide		
	As 39.60	In	60.97

Value in parenthesis is not certified.

Order information:

These CRMs are available for US$80 per unit except for GBW 07513 and 07514 which can be purchased for US$100. Price subject to change without notice. Please contact NRCCRM at the address above.

Reference:

National Research Center for CRMs (1991) Certified reference materials catalog. State Bureau of Technical Supervision, National Research Center for CRMs, Office of CRMs, Hepingjie, Chaoyangqu, Beijing, China. 86 pp.

GBW 07701 - 07711

Synthetic Silicates for Spectral Analysis

Source:

National Research Center for CRMs
Office of CRMs
No. 7 District 11
Hepingjie, Chaoyangqu
Beijing, 100013
CHINA

Description:

No information available.

Certified concentrations (μg/g):

Component	GBW 07701 Value	GBW 07702 Value	GBW 07703 Value	GBW 07704 Value	GBW 07705 Value	GBW 07706 Value	GBW 07707 Value	GBW 07708 Value	GBW 07709 Value	GBW 07710 Value	GBW 07711 Value
Li	15	18	23	33	63	113	213	513	1010	-	-
Be	0.26	0.56	1.1	2.1	5.1	10	20	50	100	200	500
B	2.1	5.1	10.0	20	50	100	200	500	1000	-	-
Ti	24	54	104	204	504	1000	2000	5000	10000	20000	-
V	2.8	5.8	10.8	20.8	51	101	200	500	1000	-	-
Cr	2.3	5.3	10.3	20.3	50	100	200	500	1000	-	-
Mn	27	57	107	207	507	1000	2000	5000	10000	-	-
Co	2.6	5.6	10.6	20.6	50.6	101	200	500	-	-	-
Ni	2.6	5.6	10.6	20.6	50.6	101	200	500	-	-	-
Cu	2.0	5.0	10.0	20.0	50	100	200	500	1000	2000	5000
Zn	3.0	6.0	11.0	21	51	101	200	500	1000	2000	5000
As	2.0	5.0	10	20	50	100	200	500	-	-	-
Sr	5.0	8.0	13	23	53	103	203	500	1000	2000	5000
Y	2.0	5.0	10	20	50	100	200	500	-	-	-
Zr	2.2	5.2	10.2	20	50	100	200	500	1000	-	-
Nb	2.3	5.3	10.3	20.3	50	100	200	500	-	-	-
Mo	0.21	0.51	1.0	2.0	5.0	10	20	50	100	200	500
Ag	-	0.064	0.11	0.21	0.51	1.0	2.0	5.0	10.0	20	50
Cd	0.022	0.052	0.10	0.20	0.50	1.0	2.0	5.0	10.0	20	50
Sn	0.28	0.58	1.1	2.1	5.1	10	20	50	100	200	500
Sb	0.28	0.58	1.1	2.1	5.1	10	20	50	100	200	500
Ba	24	54	104	204	504	1000	2000	5000	10000	-	-
La	2.1	5.1	10	20	50	100	200	500	-	-	-

Component	GBW 07701	GBW 07702	GBW 07703	GBW 07704	GBW 07705	GBW 07706	GBW 07707	GBW 07708	GBW 07709	GBW 07710	GBW 07711
	Value	Value	Value	Value	Value	Value	Value	Value	Value	Value	Value
Ce	2.0	5.0	10.0	20	50	100	200	500	1000	-	-
Yb	0.2	0.50	1.0	20	5	10	20	50	100	-	-
W	0.20	0.50	1.0	2.0	5.0	10	20	50	100	200	500
Pb	2.5	5.5	10.5	20.5	50	100	200	500	1000	2000	5000
Bi	0.31	0.61	1.1	2.1	5.1	10	20	50	100	200	-

Noncertified concentrations (μg/g):

GBW 07701

Component	Value
Ag	0.034

Order information:

These CRMs are available for US$70 per unit (60 g). Price subject to change without notice. Please contact NRCCRM at the address above.

Reference:

National Research Center for CRMs (1991) Certified reference materials catalog. State Bureau of Technical Supervision, National Research Center for CRMs, Office of CRMs, Hepingjie, Chaoyangqu, Beijing, China. 86 pp.

GBW 07712 - 07720

Synthetic Limestones for Spectral Analysis

Source:

National Research Center for CRMs
Office of CRMs
No. 7 District 11
Hepingjie, Chaoyangqu
Beijing, 100013
CHINA

Description:

No information available.

Certified concentrations (μg/g):

Component	GBW 07712	GBW 07713	GBW 07714	GBW 07715	GBW 07716	GBW 07717	GBW 07718	GBW 07719	GBW 07720
	Value	Value	Value	Value	Value	Value	Value	Value	Value
Li	3.2	6.2	11.2	21	51	101	200	500	-
Be	0.22	0.52	1.0	2.0	5.0	10	20	50	100
B	2.2	5.2	10	20	50	100	200	500	-
Ti	31	61	111	210	510	1010	2000	5000	-
V	3.2	6.2	11.2	21	51	101	200	500	-
Cr	2.3	5.3	10.3	20.3	50	100	200	-	-
Mn	37	67	117	217	517	1020	2020	5000	10000
Co	2.3	5.3	10.3	20.3	50	100	200	-	-
Ni	2.1	5.1	10	20	50	100	200	500	-
Cu	2.2	5.2	10.2	20	50	100	200	500	1000
Zn	3.0	6.0	11	21	51	101	200	500	1000
Ga	2.8	5.8	10.8	20.8	51	101	200	-	-
As	2.2	5.2	10.2	20	50	100	200	500	-
Sr	170	200	250	350	650	1150	2150	5150	-
Y	2.1	5.1	10	20	50	100	200	-	-
Zr	4.0	7.0	12	22	52	102	202	500	-
Nb	2.5	5.5	10.5	20.5	50.5	100	200	-	-
Mo	0.21	0.51	1.0	2.0	5.0	10	20	50	100
Ag	-	0.06	0.11	0.21	0.51	1.0	2.0	5.0	10
Cd	-	0.05	0.1	0.2	0.5	1.0	2.0	5.0	10
Sn	0.28	0.58	1.1	2.1	5.1	10	20	50	100
Sb	0.21	0.51	1.0	2.0	5.0	10	20	50	100
Ba	24	54	104	204	504	1000	2000	5000	-
La	2.6	5.6	10.6	20.6	50.6	101	200	-	-
Ce	2.8	5.8	11	21	51	101	200	500	-
Yb	0.22	0.52	1.0	2.0	5.0	10	20	50	100
W	0.22	0.52	1.0	2.0	5.0	10	20	50	100

Component	GBW 07712 Value	GBW 07713 Value	GBW 07714 Value	GBW 07715 Value	GBW 07716 Value	GBW 07717 Value	GBW 07718 Value	GBW 07719 Value	GBW 07720 Value
Pb	2.4	5.4	10.4	20.4	50	100	200	500	1000
Bi	0.23	0.53	1.0	2.0	5.0	10	20	50	100

Noncertified concentrations (μg/g):

GBW 07712

Component	Value
Ag	0.030
Cd	0.023

Order information:

These CRMs are available for US$60 per unit (70 g). Price subject to change without notice. Please contact NRCCRM at the address above.

Reference:

National Research Center for CRMs (1991) Certified reference materials catalog. State Bureau of Technical Supervision, National Research Center for CRMs, Office of CRMs, Hepingjie, Chaoyangqu, Beijing, China. 86 pp.

GBW 08601 - 08609

Elements in Water

Source:

National Research Center for CRMs
Office of CRMs
No. 7 District 11
Hepingjie, Chaoyangqu
Beijing, 100013
CHINA

Description:

No information available.

Certified concentrations (μg/g):

CRM	Component	Value	CRM	Component	Value
GBW 08601	Pb	1.00	GBW 08608 (ng/g)	Cd	10.0
GBW 08602	Cd	0.100		Pb	50
GBW 08603	Hg	0.0100		Cu	30
GBW 08604	F	1.00		Cr	50
GBW 08605	As	0.500		Zn	90
GBW 08606	Chloride	22.0		Ni	60
	Nitrate	4.50	GBW 08609	Hg	1.00
	Sulfate	38.0			
GBW 08607	Cd	0.100			
	Pb	1.00			
	Cu	1.00			
	Cr	0.500			
	Zn	5.00			
	Ni	0.500			

Order information:

These CRMs are available for US$30 per unit (100 mL except for GBW 08605 and 08609 which are available in 20 mL quantities). Price subject to change without notice. Please contact NRCCRM at the address above.

Reference:

National Research Center for CRMs (1991) Certified reference materials catalog. State Bureau of Technical Supervision, National Research Center for CRMs, Office of CRMs, Hepingjie, Chaoyangqu, Beijing, China. 86 pp.

P11-01 - P18-01

Reference Materials for Pesticide Analysis

Source:

Office of Reference Materials
Laboratory of the Government Chemist
Queen's Road, Teddington
Middlesex TW11 0LY
ENGLAND

Description:

These pesticide samples of certified purity are intended for use as certified reference materials in the analysis of technical grade pesticides, formulations and residues. They are approved by the Collaborative International Pesticides Analytical Council Limited (CIPAC).

Available compounds:

Compound (* - 0.25 g vials; ** - 0.5 g sealed ampoules)	LGC number	Purity (mole percent)	Price (£)
Chlorinated compounds			
Aldrin *	P11-23	99.5	56
alpha-BHC *	P11-01	99.8	56
beta-BHC *	P11-02	98.9	56
delta-BHC *	P11-03	99.6	56
gamma-BHC	P11-04	99.7	56
Chlorbenside	P11-06	99.4	36
Chlordane	P11-08	Technical	36
o,p'-DDE *	P11-09	99.3	56
p,p'-DDE *	P11-10	99.8	56
o,p'-DDT *	P11-11	99.6	56
p,p'-DDT *	P11-12	99.8	36
Dichlobenil	P11-13	99.4	36
Dichlone	P11-14	99.9	36
p-Dichlorobenzene	P11-15	99.7	36
Dicloran	P11-16	99.9	36
Dieldrin *	P11-22	99.5	36
alpha-Endosulfan	P11-19	99.7	36
beta-Endosulfan	P11-20	99.9	36
Endrin *	P11-21	99.5	36
Hexachlorobenzene	P11-31	99.9	36
Quintozene	P11-25	99.3	36
o,p'-TDE *	P11-26	99.4	56
p,p'-TDE *	P11-27	99.3	56
p,p'-TDE (olefin) *	P11-29	99.7	36
Tecnazene	P11-30	99.8	36

Compound (* - 0.25 g vials; ** - 0.5 g sealed ampoules)	LGC number	Purity (mole percent)	Price (£)
Organophosphorus compounds			
Dimethoate	P12-04	98.9	36
Malathion	P12-05	99.6	36
Mecarbam	P12-06	99.6	36
Methidathion	P12-07	99.4	36
Pirimiphos-methyl	P12-08	99.9	56
Propetamphos	P12-09	99.0	36
Phenoxy-acids and related compounds			
4-CPA	P13-01	99.8	36
2,4-D (acid)	P13-02	99.7	36
2,4-D (methyl ester)	P13-03	99.7	36
2,4-DB	P13-04	99.2	36
2,4-Dichlorobenzoic acid	P13-05	99.7	36
Dichlorprop	P13-13	99.7	36
Dichlorprop (2-ethylhexyl ester)	P13-17	99.4	36
Fenoprop	P13-06	99.5	36
MCPA (acid)	P13-07	99.7	36
MCPA (2-ethylhexyl ester)	P13-14	99.6	36
MCPA (2-butoxyethyl ester)	P13-16	99.8	36
MCPB (acid)	P13-08	99.9	36
Mecoprop (MCPP)	P13-09	99.7	36
Mecoprop (2-butoxyethyl ester)	P13-15	99.5	36
2,4,5-T (acid)	P13-10	99.8	36
2,4,5-T (methyl ester)	P13-11	99.7	36
2,4,6-TBA (acid)	P13-12	99.0	36
Substituted urea compounds			
Chlorobromuron	P14-01	99.8	36
Chlorotoluron	P14-02	99.8	36
Diuron	P14-03	99.9	36
Linuron	P14-04	99.5	36
Monuron	P14-05	99.8	36
Heterocyclic and miscellaneous compounds			
Anthraquinone	P16-01	99.8	36
Asulam	P16-02	99.5	36
Atrazine	P16-03	99.3	36
Azobenzene	P16-04	99.9	36
Bentranil	P16-05	99.3	36
Biphenyl	P16-06	99.9	36
2,2'-Bipyridyl	P16-07	99.9	19
4,4'-Bipyridyl	P16-08	99.9	19
Bromoxynil	P16-09	99.9	36
Bromoxynil octanoate	P16-10	99.5	36
Bupirimate	P16-36	99.9	36
Carbaryl	P16-11	99.6	36
Clofentezine	P16-37	99.8	56
Cyanazine	P16-35	99.4	36
DEET	P16-12	99.0	36

Compound (* - 0.25 g vials; ** - 0.5 g sealed ampoules)	LGC number	Purity (mole percent)	Price (£)
Desmetryn	P16-32	98.5	19
Dimethirimol	P16-33	99.7	36
Dinobuton	P16-13	98.1	36
Dinoseb	P16-14	99.5	36
Dinoterb	P16-15	99.7	36
Dinoterb acetate	P16-16	99.9	36
Diphenyl sulphone	P16-17	99.9	36
Diquat dibromide	P16-18	100.0	36
DNOC	P16-19	99.6	36
Ethirimol	P16-34	99.6	36
Ioxynil	P16-20	99.9	36
Ioxynil octanoate	P16-21	99.2	36
Methyl mercury chloride	P15-02	>98	36
Nicotine **	P18-01	99.4	75
Paraquat dichloride	P16-22	100.0	36
Pentachlorophenol	P16-23	99.3	36
2-Phenylphenol	P16-24	99.6	19
Piperonyl butoxide	P16-25	94.8	36
Pirimicarb	P16-26	99.8	36
Prometryn	P16-27	99.6	36
Propoxur	P16-28	99.9	36
Simazine	P16-29	99.9	36
Terbutryn	P16-30	99.7	36
Thiabendazole	P12-10	99.7	56
Trietazine	P16-31	99.3	19
Pyrethroids			
cis-Permethrin	P17-01	99.1	30
Cypermethrin (certified for cis and trans isomer ratio)	P17-04	-	56
trans-Permethrin	P17-02	99.5	30

Order information:

These samples are available in 0.5-gram quantities in screw capped vials unless noted. Price subject to change without notice. Please contact LGC at the address shown above.

Reference:

Laboratory of the Government Chemist (1991) Certified Reference Materials. Issue No. 2. Office of Reference Materials, Laboratory of the Government Chemist, Queen's Road, Teddington, Middlesex TW11 0LY, England.

RM 8464 - 8469

Pesticides

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

These RMs are provided as primary reference compounds of measured purity are intended for use in the evaluation of procedures used on environmental samples.

Compound :

RM	Compound
8464	Aldrin
8465	Dieldrin
8466	gamma-HCH
8467	4,4'-DDE
8468	Heptachlor
8469	4,4'-DDT

Order information:

At the time of this writing, prices for these materials were not available. Please contact NIST at the address shown above.

References:

National Institute of Standards and Technology (1992) RM 8466. 4,4'-DDE. Report of investigation. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1992) RM 8467. γ-Hexachlorocyclohexane (Lindane). Report of investigation. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1992) RM 8469. 4,4'-DDT. Report of investigation. National Institute of Standards and Technology, Gaithersburg, MD, USA.

Trahey, N. M. (ed.) (1992) NIST Standard Reference Materials Catalog 1992-93. NIST Spec. Pub. 260, 162 pp. National Institute of Standards and Technology, Gaithersburg, MD, USA.

SRM 141c through 2144

Microchemical Elemental Analysis

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

These materials are highly purified chemicals used in evaluating microchemical procedures for the determination of C, N, S, H, Cl, F and/or Br in organic matter. SRM 142 is used for microdeterminations of methoxyl ion (CH_3O-).

Certified composition (nominal weight percent):

SRM	Compound	Element							
		C	H	N	Br	Cl	F	S	CH_3O-
141c	Acetanilide	71.09	6.71	10.36	-	-	-	-	-
142	Anisic acid	-	-	-	-	-	-	-	20.40
143c	Cystine	29.99	5.03	11.66	-	-	-	26.69	-
148	Nicotinic acid	58.54	4.09	11.38	-	-	-	-	-
2141	Urea	-	-	46.63	-	-	-	-	-
2142	o-Bromobenzoic acid	-	-	-	39.80	-	-	-	-
2143	p-Fluorobenzoic acid	-	-	-	-	-	13.54	-	-
2144	m-Chlorobenzoic acid	-	-	-	-	22.62	-	-	

Order information:

These SRMs range in price from US$78 to US$148 per unit (2-g vial). Price subject to change without notice. Please contact NIST at the address shown above.

References:

National Institute of Standards and Technology (1969) SRM 142. Anisic acid. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1970) SRM 148. Nicotinic acid. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1970) SRM 2141. Urea. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1970) SRM 2142. o-Bromobenzoic acid. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1973) SRM 2144. m-Chlorobenzoic acid. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1976) SRM 141c. Acetanilide. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1976) SRM 143c. Cystine. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1982) SRM 2143. p-Fluorobenzoic acid. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

SRM 185g through 2192

pH and pD Calibration Solutions

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

These SRMs are intended for use in the preparation of solutions for calibrating electrodes for pH and pD measuring systems. The pH value of the standards, pH(S), corresponds to $\log(1/a_H)$ where a_H is a conventional activity of the hydrogen ion referred to the standard state on the molal scale. The pH or pD values, as a function of temperature, are reported in the Certificates of Analysis and were derived from emf measurements of cells without liquid junction by the method of calculation described in Bates (1962). SRMs 186Ie and 186IIe, 191a and 192a, and 922 and 923 are each certified as an admixture only. SRM 186Ie and 186IIe may be used to prepare solutions with a pH of 6.863 at 25°C or a physiological buffer solution with a pH of 7.41 at 25°C. SRMs 2185, 2186I and 2186II, 2191a, and 2192a are certified for use as an admixture only and are used for preparation of known deuterium ion concentrations solutions in pD determinations. Some of the materials used for the SRMs were purchased from commercial sources and may contain impurities such as occluded water, free acid or alkali, chlorides, sulfur or heavy metals.

SRM		pH(S) at 25°C	Cost US$	Unit size (g)
SRM 185g	Potassium hydrogen phthalate	4.006	128	60
SRM 186Ie	Potassium dihydrogen phosphate	-	111	30
SRM 186IIe	Disodium hydrogen phosphate	-	111	30
SRM 187c	Sodium tetraborate decahydrate (Borax)	9.180	107	30
SRM 188	Potassium hydrogen tartrate	3.557	111	60
SRM 189a	Potassium tetroxalate	1.681	125	65
SRM 191a	Sodium bicarbonate	10.011	106	25
SRM 192a	Sodium carbonate	10.011	106	30
SRM 922	Tris(hydroxymethyl)aminomethane	7.699	106	25
SRM 923	Tris(hydroxymethyl)aminomethane hydrochloride	12.46	106	35
SRM 2193	Calcium carbonate	12.46	141	30

SRM		pD(S) at 25°C	Cost US$	Unit size (g)
SRM 2185	Potassium hydrogen phthalate	4.518	137	60
SRM 2186I	Potassium dihydrogen phosphate	7.428	113	30
SRM 2186II	Disodium hydrogen phosphate	7.428	113	30
SRM 2191a	Sodium bicarbonate	10.732	137	30
SRM 2192	Sodium carbonate	10.732	137	30

Order information:

Prices and unit quantities are listed above. Price subject to change without notice. Please contact NIST at the address shown above.

References:

Bates, R.G. (1962) Revised standard values for pH measurements from 0 to 95°C. J. Res. National Bureau of Standards, 66A:179-84.

Trahey, N. M. (ed.) (1992) NIST Standard Reference Materials Catalog 1992-93. NIST Spec. Pub. 260, 162 pp. National Institute of Standards and Technology, Gaithersburg, MD, USA.

SRM 610 - 617

Trace Elements in Glass Matrices

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

These SRMs were produced and certified to facilitate the development of trace analytical methods. A glass support matrix (72% SiO_2, 12% CaO, 14% Na_2O, 2% Al_2O_3) was spiked with 500, 50, 1 and 0.02 ppm each of 61 elements to produce the 4 sets of SRMs. The material was prepared in rod form and then sliced into 3- and 1-mm thick wafers. The certification process for some of the spiked elements is underway.

Certified concentrations (µg/g):

Element	Value	Uncertainty (±)
SRM 610 and 611		
Mn	485	10
Fe	458	9
Ni	458.7	4
Rb	425.7	0.8
Sr	515.5	0.5
Pb	426	1
Th	457.2	1.2
U	461.5	1.1
SRM 612 and 613		
Mn	39.6	0.8
Fe	51	2
Co	35.5	1.2
Ni	38.8	0.2
Rb	31.4	0.4
Sr	78.4	0.2
Ag	22.0	0.3
Pb	38.57	0.2
Th	37.79	0.08
U	37.38	0.08

Element	Value	Uncertainty (±)
SRM 614 and 615		
K	30	1
Cu	1.37	0.07
Rb	0.855	0.005
Sr	45.8	0.1
Ag	0.42	0.04
Pb	2.32	0.04
Th	0.748	0.006
U	0.823	0.002
SRM 616 and 617		
K	29	1
Sr	41.72	0.05
Pb	1.85	0.04
Th	0.0252	0.0007
U	0.0721	0.0013

Noncertified concentrations (μg/g):

Element	Value	Uncertainty (±)
SRM 610 and 611		
B	351	-
K	461	-
Ti	437	-
Co	390	-
Cu	444	4
Zn	433	-
Ag	254	10
Au	25	-
Tl	61.8	2.5
SRM 612 and 613		
B	32	-
K	64	-
Ti	50.1	0.8
Cu	37.7	0.9
La	36	-
Ce	39	-
Sm	39	-
Eu	36	-
Gd	39	-
Yb	42	-
Au	5	_
Tl	15.7	0.3

Element	Value	Uncertainty (±)
SRM 614 and 615		
B	1.30	0.2
Sc	0.59	0.04
Ti	3.1	0.3
Fe	13.3	1
Co	0.73	0.02
Ni	0.95	-
Ga	1.3	-
Sb	1.06	-
La	0.83	0.02
Eu	0.99	0.04
Au	0.5	-
Tl	0.269	0.005
SRM 616 and 617		
B	0.20	0.02
Ti	2.5	0.7
Fe	11	2
Cu	0.80	0.09
Ga	0.23	0.02
Rb	0.100	0.007
Sb	0.078	0.007
La	0.034	0.007
Au	0.18	0.01
Tl	0.0082	0.0005

Order information:

These SRMs consist of 3- and 1-mm wafers and can be purchased for US$150 per set (6 wafers). Price subject to change without notice. Please contact NIST at the address shown above.

References:

National Institute of Standards and Technology (1982) SRM 610, 611. Trace elements in a glass matrix. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1982) SRM 612, 613. Trace elements in a glass matrix. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1982) SRM 614, 615. Trace elements in a glass matrix. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1982) SRM 616, 617. Trace elements in a glass matrix. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

SRM 640b

Silicon Powder 2ø/d-Spacing Standard for X-Ray Diffraction

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

This SRM was prepared for use as an external or internal 2ø/d-spacing calibration standard for powder diffractometry. SRM 640b is a high purity silicon powder prepared by grinding electronic grade silicon rods, followed by jet milling to reduce particle size. The median particle size is about 5 μm.

Certified lattice parameter (Å):

Spacing	Value	Uncertainty (±)
(a)	5.430940	0.000035

Order information:

SRM 640b can be purchased for US$129 per unit (7.5-gram bottle). Price subject to change without notice. Please contact NIST at the address shown above.

Reference:

National Institute of Standards and Technology (1987) SRM 640b. Silicon powder 2ø/d-spacing standard for x-ray diffraction. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

SRM 674a

X-Ray Powder Diffraction Intensity Set

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

This SRM consists of five different phases, bottled separately. These are: α-Al_2O_3 (corundum structure), ZnO (wurtzite structure), TiO_2 (rutile structure), Cr_2O_3 (corundum structure), and CeO_2 (fluorite structure). These phases can be used as internal standards for quantitative analysis and as external standards for checking the intensity response of x-ray diffraction instruments. The five phases cover the range of linear absorption coefficients from 100 to 1000 cm^{-1} for Cu K-alpha radiation.

Certified intensities of major lines:

hkl	2ø (°)	I_{rel}	Sigma
α-Al_2O_3 (corundum structure), $\mu_{CuK\alpha}$ = 126 cm^{-1}			
012	25.54	58.7	0.19
104	35.10	87.2	0.22
110	37.72	38.3	0.09
113	43.30	100.0	NA[Δ]
024	52.48	46.1	0.07
116	57.44	94.1	0.09
214	66.44	35.7	0.09
300	68.14	52.4	0.34
ZnO (wurtzite structure), $\mu_{CuK\alpha}$ = 279 cm^{-1}			
100	31.70	57.9	0.12
002	34.36	42.1	0.06
101	36.18	100.0	NA
102	47.48	23.5	0.02
110	56.52	35.4	0.07
103	62.80	31.6	0.05
200	66.30	4.8	0.01
112	67.88	25.6	0.06

Δ Not available.

SRM 674a (cont.)

Certified intensities of major lines:

hkl	2ø (°)	I^{rel}	Sigma
TiO_2 (rutile structure), $\mu_{CuK\alpha}$ = 536 cm^{-1}			
110	27.38	100.0	NA
101	36.04	42.7	0.09
111	41.18	20.4	0.03
211	54.28	56.6	0.07
220	56.58	16.6	0.04
002	62.72	8.0	0.03
301	68.96	(17.2)	0.07
112	69.76	(5.6)	0.12
Cr_2O_3 (corundum structure), $\mu_{CuK\alpha}$ = 912 cm^{-1}			
012	24.42	67.6	0.35
104	33.53	100.0	NA
110	36.12	80.8	0.68
113	41.40	30.9	0.13
024	50.14	36.9	0.19
116	54.76	92.1	0.22
214	63.38	28.6	0.13
300	65.04	37.5	0.20
CeO_2 (fluorite structure), $\mu_{CuK\alpha}$ = 2203 cm^{-1}			
111	28.60	100.0	NA
200	33.12	27.8	0.05
220	47.52	55.2	0.19
311	56.38	43.8	0.14

Reference intensity ratios:

Phase	hkl	I/I_c	Sigma
ZnO	101	5.33	0.06
TiO_2	110	3.32	0.04
Cr_2O_3	104	2.16	0.02
CeO_2	111	13.15	0.10

Lattice parameters (25 ± 2°C), Cu Kα radiation (μ = 124.1 cm^{-1}):

Phase	Crystal	a (Å)	Sigma	c (Å)	Sigma
α–Al_2O_3	Trigonal	4.759397	0.000080	12.99237	0.00022
ZnO	Hexagonal	3.249074	0.000055	5.206535	0.000101
TiO_2	Tetragonal	4.593939	0.000062	2.958862	0.000063
Cr_2O_3	Trigonal	4.959610	0.000079	13.59747	0.00025
CeO_2	Cubic	5.411102	0.000097	NA	NA

SRM 674a (cont.)

Particle size data:

Phase	90% finer than (μm)	50% finer than (μm)
α–Al_2O_3	1.5	0.6
ZnO	2.5	0.79
TiO_2	0.7	0.45
Cr_2O_3	2.0	0.87
CeO_2	2.8	0.75

Order information:

SRM 674a can be purchased for US$302 per unit (20-gram bottle). Price subject to change without notice. Please contact NIST at the address shown above.

Reference:

National Institute of Standards and Technology (1989) SRM 674a. X-ray powder diffraction intensity set. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

SRM 675

Low 2ø (Large d-Spacing) Standard for X-Ray Powder Diffraction

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

This SRM was prepared for use as an external or internal low 2ø (large d-spacing) calibration standard for powder diffractometry. The material is synthetic fluorophlogopite mica and is best suited for reflection diffractometry as pressed samples have a high degree of preferred orientation in which only the 001 reflections have significant intensity. The mica was ground to pass a 75-µm sieve.

Certified d-spacing (Å):

Spacing	Value	Uncertainty (±)
d(001)	9.98104	0.00007

Order information:

SRM 675 can be purchased for US$155 per unit (5 gram bottle). Price subject to change without notice. Please contact NIST at the address shown above.

Reference:

National Institute of Standards and Technology (1982) SRM 675. Low 2ø (large d-spacing) standard for x-ray powder diffraction. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

SRM 676

Alumina Internal Standard

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

This SRM consists of a phase-pure alumina (corumdum structure) powder intended primarily for use as an internal standard for quantitative analysis and I/I_c determinations by x-ray powder diffraction. The powder consists of sub-micron equi-axial grains which have been de-aggregated and calcined. The certified parameters are 7 relative intensity values and lattice parameters.

Order information:

Price was not available at the time of writing. Please contact NIST at the address shown above.

Reference:

National Institute of Standards and Technology (1992) SRM 676. Alumina internal standard. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

SRM 869

Column Selectivity Test Mixture for Liquid Chromatography

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

SRM 869 is an acetonitrile solution of three PAHs and is a new type of SRM intended for certifying the performance characteristics of reversed-phased liquid chromatography columns rather than proving quantitative levels of the individual constituents. Selectivity ranges for various commercial C_{18} columns are provided in the Certificate.

PAHs in SRM 869:

Benzo[a]pyrene
1,2:3,4:5,6:7,8-Tetrabenzonaphthalene (TBN, dibenzo[g,p]chrysene
Phenanthro[3,4-c]phenanthrene

Order information:

SRM 869 can be purchased for US$99 per unit (5 1.1 mL ampoules). Price subject to change without notice. Please contact NIST at the address shown above.

Reference:

National Institute of Standards and Technology (1990) SRM 869. Column selectivity test mixture for liquid chromatography. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

SRM 930D and 1930

Glass Filters for Spectrophotometry

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

SRM 930D consists of three neutral glass filters. The glass filters have transmittances of approximately 10, 20, and 30%. Each filter is individually calibrated and certified for absorbance and transmittance at wavelengths 440, 465, 546.1, 590, and 635 nm. The 546.1 nm wavelength coincides with the mercury emission line. SRM 1930 compliments 930D and consists of three individual glass filters in metal holders. SRM 1930 is intended fro use in the verification and calibration of the transmittance and absorbance scales of spectrophotometers at 440, 465, 546, 590, and 635 nm in the visible spectrum. It is complementary to SRM 930D.

Order information:

SRM 930D can be purchased for US$1278 per each set, and SRM 1930 for US$1708. Price subject to change without notice. Please contact NIST at the address shown above.

References:

National Institute of Standards and Technology (1984) SRM 1930. Glass filters for spectrophotometry. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

Trahey, N. M. (ed.) (1992) NIST Standard Reference Materials Catalog 1992-93. NIST Spec. Pub. 260, 162 pp. National Institute of Standards and Technology, Gaithersburg, MD, USA.

SRM 931d

Liquid Filters

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

These filters are absorbance standards for use in ultraviolet and visible spectrophotometry. This SRM consists of three sets of four vials, each containing a blank solution and three solutions of different concentrations of an absorbing liquid. The net absorbances are certified for each concentration at wavelengths of 302, 395, 512, and 678 nm.

Order information:

SRM 931e can be purchased for US$230 per unit. Price subject to change without notice. Please contact NIST at the address shown above.

Reference:

Trahey, N. M. (ed.) (1992) NIST Standard Reference Materials Catalog 1992-93. NIST Spec. Pub. 260, 162 pp. National Institute of Standards and Technology, Gaithersburg, MD, USA.

SRM 935a - 936

Potassium Dichromate and Quinine Sulfate Dihydrate

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

SRM 935a consists of crystalline potassium dichromate ($K_2Cr_2O_7$) of established purity certified for use as an ultraviolet absorbance standard. Solutions made with this SRM in 0.001 N perchloric acid ($HClO_4$) are certified for their molecular emission spectrum at 23.5° C and wavelengths of 235, 257, 313, 345, and 350 nm. SRM 936 consists of powdered quinine sulfate dihydrate of known purity certified for use as an spectrofluorimetric emission standard. Solutions made with this SRM in 0.1 N perchloric acid ($HClO_4$) are certified for their molecular emission spectrum, E(g), at 25° C and a wavelength range of 375 to 675 nm.

Order information:

SRM 935a can be purchased for US$160 per unit (15 g) and SRM 936 for US$168 per unit (1 g). Price subject to change without notice. Please contact NIST at the address shown above.

Reference:

Trahey, N. M. (ed.) (1992) NIST Standard Reference Materials Catalog 1992-93. NIST Spec. Pub. 260, 162 pp. National Institute of Standards and Technology, Gaithersburg, MD, USA.

SRM 1491

Aromatic Hydrocarbons in Hexane/Toluene

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

The chemicals used in the preparation of this SRM were obtained from commercial sources or the Community Bureau of Reference, Belgium. The solution was prepared at NIST by weighing and mixing the individual components and toluene, adding hexane and then mixing until completely dissolved and homogenized. The total mass of this solution was then measured. The calculated concentration based on the mass of each compound (adjusted for its consensus purity estimate) in the total mass of the solution is given in the Certificate of Analysis for each component. The bulk solution was then chilled to approximately -5 °C, 1.2-mL aliquots were dispensed into 2-mL amber ampoules and flame sealed. This SRM is similar to SRM 2260.

Certified concentrations (μg/mL):

Compound	Value	Uncertainty (±)	Compound	Value	Uncertainty (±)
1-Methylnaphthalene	8.3	0.3	Benzo[k]fluoranthene	5.57	0.08
1-Methylphenanthrene	7.0	0.2	Biphenyl	7.00	0.03
2,3,5-Trimethylnaphthalene	6.6	0.2	Chrysene	7.03	0.04
2,6-Dimethylnaphthalene	7.2	0.3	Dibenz[a,h]anthracene	5.18	0.12
Acenaphthene	7.28	0.2	Fluoranthene	5.91	0.04
Acenaphthylene	6.96	0.05	Fluorene	7.27	0.05
Anthracene	7.82	0.04	Indeno[1,2,3-cd]pyrene	6.29	0.05
Benz[a]anthracene	3.59	0.03	Naphthalene	6.89	0.07
Benzo[a]pyrene	6.79	0.06	Phenanthrene	7.01	0.05
Benzo[b]fluoranthene	5.25	0.04	Perylene	7.12	0.04
Benzo[e]pyrene	5.62	0.03	Pyrene	5.89	0.06
Benzo[ghi]perylene	5.29	0.09			

Noncertified concentration (μg/g):

Compound	Value
2-Methylnaphthalene	11.3

Order information:

SRM 1491 can be purchased for US$152 per unit (5 2-mL ampoules). Price subject to change without notice. Please contact NIST at the address shown above.

SRM 1491 (cont.)

Reference:

National Institute of Standards and Technology (1989) SRM 1491: Aromatic hydrocarbons in hexane/toluene. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

SRM 1492

Chlorinated Pesticides in Hexane

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

This SRM is a solution of 15 chlorinated pesticides in hexane and is intended primarily for use in the calibration of chromatographic instrumentation. The pesticides used were obtained from the EPA Pesticides and Industrial Chemicals Repository and the Office of the Government Chemist of the United Kingdom. The solution was prepared by weighing and mixing the individuals pesticides and hexane.

Certified concentrations (ng/mL):

Compound	Value	Uncertainty (±)	Compound	Value	Uncertainty (±)
2,4'-DDD	200	3	Dieldrin	205	3
2,4'-DDE	202	2	gamma-HCH	205	2
2,4'-DDT	205	3	Heptachlor	200	5
4,4'-DDD	197	2	Heptachlor epoxide	204	5
4,4'-DDE	204	2	Hexachlorobenzene	207	2
4,4'-DDT	202	2	Mirex	204	2
Aldrin	202	3	*trans*-Nonachlor	198	4
cis-Chlordane	203	2			

Order information:

SRM 1492 can be purchased for US$183 per unit (5 1.2-mL ampoules). Price subject to change without notice. Please contact NIST at the address shown above.

Reference:

National Institute of Standards and Technology (1989) SRM 1492. Chlorinated pesticides in hexane. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

SRM 1543

GC/MS System Reference Standard

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

This SRM is intended primarily for use in evaluating the sensitivity of gas chromatography/mass spectrometry (GC/MS) instrumentation. It consists of four solutions: two concentrations of methyl stearate in hexane and two concentrations of benzophenone in hexane.

Certified concentrations (ng/μL):

Compound	Value	Uncertainty (±)
Methyl stearate	0.99	0.02
Methyl stearate	4.98	0.08
Benzophenone	1.01	0.02
Benzophenone	5.01	0.07

Order information:

SRM 1543 can be purchased for US$99 per unit (4 ampoules). Price subject to change without notice. Please contact NIST at the address shown above.

Reference:

National Institute of Standards and Technology (1984) SRM 1543. GC/MS system reference material. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

SRM 1583

Chlorinated Pesticides in 2,2,4-Trimethylpentane

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

Pesticides and 2,2,4-trimethylpentane were obtained from commercial sources. The pesticide solutions were prepared at NIST by weighing and mixing individual pesticides and 2,2,4-trimethylpentane. These solutions were dispensed into 2-mL amber ampoules. This SRM is intended primarily for calibrating methods for the determination of the chlorinated pesticides certified in this standard. It can also be used for adding known amounts of these pesticides to samples in recovery studies.

Certified concentrations:

	µg/g		µg/mL	
Compound	Value	Uncertainty (±)	Value	Uncertainty (±)
Aldrin	0.86	0.01	0.59	0.01
gamma-BHC	1.11	0.01	0.77	0.01
delta-BHC	0.76	0.01	0.53	0.01
p,p'-DDE	1.23	0.03	0.85	0.02
p,p'-DDT	1.90	0.10	1.31	0.07

Noncertified concentration (µg/mL):

Heptachlor epoxide	0.997

Order information:

SRM 1583 can be purchased for US$190 per unit (6 1-mL ampoules). Price subject to change without notice. Please contact NIST at the address shown above.

Reference:

National Institute of Standards and Technology (1985) SRM 1583. Chlorinated pesticides in 2,2,4-trimethylpentane. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

SRM 1584

Priority Pollutant Phenols in Methanol

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

This SRM is intended primarily for the calibration of chromatographic instrumentation used in the determination of phenols. Due to its miscibility with water, it can also be used to fortify aqueous samples with known amounts of phenols. Since the density of methanol changes with temperature, the concentrations are certified only for the temperature range between 19 and 27°C only. The methanol solutions are sealed under nitrogen in amber glass ampoules.

Certified concentrations (μg/mL):

Compound	Value	Uncertainty (±)	Compound	Value	Uncertainty (±)
2-Chlorophenol	64.4	1.4	2-Nitrophenol	25.2	0.7
4-Chloro-m-cresol	27.4	0.4	4-Nitrophenol	20.7	0.7
2,4-Dichlorophenol	35.6	1.3	Pentachlorophenol	15.4	1.1
2,4-Dimethylphenol	51.6	0.2	Phenol	29.7	0.9
4,6-Dinitro-o-cresol	20.1	0.9	2,4,6-Trichlorophenol	20.4	1.9

Noncertified concentration (μg/mL):

2,4-Dinitrophenol	22.4

Order information:

SRM 1584 can be purchased for US$156 per unit (5 1.2-mL ampoules). Price subject to change without notice. Please contact NIST at the address shown above.

Reference:

National Institute of Standards and Technology (1984) SRM 1584. Priority pollutant phenols in methanol. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

SRM 1585

Chlorinated Biphenyls in 2,2,4-Trimethylpentane (Isooctane)

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

The chlorinated biphenyl compounds (PCBs) and 2,2,4-trimethylpentane were obtained from commercial sources. A solution was prepared at NIST by weighing and mixing the individual compounds and 2,2,4-trimethylpentane. This solution was dispensed into 2-mL amber ampoules which were then flame sealed.

Certified concentrations (μg/mL):

Compound	Value	Uncertainty (±)	Compound	Value	Uncertainty (±)
PCB 3	29.9	0.7	PCB 77	4.56	0.03
PCB 15	6.57	0.06	PCB 101	3.61	0.01
PCB 28	2.55	0.01	PCB 138	1.63	0.01
PCB 52	5.32	0.04	PCB 153	2.11	0.01

Order information:

SRM 1585 can be purchased for US$234 per unit (5 1.2-mL ampoules). Price subject to change without notice. Please contact NIST at the address shown above.

Reference:

National Institute of Standards and Technology (1986) SRM 1585. Chlorinated biphenyls in 2,2,4-trimethylpentane (isooctane). Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

SRM 1586

Isotopically Labeled and Unlabeled Priority Pollutants in Methanol

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

SRM 1586 is composed of two solutions that were prepared at NIST by weighing and mixing ten individual compounds and the methanol solvent. The solutions were kept chilled and were stored in ampoules. The ampoules were purged with nitrogen before being sealed. All the chemicals used in the preparation of this SRM were obtained from commercial sources and were deemed the best available at the time. Information on the purity and percent of molecules labeled can be found in the certificate of analysis. This SRM is intended primarily for use in the evaluation and calibration of analytical instrumentation used for the determination of priority pollutants as classified by the US Environmental Protection Agency.

Certified concentrations (μg/g):

SRM 1586-1

Compound	Value	Uncertainty	Compound	Value	Uncertainty
Benzene	101.1	0.8	2,4-Dichlorophenol	102.5	0.6
Benzo[a]pyrene	49.2	0.2	Naphthalene	126.5	1.2
bis(2-Ethyl hexyl)= phthalate	63.9	1.7	Nitrobenzene	126.0	1.1
Carbon tetrachloride	128.5	0.5	2-Nitrophenol	103.6	3.2
Chlorobenzene	133.0	0.6	Phenol	117.0	1.3

SRM 1586-2

Compound	Value	Uncertainty
Benzene-d_6	99.0	0.5
Benzo[a]pyrene-d_{12}	44.1	2.1
bis(2-Ethyl hexyl)phthalate-d_4	60.4	0.7
Carbon tetrachloride-^{13}C	124.4	2.1
Chlorobenzene-d_5	144.0	1.3
2,4-Dichlorophenol-d_3	82.2	1.6
Naphthalene-d_8	126.6	1.0
Nitrobenzene-d_5	134.5	1.4
2-Nitrophenol-d_4	101.9	2.3
Phenol-d_5	116.0	0.6

SRM 1586 (cont.)

Order information:

SRM 1586 can be purchased for US$243 per unit (set of 6 2 5-mL ampoules). Price subject to change without notice. Please contact NIST at the address shown above.

Reference:

National Institute of Standards and Technology (1984) SRM 1586. Isotopically labeled and unlabeled priority pollutants in methanol. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

SRM 1587

Nitrated Polycyclic Aromatic Hydrocarbons in Methanol

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

This SRM consists of four vials each containing approximately 1 mL of a methanol solution of seven nitrated polynuclear aromatic hydrocarbons (N-PAHs). Methanol was purged with argon (Ar) and its weight determined. After known weights of the seven N-PAHs were added to the methanol, the headspace of the mixing container was filled with Ar and the solution stirred in the dark for 20 hours. Each 2-mL amber glass ampoule was purged with Ar prior to the addition of the methanol solution and then flame-sealed.

Certified concentrations (μg/g):

Compound	Value	Uncertainty (±)
9-Nitroanthracene	5.01	0.11
7-Nitrobenz[a]anthracene	9.27	0.23
6-Nitrochrysene	8.13	0.11
2-Nitrofluoranthene	9.24	0.06
2-Nitrofluorene	9.67	0.39
1-Nitropyrene	8.95	0.28

Information only value (μg/g):

6-Nitrobenzo[a]pyrene	6.1

Order information:

SRM 1587 can be purchased for US$259 per unit (4 1-mL ampoules). Price subject to change without notice. Please contact NIST at the address shown above.

Reference:

National Institute of Standards and Technology (1985) SRM 1587. Nitrated polycyclic aromatic hydrocarbons in methanol. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

SRM 1596

Dinitropyrene Isomers and 1-Nitropyrene in Methylene Chloride

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

SRM 1596 was prepared gravimetrically from a mixture of three dinitropyrene isomers and the addition of 1-nitropyrene as an individual component. The isomers were obtained from the Midwest Research Institute and no corrections were made for purity since it was found to be at least 99% for all compounds used. The final solution was dispensed into 2-mL amber ampoules which were then flame sealed.

Certified concentrations (μg/mL):

Compound	Value	Uncertainty (±)
1-Nitropyrene	5.81	0.11
1,3-Dinitropyrene	2.70	0.04
1,6-Dinitropyrene	6.39	0.23
1,8-Dinitropyrene	10.48	0.20

Order information:

SRM 1596 can be purchased for US$419 per unit (5 1.2-mL ampoules). Price subject to change without notice. Please contact NIST at the address shown above.

Reference:

National Institute of Standards and Technology (1986) SRM 1596. Dinitropyrene isomers and 1-nitropyrene in methylene chloride. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

SRM 1614

Dioxin (2,3,7,8-TCDD in Isooctane)

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

This SRM consists of separate solutions of unlabeled and labeled 2,3,7,8-tetrachlorodibenzo-p-dioxin (2,3,7,8-TCDD) in 2,2,4-trimethylpentane (isooctane). Three ampoules contain approximately 1.2 mL each of an isooctane solution on unlabeled 2,3,7,8-TCDD, and three ampoules contain approximately 1.2 mL each of an isooctane solution on $^{13C\text{-labelled}}$ 2,3,7,8-TCDD. This SRM is intended primarily for evaluation of analytical methods used in the determination of 2,3,7,8-TCDD.

Certified concentrations:

	ng/g		ng/mL	
Compound	Value	Uncertainty (±)	Value	Uncertainty (±)
2,3,7,8-TCDD	98.3	3.3	67.8	2.3
2,3,7,8-TCDD-^{13}C	95.6	1.5	65.9	1.0

Noncertified concentrations:

Solution	Compound	Value (ng/g)	Value (ng/mL)
Unlabeled	Trichlorodibenzo-p-dioxin-$^{12}C_{12}$	1.5	1.0
Labeled (^{13}C)	Trichlorodibenzo-p-dioxin-$^{13}C_{12}$	3.9	2.7

Order information:

SRM 1614 can be purchased for US$239 per unit (6 1.2-ml ampoules). Price subject to change without notice. Please contact NIST at the address shown above.

Reference:

National Institute of Standards and Technology (1985) SRM 1614. Dioxin (2,3,7,8-TCDD in isooctane). Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

WARNING:

The toxicity and/or carcinogenicity of 2,3,7,8-TCDD has not been precisely defined so this material should be treated as a potential health hazard. Techniques used in handling radioactive and infectious materials are applicable to 2,3,7,8-TCDD.

SRM 1639

Halocarbons (in Methanol) for Water Analysis

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

This SRM is intended primarily for use with chromatographic instrumentation used for the determination of halocarbons and in recovery studies for adding known amounts of the certified compounds to a sample. The methanol solution of halocarbons was prepared at NIST, chilled and stored in 2-mL amber glass ampoules. The ampoules were purged with argon immediately before filling with the methanol solution.

Certified concentrations (ng/μL):

Compound	Value	Uncertainty (±)
Bromodichloromethane	389.9	7.1
Bromoform	86.5	1.4
Carbon tetrachloride	157.0	4.4
Chlorodibromomethane	124.6	1.1
Chloroform	6235	340
Tetrachloroethylene	40.6	0.9
Trichloroethylene	85.8	2.6

Order information:

SRM 1639 can be purchased for US$248 per unit (4 ampoules). Price subject to change without notice. Please contact NIST at the address shown above.

Reference:

National Institute of Standards and Technology (1983) SRM 1639. Halocarbon (in methanol) for water analysis. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

SRM 1641b

Mercury in Water

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

This SRM consists of a solution of mercury in nitric acid. Gold tetrachloride ($AuCl_4$) has been added as a stabilizer at a concentration ten times that of Hg.

Certified concentrations (μg/mL):

Value	Uncertainty (±)
1.52	0.04

Order information:

SRM 1641b can be purchased for US$1848 per unit (6 20-mL ampoules). Price subject to change without notice. Please contact NIST at the address shown above.

Reference:

National Institute of Standards and Technology (1983) SRM 1641b. Mercury in water - μg/mL. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

SRM 1643c

Trace Elements in Water

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

This SRM is intended primarily for use in evaluating the accuracy of trace element determination in filtered and acidified fresh water and for calibrating instrumentation used in these determinations. SRM 1643c was prepared at the US Geological Survey's Branch of Quality Assurance in Golden, Colorado, USA, using high-purity reagents. All containers were acid-cleaned and sterilized before use. Solutions containing known amounts of the analytes were added to a 0.5 M HNO_3 solution in a polyethylene tank. The solution was mixed, then filtered, sterilized, and transferred to 500 mL polyethylene bottles.

Certified concentrations (μg/mL):

Element	Value	Uncertainty (±)	Element	Value	Uncertainty (±)
Li	16.5	1.0	Zn	73.9	0.9
B	119.0	1.4	As	82.1	1.2
Be	23.2	2.2	Se	12.7	0.7
Al	114.6	5.1	Rb	11.4	0.2
V	31.4	2.8	Sr	263.6	2.6
Cr	19.0	0.6	Mo	104.3	1.9
Mn	35.1	2.2	Ag	2.21	0.30
Fe	106.9	3.0	Cd	12.2	1.0
Co	23.5	0.8	Ba	49.6	3.1
Ni	60.6	7.3	Pb	35.3	0.9
Cu	22.3	2.8			

Noncertified concentrations (μg/mL):

Element	Value	Element	Value
K	2.3	Tl	7.9
Te	2.7	Bi	12

Order information:

SRM 1643c can be purchased for US$148 per unit (500 mL). Price subject to change without notice. Please contact NIST at the address shown above.

Reference:

National Institute of Standards and Technology (1991) SRM 1643c. Trace elements in water. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

SRM 1644

Generator Columns for Polynuclear Aromatic Hydrocarbons

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

This SRM consists of three 50 cm x 0.6 cm coiled, stainless-steel tubes, each packed with fine quintus quartz (sea sand) coated with approximately 0.5% by weight of the polynuclear aromatic hydrocarbon (PAH) of interest. A saturated aqueous solution of the PAH of interest can be generated by flowing high-purity water slowly through the column. Because the aqueous solubility of a compound is a well-defined thermodynamic quantity, a saturated solution has a fixed concentration. The concentration of these solutions generated at temperatures between 10 and 30°C are reported in the certificate of analysis. The generator columns are certified for two years or for a total aqueous purge volume of between 100 and 10,000 liters, whichever comes first.

Certified concentrations at 25° C (µg/kg):

Compound	Value	Uncertainty (±)
Anthracene	42.7	0.6
Benz[a]anthracene	9.05	1.0
Benzo[a]pyrene	1.59	0.04

Order information:

SRM 1644 can be purchased for US$358 per unit (set of 3 columns). Price subject to change without notice. Please contact NIST at the address shown above.

Reference:

National Institute of Standards and Technology (1981) SRM 1644. Generator columns for polynuclear aromatic hydrocarbons. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

SRM 1647b

Priority Pollutant Polynuclear Aromatic Hydrocarbons (in Acetonitrile)

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

The acetonitrile (C_2H_3N) solution of 16 polynuclear aromatic hydrocarbons (PAHs) was prepared gravimetrically from individual compounds obtained from BCR (Community Bureau of Reference) and commercial sources. The solution was aliquoted into 2-mL amber glass ampoules. The ampoules were purged with argon just prior to filling. Ultraviolet absorption data between 205-600 nm are supplied. This SRM is intended for calibrating chromatographic instrumentation used in the determination of the PAHs certified for this SRM. It is also useful in recovery studies for adding known accurate amounts of these PAHs to a sample; and because of its miscibility with water, it can be used to fortify aqueous samples with known concentrations of PAHs. Since the density of acetonitrile changes with temperature, the concentrations are certified for the temperature range of 21 to 25°C.

Certified concentrations (μg/mL):

Compound	Value	Uncertainty (±)	Compound	Value	Uncertainty (±)
Acenaphthene	19.89	0.33	Chrysene	3.69	0.07
Acenaphthylene	16.15	0.24	Dibenz[a,h]anthracene	3.64	0.06
Anthracene	0.75	0.05	Fluoranthene	7.76	0.13
Benz[a]anthracene	3.94	0.06	Fluorene	4.79	0.09
Benzo[b]fluoranthene	4.16	0.04	Indeno[1,2,3-cd]pyrene	4.37	0.06
Benzo[k]fluoranthene	4.70	0.07	Naphthalene	19.80	0.95
Benzo[a]pyrene	4.92	0.09	Phenanthrene	3.50	0.04
Benzo[ghi]perylene	3.76	0.08	Pyrene	8.38	0.11

Order information:

SRM 1647b can be purchased for US$176 per unit (5 2-mL vials). Price subject to change without notice. Please contact NIST at the address shown above.

Reference:

National Institute of Standards and Technology (1990) SRM 1647b. Priority pollutant polynuclear aromatic hydrocarbons. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

SRM 1871 - 1873

Glasses for Microscopic Analysis

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

These SRMs are intended primarily for the analysis of glasses, ceramics and minerals by microanalytical techniques such as quantitative electron probe, secondary ion mass spectrometry, spark source mass spectrometry, and laser probe microanalysis. These glasses provide a highly homogeneous material at microscopic spatial resolution.

Certified concentrations; noncertified concentrations are in parenthesis (nominal weight percent):

Pb-Si Glass (SRM 1871)

Element	K-456		K-493		K-523	
	Value	Uncertainty (±)	Value	Uncertainty (±)	Value	Uncertainty (±)
O	(20.35)	-	(20.58)	-	(20.80)	-
Mg	-	-	-	-	(0.12)	-
Al	-	-	(0.13)	-	-	-
Si	13.37	0.24	(13.09)	(0.24)	(12.94)	(0.24)
P	-	-	-	-	(0.24)	-
Ti	-	-	(0.20)	-	(0.21)	-
Cr	-	-	-	-	(0.20)	-
Fe	-	-	(0.25)	-	-	-
Ni	-	-	-	-	(0.25)	-
Ge	-	-	-	-	(0.20)	-
Zr	-	-	(0.38)	-	(0.33)	-
Ba	-	-	-	-	(0.61)	-
Ce	-	-	(0.53)	-	-	-
Eu	-	-	-	-	(0.73)	-
Ta	-	-	(0.64)	-	-	-
Pb	65.67	0.26	63.28	0.26	63.10	0.26
Th	-	-	-	-	(0.08)	-
U	-	-	-	-	(0.23)	-
Total	(99.38)		(99.08)		(100.19)	

Pb-Ge Glass (SRM 1872)

Element	K-453		K-491		K-928	
	Value	Uncertainty (±)	Value	Uncertainty (±)	Value	Uncertainty (±)
O	(16.73)	-	(16.45)	-	(16.67)	-
Mg	-	-	-	-	(0.22)	-
Al	-	-	(0.10)	-	-	-
Si	-	-	(0.11)	-	-	-
P	-	-	-	-	(0.21)	-
Ti	-	-	(0.14)	-	(0.16)	-
Cr	-	-	-	-	(0.19)	-
Fe	-	-	(0.17)	-	-	-
Ni	-	-	-	-	(0.20)	-
Ge	28.43	0.34	26.10	0.34	25.93	0.34
Zr	-	-	(0.26)	-	(0.48)	-
Ba	-	-	-	-	(0.46)	-
Ce	-	-	(0.59)	-	-	-
Eu	-	-	-	-	(0.64)	-
Ta	-	-	(0.52)	-	-	-
Th	-	-	-	-	(0.12)	-
U	-	-	-	-	(0.05)	-
Pb	54.21	0.26	54.69	0.26	54.74	0.26
Total	(99.37)		(99.13)		(100.07)	

Ba-Zn-Si Glass (SRM 1873)

Element	K-458		K-489		K-963	
	Value	Uncertainty (±)	Value	Uncertainty (±)	Value	Uncertainty (±)
O	(31.86)	-	(31.70)	-	(32.00)	-
Mg	-	-	-	-	(0.34)	-
Al	-	-	(0.11)	-	-	-
Si	23.05	0.34	(22.23)	(0.34)	(21.96)	(0.34)
P	-	-	-	-	(0.33)	-
Ti	-	-	(0.27)	-	(0.32)	-
Cr	-	-	-	-	(0.31)	-
Fe	-	-	(0.35)	-	-	-
Ni	-	-	-	-	(0.33)	-
Zn	3.01	0.06	2.93	0.06	2.95	0.06
Ge	-	-	-	-	(0.47)	-
Zr	-	-	(0.40)	-	(0.61)	-
Ba	41.79	0.20	39.53	0.20	39.21	0.48
Ce	-	-	(0.80)	-	-	-
Eu	-	-	-	-	(0.95)	-
Ta	-	-	(0.95)	-	-	-
Pb	-	-	1.32	-	-	-
Th	-	-	-	-	(0.06)	-
U	-	-	-	-	(0.16)	-
Total	(99.71)		(100.59)		(100.00)	

Order information:

These SRMs consists of 3 2x2x20 mm rods. SRM 1871 and 1872 and can be purchased for US$367 per each set, and SRM 1873 for US$369. Price subject to change without notice. Please contact NIST at the address shown above.

References:

National Institute of Standards and Technology (1984) SRM 1871. Lead-silicate glasses for microanalysis. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1984) SRM 1872. Lead-germanate glasses for microanalysis. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1984) SRM 1873. Barium-zinc-silicate glasses for microanalysis. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

SRM 2009a

Didynium Glass Filter

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

SRM 2009a consists of a set of filters for use in checking the wavelength scale of scanning spectrophotometers between 400 and 760 nm for a bandpass range between 1.5 and 10.5 nm. Depending upon the bandwidth of the spectrophotometer, 12 to 22 wavelength corrections can be determined from 389 to 760 nm. SRM 2009a is approximately 1 cm wide by 3 cm high and is supplied in a holder which fits in the place of a standard analytical cuvette. For further information, consult Venable and Eckerle (1979).

Order information:

SRM 2009a can be purchased for US$533 per unit (one filter) each. Price subject to change without notice. Please contact NIST at the address shown above.

References:

National Institute of Standards and Technology (1984) SRM 2009a. Didynium glass filter for checking the wavelength scale of spectrophotometers. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

Venable, W. H., and K. Eckerle (1979) Standard reference materials: didynium glass filters for calibrating the wavelength scale of spectrophotometers - SRM 2009, 2010, 2013 and 2014. NBS Spec. Pub. 260-66, PB-80-104961. National Institute of Standards and Technology, Gaithersburg, MD, USA.

SRM 2032

Potassium Iodide

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

This SRM is intended for use in the assessment of heterochromatic stray light radiation energy in ultraviolet spectrometers in the spectral region below 260 nm. It consists of crystalline potassium iodide (KI) of established purity Aqueous solutions made with this material are certified for their specific absorbance under well defined conditions over a wavelength range from 240 to 275 nm. The KI solutions exhibit sharp cutoffs in transmittances below approximately 260 nm. Equations are given in the Certificate to calculate the amount of heterochromatic stray light.

Order information:

SRM 2032 can be purchased for US$305 per unit (25-g bottle). Price subject to change without notice. Please contact NIST at the address shown above.

Reference:

Trahey, N. M. (ed.) (1992) NIST Standard Reference Materials Catalog 1992-93. NIST Spec. Pub. 260, 162 pp. National Institute of Standards and Technology, Gaithersburg, MD, USA.

SRM 2033

Potassium Iodide with Attenuator

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

SRM 2033 consists of the same material used in SRM 2032 plus a reference beam attenuator that can be used to assess the heterochromatic stray radiant energy in ultraviolet absorption spectrometers in the spectral region below 260 nm. The attenuator consists of two semitransparent, evaporated metal-on-fused silica (non-fluorescent) filters, each with a nominal transmittance of 10%.

Order information:

SRM 2033 can be purchased for US$460 per unit (25-g bottle and attenuator). Price subject to change without notice. Please contact NIST at the address shown above.

Reference:

National Institute of Standards and Technology (1980) SRM 2033. Crystalline potassium iodide with attenuator. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

SRM 2034

Holmium Oxide Solution Wavelength Standard

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

SRM 2034 consists of a solution of holmium oxide (Ho_2O_3) in 10% perchloric acid in water, sealed in a non-fluorescent fused silica cuvette of nominal 10 mm light path. This SRM is used to establish the accuracy of the wavelength scale of conventional spectrophotometers in the spectral range of 240-650 nm. Details concerning the materials, instrumentation, method of certification and procedures for using this SRM can be found in Weidner *et al.* (1986).

Order information:

SRM 2034 can be purchased for US$659 (sealed cuvette). Price subject to change without notice. Please contact NIST at the address shown above.

References:

National Institute of Standards and Technology (1992) Certificate, SRM 2034, Holmium oxide solution wavelength standard from 240 to 650 nm, Series 91. National Institute of Standards and Technology, Gaithersburg, MD.

Weidner, V. R., R. Mavrodineau, K. D. Mielenz, R. A. Velapoldi, K. L. Eckerle, and B. Adams (1986) Standard reference materials: holmium oxide solution wavelength standard from 240-650 nm, SRM 2034. NBS Spec. Pub. 260-102. PB-86-245727. 56 pp. National Institute of Standards and Technology, Gaithersburg, MD.

SRM 2069b

SEM Performance Standard

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

This SRM is intended for use in evaluating the performance of scanning electron microscopes (SEM). It consists of graphitized rayon fibers with very smooth and uniform surfaces, relatively free of debris. Transmission electron microscope studies of microtomed fiber cross sections show rounded edges. Two bundles of fibers, 3-5 mm long, are mounted in a specially designed SEM specimen mount. The specimen mount is constructed of aluminum 12.5 mm in diameter and has a 3 mm peg that most SEMs will accept. Additional carbon fibers are provided for mounting by the user. The procedure to be followed in determining SEM performance is given on the back of the certificate of analysis.

Order information:

SRM 2069b can be purchased for US$144 per unit. Price subject to change without notice. Please contact NIST at the address shown above.

Reference:

National Institute of Standards and Technology (1991) SRM 2069b. SEM performance standard. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

SRM 2201 - 2203

Sodium Chloride, Potassium Chloride, Potassium Fluoride for Ion-Selective Electrodes

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

SRM 2201 (NaCl), 2202 (KCl) and 2203 (KF) are primarily intended for use in the calibration of ion-selective electrodes for sodium, potassium, chloride and fluoride ions. The materials meet the American Chemical Society's specifications for reagent grade materials. They do contain, however, impurities such as chlorides, fluorosilicates and heavy metals. The materials are certified for the activity coefficients at 25°C of the sodium, potassium, chloride and fluoride ions as appropriate at various concentrations, and the related values pNa, pK, pCl and pF. Mean activity coefficients at temperatures from 15 to 45°C for any concentration up to 0.1 molal may also be calculated using the provided temperature-dependence equations.

[NOTE: The chlorinity (Cl °/oo, Cl g/kg seawater) of seawater, which is related to salinity, is currently most commonly determined using electrical conductivity. Chlorinity, in turn, can be related to pCl.]

Order information:

SRM 2201 and 2202 can each be purchased for US$94 per unit (125 g); and SRM 2203 for US$159 per unit (125 g). Price subject to change without notice. Please contact NIST at the address shown above.

References:

National Institute of Standards and Technology (1973) SRM 2203. Potassium fluoride. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1984) SRM 2201. Sodium chloride. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1984) SRM 2202. Potassium chloride. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

SRM 2260

Aromatic Hydrocarbons in Toluene

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

The chemicals used in the preparation of this SRM were obtained from commercial sources or the Community Bureau of Reference, Belgium. The solution was prepared at NIST by weighing and mixing the individual components and toluene, and then mixing until completely dissolved and homogenized. The total mass of this solution was then measured. The calculated concentration based on the mass of each compound (adjusted for its consensus purity estimate) in the total mass of the solution is given in the Certificate of Analysis for each component. The bulk solution was then chilled to approximately -5 °C, 1.2-mL aliquots were dispensed into 2-mL amber ampoules and flame sealed.

Certified concentrations (μg/mL):

Compound	Value	Uncertainty (±)	Compound	Value	Uncertainty (±)
1-Methylnaphthalene	65.5	3.6	Benzo[k]fluoranthene	65.42	0.93
1-Methylphenanthrene	65.0	2.1	Biphenyl	65.84	0.58
2,3,5-Trimethylnaphthalene	58.4	3.2	Chrysene	66.2	1.9
2,6-Dimethylnaphthalene	65.6	3.2	Dibenz[a,h]anthracene	49.3	1.5
Acenaphthene	68.2	1.6	Fluoranthene	65.98	0.83
Acenaphthylene	63.20	0.59	Fluorene	65.38	0.70
Anthracene	49.75	0.52	Indeno[1,2,3-cd]pyrene	58.3	1.1
Benz[a]anthracene	57.1	1.6	Naphthalene	66.0	1.1
Benzo[a]pyrene	59.32	0.61	Phenanthrene	65.72	0.82
Benzo[b]fluoranthene	65.68	0.57	Perylene	49.69	0.36
Benzo[e]pyrene	65.69	0.95	Pyrene	65.89	0.86
Benzo[ghi]perylene	58.7	1.5			

Certified concentrations (μg/g):

Compound	Value
2-Methylnaphthalene	75.3

Order information:

SRM 2260 can be purchased for US$177 per unit (5 2-mL ampoules). Price subject to change without notice. Please contact NIST at the address shown above.

SRM 2260 (cont.)

Reference:

National Institute of Standards and Technology (1992) SRM 2261. Aromatic hydrocarbons in toluene. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

SRM 2261

Chlorinated Pesticides in Hexane

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

Pesticides used in the preparation of this SRM were donated by the U. S. EPA Pesticides & Industrial Chemicals Repository and the Laboratory of the Government Chemist, United Kingdom. The pesticide solution was prepared at NIST by weighing and mixing the individual pesticides with hexane, and mixing until completely dissolved and homogenized. The total mass of this solution was then measured. The calculated concentration based on the mass of the pesticide compound (adjusted for its consensus purity estimate) in the total mass of the solution is given in the Certificate of Analysis for each component. The bulk solution was then chilled to approximately -5 °C, 1.2-mL aliquots were dispensed into 2-mL amber ampoules and flame sealed.

Certified concentrations (μg/mL):

Compound	Value	Uncertainty (±)	Compound	Value	Uncertainty (±)
2,4'-DDD	1.973	0.017	Dieldrin	1.972	0.013
2,4'-DDE	1.976	0.017	gamma-HCH	1.972	0.010
2,4'-DDT	1.959	0.009	Heptachlor	1.977	0.015
4,4'-DDD	1.992	0.027	Heptachlor epoxide	1.977	0.017
4,4'-DDE	1.976	0.010	Hexachlorobenzene	1.968	0.009
4,4'-DDT	1.967	0.012	Mirex	1.991	0.028
Aldrin	1.983	0.026	*trans*-Nonachlor	1.986	0.014
cis-Chlordane	1.972	0.012			

Order information:

No price was available for SRM 2261 at the time of this writing. A unit of this SRM is composed of 5 2-mL ampoules. Please contact NIST at the address shown above.

Reference:

National Institute of Standards and Technology (1992) SRM 2261. Chlorinated pesticides in hexane. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

SRM 3101 - 3174

Spectrometric Standard Solutions

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

These SRMs are intended for use as stock solutions in atomic absorption spectrometry, optical emission (plasma) spectrometry, spectrophotometry, or any other analytical technique that requires aqueous solutions for calibration. These standards were prepared gravimetrically using well-characterized high purity elements or salts to contain 10 mg/mL of the selected metal in 10% high-purity acid. Some of the high purity elements used in the preparation of these SRMs are available as NIST SRMs and are so noted below. NIST monitors the stability of these solutions and will notify purchasers of any change.

Available single element solutions (10 mg/mL unless noted):

SRM	Element	Metal or salt	Acid Concentration
3101	Al	SRM 1257	10 % HCl
3102	Sb	Metal	50 % HCl
3103	As	SRM 83d	15 % HCl
3104	Ba	$BaCO_3$	10 % HCl
3105	Be	Metal	10 % HCl
3106	Bi	Metal	10 % HNO_3
3107	B (5.00)	SRM 951	Water
3108	Cd	Metal	10 % HNO_3
3109	Ca	SRM 915	10 % HCl
3110	Ce	CeO_2	10 % HNO_3
3111	Cs	Cs_2CO_3	1 % HCl
3112	Cr	Metal	10 % HCl
3113	Co	Metal	10 % HNO_3
3114	Cu	SRM 393	10 % HNO_3
3115	Dy	Dy_2O_3	10 % HCl
3116	Er	Er_2O_3	10 % HCl
3117	Eu	Eu_2O_3	10 % HCl
3118	Gd	Gd_2O_3	10 % HCl
3119	Ga	Metal	10 % HCl
3120	Ge	Metal	In preparation
3121	Au	SRM 685w	10 % HCl
3122	Hf	Metal	In preparation
3123	Ho	Ho_2O_3	10 % HCl
3124	In	Metal	10 % HCl
3126	Fe	Metal	10 % HCl

SRM 3101 - 3174 (cont.)

SRM	Element	Metal or salt	Acid Concentration
3127	La	La_2O_3	10 % HCl
3128	Pb	SRM 49e	10 % HNO_3
3129	Li	SRM 924	1 % HCl
3130	Lu	Lu_2O_3	10 % HCl
3131	Mg	Metal	10 % HCl
3132	Mn	Metal	10 % HNO_3
3133	Hg	SRM 743	10 % HNO_3
3134	Mo	Metal	10 % HCl
3135	Nd	Nd_2O_3	10 % HCl
3136	Ni	Metal	10 % HNO_3
3137	Nb	Metal	5 % HNO_3+2 % HF
3138	Pd	Metal	10 % HCl
3139	P	SRM 194	0.05 % HCl
3140	Pt	SRM 680	10 % HCl
3141	K	SRM 999	1 % HCl
3142	Pr	Pr_6O_{11}	10 % HCl
3143	Re	Metal	10 % HNO_3
3144	Rh		
3145	Rb	SRM 984	1 % HCl
3147	Sm	Sm_2O_3	10 % HCl
3148	Sc	Sc_2O_3	10 % HCl
3149	Se	SRM 726	10 % HCl
3150	Si	$Na_2SiO_3 \cdot 9H_3O$	Water
3151	Ag	SRM 748	10 % HNO_3
3152	Na	SRM 919	1 % HCl
3153	Sr	$SrCO_3$	10 % HCl
3154	S	H_3SO_4	Water
3155	Ta	Metal	5 % HNO_3 + 2 % HF
3156	Te	Metal	10 % HCl
3157	Tb	Tb_4O_7	10 % HCl
3158	Tl	Metal	10 % HNO_3
3159	Th	ThO_2	10 % HNO_3
3160	Tm	Tm_2O_3	10 % HCl
3161	Sn	SRM 741	60 % HCl
3162	Ti	Metal	20 % HCl
3163	W	Metal	7 % HNO_3 + 4 % HF
3164	U	SRM 950b	10 % HNO_3
3165	V (5.00)	NH_4O_3	10 % HNO_3
3166	Yb	Yb_2O_3	10 % HCl
3167	Y	Y_2O_3	10 % HCl
3168	Zn	SRM 740	10 % HCl
3169	Zr	SRM 1234	10 % HNO_3 + 2 % HF

Multielement solutions (100 mg/mL unless noted):

SRM	Elements	Acid Concentration
3171	Al, Be (10), Cd, Cr, Fe, Mg, Mn, Ni, K (500), Na	5 % HNO_3
3172	As (200), Ba (10), Ca (10), Co, Cu, Pb, Se (500), Ag, Sr (10), Zn	5 % HNO_3
3174	Al, Be, B, Cd, Au, Hf, Fe, Pb, Ti (50), Zr	5 % HNO_3 + trace HF

Order information:

The single element SRMs can be purchased for US$85 per unit (50-mL bottle) except for the Sc standard which is priced at US$162. SRM 3171, 3172 and 3174 can be purchased for US$115, 115 and 113 respectively. Price subject to change without notice. Please contact NIST at the address shown above.

References:

National Institute of Standards and Technology (1986) SRM 3124. Spectrometric standard solution. Indium. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1986) SRM 3140. Spectrometric standard solution. Platinum. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1987) SRM 3110. Spectrometric standard solution. Cerium. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1987) SRM 3116. Spectrometric standard solution. Erbium. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1987) SRM 3117. Spectrometric standard solution. Europium. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1987) SRM 3123. Spectrometric standard solution. Holmium. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1987) SRM 3130. Spectrometric standard solution. Lutetium. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1987) SRM 3147. Spectrometric standard solution. Samarium. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1987) SRM 3160. Spectrometric standard solution. Thullium. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1987) SRM 3163. Spectrometric standard solution. Tungsten. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1987) SRM 3166. Spectrometric standard solution. Ytterbium. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1988) SRM 3120. Spectrometric standard solution. Germanium. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1988) SRM 3157. Spectrometric standard solution. Terbium. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1989) SRM 3102. Spectrometric standard solution. Antimony. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1989) SRM 3103. Spectrometric standard solution. Arsenic. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1989) SRM 3105. Spectrometric standard solution. Beryllium. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1989) SRM 3107. Spectrometric standard solution. Boron. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1989) SRM 3109. Spectrometric standard solution. Calcium. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1989) SRM 3112. Spectrometric standard solution. Chromium. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1989) SRM 3113. Spectrometric standard solution. Cobalt. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1989) SRM 3114. Spectrometric standard solution. Copper. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1989) SRM 3119. Spectrometric standard solution. Gallium. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1989) SRM 3129. Spectrometric standard solution. Lithium. Certificate of analysis. National Institute of Standards and Technology,

Gaithersburg, MD, USA.

National Institute of Standards and Technology (1989) SRM 3131. Spectrometric standard solution. Magnesium. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1989) SRM 3132. Spectrometric standard solution. Manganese. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1989) SRM 3136. Spectrometric standard solution. Nickel. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1989) SRM 3137. Spectrometric standard solution. Niobium. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1989) SRM 3138. Spectrometric standard solution. Palladium. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1989) SRM 3139. Spectrometric standard solution. Phosphorus. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1989) SRM 3141. Spectrometric standard solution. Potassium. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1989) SRM 3142. Spectrometric standard solution. Praseodynium. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1989) SRM 3150. Spectrometric standard solution. Silicon. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1989) SRM 3151. Spectrometric standard solution. Silver. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1989) SRM 3152. Spectrometric standard solution. Sodium. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1989) SRM 3155. Spectrometric standard solution. Tantalum. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1989) SRM 3158. Spectrometric standard solution. Thallium. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1989) SRM 3161. Spectrometric standard solution. Tin. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1989) SRM 3168. Spectrometric standard solution. Zinc. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1989) SRM 3169. Spectrometric standard solution. Zirconium. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1990) SRM 3101. Spectrometric standard solution. Aluminum. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1990) SRM 3108. Spectrometric standard solution. Cadmium. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1990) SRM 3126. Spectrometric standard solution. Iron. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1990) SRM 3127. Spectrometric standard solution. Lanthanum. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1990) SRM 3148. Spectrometric standard solution. Scandium. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1990) SRM 3164. Spectrometric standard solution. Uranium. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1991) SRM 3104. Spectrometric standard solution. Barium. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1991) SRM 3106. Spectrometric standard solution. Bismuth. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1991) SRM 3111. Spectrometric standard solution. Cesium. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1991) SRM 3115. Spectrometric standard solution. Dysprosium. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1991) SRM 3118. Spectrometric standard

solution. Gadolinium. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1991) SRM 3121. Spectrometric standard solution. Gold. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1991) SRM 3122. Spectrometric standard solution. Hafnium. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1991) SRM 3128. Spectrometric standard solution. Lead. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1991) SRM 3133. Spectrometric standard solution. Mercury. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1991) SRM 3134. Spectrometric standard solution. Molybdenum. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1991) SRM 3145. Spectrometric standard solution. Rubidium. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1991) SRM 3143. Spectrometric standard solution. Rhenium. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1991) SRM 3149. Spectrometric standard solution. Selenium. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1990) SRM 3156. Spectrometric standard solution. Tellerium. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1991) SRM 3159. Spectrometric standard solution. Thorium. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1991) SRM 3162. Spectrometric standard solution. Titanium. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1991) SRM 3165. Spectrometric standard solution. Vanadium. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1991) SRM 3167. Spectrometric standard solution. Yttrium. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1991) SRM 3171. Multielement mix A standard solution. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1991) SRM 3172. Multielement mix B standard solution. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1991) SRM 3174. Multielement mix D standard solution. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1992) SRM 3135. Spectrometric standard solution. Neodynium. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1992) SRM 3144. Spectrometric standard solution. Rhodium. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1992) SRM 3153. Spectrometric standard solution. Strontium. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1992) SRM 3154. Spectrometric standard solution. Sulfur. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

SRM 3181 - 3186

Anion Standard Solutions

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

These SRMs are intended for use in anion ion chromatography. They consist of single component solutions prepared gravimetrically to contain 1000 µg of the anion per gram of solution. The solutions are prepared in 18 megohm water.

Concentrations (µg anion/g):

SRM	Anion	Salt	Value	Uncertainty (±)
3181	Sulfate	K_2SO_4	1000	5
3182	Chloride	KCl	1000	5
3183	Fluoride	NaF	1000	5
3184	Bromide	KBr	1000	4
3185	Nitrate	$NaNO_3$	1000	4
3186	Phosphate	KH_2PO_4	1000	4

Order information:

These SRMs can be purchased for US$76 per unit (50 mL) respectively. Price subject to change without notice. Please contact NIST at the address shown above.

References:

National Institute of Standards and Technology (1987) SRM 3183. Anion standard solution, fluoride. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1991) SRM 3181. Anion standard solution sulfate. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1991) SRM 3184. Anion standard solution, bromide. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1991) SRM 3186. Anion standard solution, phosphate. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1992) SRM 3182. Anion standard solution, chloride. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1992) SRM 3185. Anion standard solution, nitrate. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

SRM 4226B through 4949B

Alpha-Particle, Beta-Particle, Gamma-Ray, and Electron Capture Solutions

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

Certain radioactivity SRMs have short half-lives and are available only at certain announced times. Others of intermediate half-lifes are issued periodically and may be out of stock. The amount of radionuclide in these SRMs is stated in terms of activity or decays per second. Becquerel (Bq) units are related to curies (Ci) by the formula

$$1 \text{ Ci} = 3.7 \times 10^{10} \text{ Bq}.$$

Radioactivity level (Bq/g):

SRM	Radionuclide	Approx. activity (Bq/g)	Date of calibration	Total uncertainty (%)
4226B *	^{63}Ni	1×10^{6}	12/84	1.1
4233C *	^{137}Cs	7×10^{5}	11/89	0.94
4251B *	^{133}Ba	4×10^{5}	6/81	1.4
4276C *	^{125}Sb	2×10^{4}	9/88	-
	^{154}Eu	1×10^{4}		
	^{155}Eu	7×10^{3}		
4288 *	^{99}Tc	4×10^{4}	11/82	1.6
4320	^{244}Cm	57	4/89	0.9
4321	^{238}U	263	11/86	0.4
4322 *	^{241}Am	39	11/86	1.0
4323 *	^{238}Pu	33	11/86	0.5
4324 *	^{232}U	83	2/84	1.5
4325	^{9,10}Be	2.68×10^{11}	8/86	5.1
4327 *	^{208}Po	77	6/84	1.4
4328 *	^{229}Th	884	5/84	1.5
4329 *	^{243}Cm	69	6/84	1.4
4332C *	^{243}Am			
4334D *	^{242}Pu	25.58	12/89	1.2
4338 *	^{240}Pu	18	4/80	1.0
4361B	^{3}H	1.12	8/87	1.0
4370 *	^{152}Eu	9×10^{4}	2/87	1.1
4423	^{90}Sr	4×10^{6}	11/85	1.1

* License certification is required by NIST.

SRM 4226B through 4949B (cont.)

SRM	Radionuclide	Approx. activity (Bq/g)	Date of calibration	Total uncertainty (%)
4915D *	^{60}Co	3×10^5	2/84	0.8
4919G *	^{90}Sr	4×10^3	5/88	1.2
4926D	^{3}H	3×10^3	4/89	0.8
4927D	^{3}H	7×10^5	1/89	0.8
4929D	^{55}Fe	1×10^4	8/85	2.6
4943 *	^{36}Cl	1×10^4	12/84	0.8
4947C	^{3}H	3×10^5	3/87	1.2
4949B	^{129}I	7×10^3	1/82	1.9

Order information:

These SRMs can be purchsed for the prices and quantities listed below. Price subject to change without notice. Please contact NIST at the address shown above.

SRM	Unit	Cost (US$)	4329	5.1 g	378
			4332C	5 mL	558
4226B	4.1 g	483	4334D	4 mL	584
4233C	5 g	646	4338	5 g	677
4251B	5 g	511	4361B	490 g	518
4276C	5 mL	723	4370		
4288	5 mL	482	4423		
4320	5 mL	503	4915D	5 g	507
4321	5 mL		4919G	5 g	493
4322	5 mL		4926D		
4323	5 mL	567	4927D	3 mL	572
4324	5 mL		4929D	5 mL	476
4325	50 mL	1509	4943	3 mL	373
4327	1.1 g	369	4947C	4 g	501
4328	2 mL	458	4949B	1.1 g	556

References:

National Institute of Standards and Technology (1980) SRM 4338. Alpha particle emission rate solution standard. Plutonium-240. Certificate. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1981) SRM 4251B. Radioactivity standard. Barium-133. Certificate. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1982) SRM 4288. Radioactivity standard. Technetium-99. Certificate. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1982) SRM 4949B. Radioactivity standard. Iodine-129. Certificate. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1984) SRM 4226B. Radioactivity standard. Nickel-63. Certificate. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1984) SRM 4324. Radioactivity standard. Uranium-232. Certificate. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1990) SRM 4332C. Radioactivity standard. Americium-243. Certificate. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1984) SRM 4943. Radioactivity standard. Chlorine-36. Certificate. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1984) SRM 4915D. Radioactivity standard. Cobalt-60. Certificate. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1985) SRM 4327. Radioactivity standard. Polonium-208. Certificate. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1985) SRM 4328. Radioactivity standard. Thorium-229. Certificate. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1985) SRM 4329. Radioactivity standard. Curium-243. Certificate. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1986) SRM 4321. Alpha particle solution standard. Natural uranium. Certificate. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1986) SRM 4322. Alpha particle solution standard. Americium-241. Certificate. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1986) SRM 4323. Alpha particle solution standard. Plutonium-238. Certificate. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1986) SRM 4929D. Radioactivity standard. X-Ray emission rate standard. Iron-55. Certificate. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1987) SRM 4361B. Radioactivity standard. Hydrogen-3. Certificate. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1987) SRM 4370. Radioactivity solution standard. Europium-152. Certificate. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1987) SRM 4947C. Tritiated toluene radioactivity standard for liquid scintillating counting. Hydrogen-3. Certificate. National Institute of Standards and Technology, Gaithersburg, MD, USA.

SRM 4226B through 4949B (cont.)

National Institute of Standards and Technology (1988) SRM 4276C. Radioactivity standard. Mixed radionuclide solution standard for the efficient calibration of germanium spectrometry systems. Certificate. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1988) SRM 4339F. Radioactivity standard. Radium-228. Certificate. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1988) SRM 4919F. Radioactivity standard. Strontium-90. Certificate. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1989) SRM 4927D. Radioactivity standard. Hydrogen-3. Certificate. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1989) SRM 4926D. Radioactivity standard. Hydrogen-3. Certificate. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1989) SRM 4233B. Radioactivity standard. Cesium-137. Certificate. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1990) SRM 4334D. Alpha particle solution standard. Plutonium-242. Certificate. National Institute of Standards and Technology, Gaithersburg, MD, USA.

SRM 4400LN through 4417LK

Radiopharmaceuticals

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

License certification is required by NIST before shipment. No other information available.

Radioactivity level (Bq/g):

SRM	Radionuclide	Approx. activity (Bq/g)	Half Life	Total uncertainty (%)
4400LN	^{51}Cr	3×10^6	27.702 d	0.7
4401LR	^{131}I	5×10^6	8.021 d	0.9
4404LO	^{201}Tl	4×10^6	72.91 h	1.2
4406LL	^{32}P	2×10^6	14.29 h	1.0
4407LP	^{125}I	1×10^6	59.6 d	1.1
4409LD	^{75}Se	1×10^6	119.8	2.8
4410HR	^{99}Tc	1×10^9	6.007 h	0.9
4412LQ	^{99}Mo, ^{99m}Tc	1×10^7	65.92 h	1.0
4415LP	^{133}Xe	5×10^8 /s total	5.243 d	1.0
4416LM	^{67}Ga	3×10^6	3.261 d	0.8
4417LK	^{111}In	5×10^6	2.805d	0.7

Order information:

No price information available at the time of writing Please contact NIST at the address shown above.

Reference:

Trahey, N. M. (ed.) (1992) NIST Standard Reference Materials Catalog 1992-93. NIST Spec. Pub. 260, 162 pp. National Institute of Standards and Technology, Gaithersburg, MD, USA.

CRM 349

PCBs in Cod Liver Oil

Source:

Community Bureau of Reference
Commission of the European Communities
Directorate General for Science
Research and Development
200 rue de la Loi
B-1049 Brussels
BELGIUM

Description:

This material consists of cod liver oil with endogeneous chlorobiphenyls in a sealed argon filled ampoule. The oil was stabilized by the addition of 0.2 mg/g butyl hydroxy toluene.

Certified concentrations (µg/kg):

PCB congener	Value	Uncertainty (±)
PCB 28	68	7
PCB 52	149	20
PCB 101	370	17
PCB 118	454	31
PCB 153	938	40
PCB 180	280	22

Noncertified concentrations (µg/kg):

Compound	Value	Compound	Value
4,4'-DDD	175	Mirex	22
4,4'-DDE	234	PCB 44	75
4,4'-DDT	59	PCB 128	104
alpha-Chlordane	20.5	PCB 138+163	765
Dieldrin	153	PCB 194	38
gamma-HCH	73		

Order information:

CRM 349 can be purchased for BFR3000 per unit (2 g). Price includes handling and normal postage and it is subject to change without notice. Please contact BCR at the address shown above.

References:

Community Bureau of Reference (BCR) (1987) BCR CRM 349, chlorobiphenyls in cod liver oil. Certificate of analysis. Community Bureau of Reference, Commission of the European Communities, Directorate General for Science, Research and Development, 200 rue de la Loi, B-1049 Brussels, Belgium.

Community Bureau of Reference (BCR) (1992) Reference Materials. Community Bureau of Reference, Commission of the European Communities, Directorate General for Science, Research and Development, 200 rue de la Loi, B-1049 Brussels, Belgium. 75 pp.

CRM 350

Chlorobiphenyls in Mackerel Oil

Source:

Community Bureau of Reference
Commission of the European Communities
Directorate General for Science
Research and Development
200 rue de la Loi
B-1049 Brussels
BELGIUM

Description:

This material consists of mackerel oil with endogeneous chlorobiphenyls in a sealed argon filled ampoule. The oil was stabilized by the addition of 0.2 mg/g butyl hydroxy toluene. Information on additional PCBs and chlorinated pesticides is available in the report.

Certified concentrations (µg/kg):

PCB congener	Value	Uncertainty (±)	PCB congener	Value	Uncertainty (±)
PCB 28	22.5	4.0	PCB 138	274	27
PCB 52	62	9	PCB 153	317	20
PCB 101	164	9	PCB 180	73	13
PCB 118	142	20			

Noncertified concentrations (µg/kg):

Compound	Value	Compound	Value
Dieldrin	80	gamma-HCH	42
HCB	20	PCB 128	44
alpha-HCH	22	PCB 138+163	274
beta-HCH	47	PCB 194	41

Order information:

CRM 350 can be purchased for BFR3000 per unit (2 g). Price includes handling and normal postage and it is subject to change without notice. Please contact BCR at the address shown above.

References:

Community Bureau of Reference (BCR) (1987) BCR CRM 350, chlorobiphenyls in mackerel oil. Certificate of analysis. Community Bureau of Reference, Commission of the European Communities, Directorate General for Science, Research and Development, 200 rue de la Loi, B-1049 Brussels, Belgium.

Community Bureau of Reference (BCR) (1992) Reference Materials. Community Bureau of Reference, Commission of the European Communities, Directorate General for Science, Research and Development, 200 rue de la Loi, B-1049 Brussels, Belgium. 75 pp.

EPA SRS950 - SRS954

EPA CRADA Oils

Source:

US Environmental Protection Agency
Quality Assurance Research Division
EMSL-Cincinnati
Cincinnati, OH 45268-1525
USA

Available from:

Fisher Scientific
711 Forbes Avenue
Pittsburgh, PA 15219

Description:

SRS950 is fuel oil no. 6 Bunker C residual with a high viscosity; SRS951 is Arabian light crude oil; SRS952 is Prudhoe Bay crude oil; SRS953 is south Louisiana crude oil; and SRS954 is fuel oil no. 2 high in aromatics. These CRADA reference materials are designed, produced and verified for purity, homogeneity and stability under a cooperative research and development agreement between Fisher Scientific and the US EPA. Infrared and ultraviolet spectra, viscosity, specific gravity and other parameters and properties of these materials are available.

Certified concentrations (percent unless noted):

Element	Value
SRS950	
N	0.34
S	2.41
V (mg/L)	66
Ni (mg/L)	25
SRS951	
N	0.080
S	1.87
V (mg/L)	15
Ni (mg/L)	4.3
SRS952	
N	0.20
S	1.03
V (mg/L)	21
Ni (mg/L)	11

Element	Value
SRS953	
N	0.031
S	0.23
V (mg/L)	0.95
Ni (mg/L)	1.1
SRS954	
N	0.009
S	0.12
V (mg/L)	0.2
Ni (mg/L)	0.1

Fuel Oil No. 2 (high aromatics) (SRS954)
Organic compounds (weight percent):

Compound	Value	Compound	Value
Acenaphthenes	3.3	Phenanthrene	1.5
Alkylbenzenes	12.1	Pyrenes	0.1
Dibenzothiophenes	0.1		
Dinaphthenebenzene	2.5	Chrysenes, dibenzanthracenes, naphthene=	
Fluorenes	1.6	phenanthrenes, perylenes, and benzothio=	
Naphthalenes	8.2	phenes were below detection limit.	
Naphthenebenzenes	12.1		
Naphthabenzothiophenes	0.2		

Order information:

These materials are available in 20 mL and 1 pint quantities. The 20-mL bottles can be purchased from US$15 each, and the pint bottles for US$55. They are available from the wholesale distributor, Fisher Scientific, 711 Forbes Ave., Pittsburgh, PA 15219, USA, as well as from other distributors worldwide. Price subject to change without notice.

References:

Environmental Protection Agency (1992) Standard reference oil sample, fuel oil no. 2 (high aromatics). US Environmental Protection Agency, Quality Assurance Research Division, EMSL-Cincinnati, Cincinnati, OH 45268-1525. 2 pp.

Environmental Protection Agency (1992) Standard reference oil sample, fuel oil no. 6 Bunker C residual (high viscosity). US Environmental Protection Agency, Quality Assurance Research Division, EMSL-Cincinnati, Cincinnati, OH 45268-1525.

Environmental Protection Agency (1992) Standard reference oil sample, Prudhoe Bay crude oil. US Environmental Protection Agency, Quality Assurance Research Division, EMSL-Cincinnati, Cincinnati, OH 45268-1525.

Environmental Protection Agency (1992) Standard reference oil sample, South Louisiana crude oil. US Environmental Protection Agency, Quality Assurance Research Division, EMSL-Cincinnati, Cincinnati, OH 45268-1525.

Environmental Protection Agency (1992) Standard reference oil sample, Arabian light crude oil. US Environmental Protection Agency, Quality Assurance Research Division, EMSL-Cincinnati, Cincinnati, OH 45268-1525.

RM 8505

Vanadium in Crude Oil

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

RM 8505 was developed primarily to further scientific and technical research on analytical methods related to the accurate determination of V in crude oils. This material is Venezuelan crude oil and contains water that can be centrifuged with approximately 99% separation. The separated water contains less than 25 ng/g V. The physical properties of RM 8505 are listed in the description sheet.

Certified concentration (μg/g):

Value	Uncertainty (±)
390	10

Order information:

RM 8505 can be purchased for US$71 per unit (275 mL). Price subject to change without notice. Please contact NIST at the address shown above.

Reference:

National Institute of Standards and Technology (1986) RM 8505. Vanadium in crude oil. Report of investigation. National Institute of Standards and Technology, Gaithersburg, MD, USA.

SRM 1580

Organics in Shale Oil

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

This SRM is intended primarily for evaluating the reliability of analytical methods for the determination of trace level organic compounds in oil matrices such as shale oil, petroleum crude oils and others. The oil was obtained from shale from the Mahogany Zone of the Colorado Green River Formation. After separation from water and sludge, the oil was centrifuged, filtered and bottled.

Certified concentrations (μg/g):

Compound	Value	Uncertainty (±)	Compound	Value	Uncertainty (±)
2,6-Dimethylphenol	175	30	Pyrene	104	18
Benzo[a]pyrene	21	6	Perylene	3.4	2.2
Benzo[e]pyrene	18	8	Phenol	407	50
Benzo[f]quinoline	16	4	o-Cresol	385	50
Fluoranthene	54	10			

Noncertified concentrations (μg/g):

Compound	Value	Compound	Value
2,4-Dimethylphenol	380	m-Cresol	330
2,5-Dimethylphenol	320	p-Cresol	270
2,4,6-Trimethylphenol	120	Phenanthridine	45
2,5,6-Trimethylphenol	360		

Order information:

SRM 1580 can be purchased for US$280 per unit (5 2-mL). Price subject to change without notice. Please contact NIST at the address shown above.

Reference:

National Institute of Standards and Technology (1980) SRM 1580. Organics in shale oil. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

SRM 1581

Polychlorinated Biphenyls in Oil

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

This SRM is intended primarily for calibrating instrumentation and validating methodology used in the determination of polychlorinated biphenyl mixtures (PCBs) in motor and transformer oils. These PCBs are present at Aroclor 1242 and 1260.

Certified concentrations (μg/g):

Matrix	Aroclor type	Value	Uncertainty (±)
Motor oil	1242	100	1
Motor oil	1260	100	2
Transformer oil	1242	100	1
Transformer oil	1260	100	3

Order information:

SRM 1581 can be purchased for US$205 per unit (4 ampoules). Price subject to change without notice. Please contact NIST at the address shown above.

Reference:

National Institute of Standards and Technology (1990) SRM 1581. Polychlorinated biphenyls in oils. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

SRM 1582

Petroleum Crude Oil

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

Petroleum crude oil from the US Environmental Protection Agency's repository at the Oak Ridge National Laboratory, Oak Ridge, TN, USA, was homogenized and transferred to amber glass ampoules.

Certified concentrations (μg/g):

Compound	Value	Uncertainty (±)	Compound	Value	Uncertainty (±)
Benz[a]anthracene	3.0	0.3	Fluoranthene	2.5	0.3
Benzo[a]pyrene	1.1	0.3	Phenanthrene	101	5
Dibenzothiophene	33	2	Perylene	31	3

Noncertified concentrations (μg/g):

Compound	Value	Compound	Value
Benzo[e]pyrene	3.5	Indeno[1,2,3-cd]pyrene	0.17
Benzo[ghi]perylene	1.7	Phenol	0.3
Carbazole	3.4	Pyrene	7
o-Cresol	0.5		

Order information:

SRM 1582 can be purchased for US$269 per unit (5 2-mL ampoules). Price subject to change without notice. Please contact NIST at the address shown above.

Reference:

National Institute of Standards and Technology (1984) SRM 1582. Petroleum crude oil. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

SRM 1588

Organics in Cod Liver Oil

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

The cod liver oil was donated to NIST by the University of Ulm, Germany. All the compounds were naturally present in the oil.

Certified concentrations (ng/g unless noted):

Compound	Value	Uncertainty (±)	Compound	Value	Uncertainty (±)
Hexachlorobenzene	148	21	4,4'-DDT	529	45
alpha-HCH	86	19	PCB 101	129	5
trans-Chlordane	50	13	PCB 138	261	29
cis-Chlordane	158	8	PCB 153	276	40
trans-Nonachlor	209	11	PCB 170	45	5
Dieldrin	150	12	PCB 180	107	4
4,4'-DDD	277	15	*alpha*-Tocopherol		
4,4'-DDE	641	62	(µg/g)	112	5
2,4'-DDT	156	5			

Order information:

SRM 1588 can be purchased for US$230 per unit (5 2-mL ampoules). Price subject to change without notice. Please contact NIST at the address shown above.

Reference:

National Institute of Standards and Technology (1989) SRM 1588. Organics in cod liver oil. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

SRM 1618

Vanadium and Nickel in Residual Fuel Oil

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

SRM 1618 consists of commercial No. 6 residual fuel oil as defined by the American Society for Testing and Materials.

Certified concentrations (μg/g):

Element	Value	Uncertainty (±)
V	423.1	3.4
Ni	75.2	0.4

Order information:

SRM 1618 can be purchased for US$151 per unit (100 mL). Price subject to change without notice. Please contact NIST at the address shown above.

Reference:

National Institute of Standards and Technology (1985) SRM 1618. Vanadium and nickel in residual fuel oil. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

SRM 1634b

Trace Elements in Fuel Oil

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

SRM 634b is a commercial "No. 6" residual fuel oil as defined by the American Society for Testing and Materials (ASTM). This SRM is intended for use in the evaluation of methods used in the analysis of fuel oils and other materials with similar matrices. The certified values are based on at least 1 g sample which is the minimum amount that should be used for analysis. Supplemental information on the physical properties of this SRM can be found on the certificate of analysis.

Certified concentrations (μg/g dry weight unless noted):

Element	Value	Uncertainty (±)	Element	Value	Uncertainty (±)
S (%)	2.80	0.05	Ni	28	2
V	55.4	1.1	Zn	3.0	0.2
Mn	0.23	0.03	As	0.12	0.02
Fe	31.6	2.0	Se	0.18	0.04
Co	0.32	0.04			

Noncertified concentrations (μg/g dry weight unless noted):

Element	Value	Element	Value
Na	90	Ba	1.3
Al	16	Hg	<0.001
Ca	15	Pb	2.8
Cr	0.7		

Order information:

SRM 1634b can be purchased for US$183 per unit (100-mL bottle). Price subject to change without notice. Please contact NIST at the address shown above.

Reference:

National Institute of Standards and Technology (1986) SRM 1634b. Trace elements in fuel oil. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

CRM 066 through 132

Particle Size Distribution

Source:

Community Bureau of Reference
Commission of the European Communities
Directorate General for Science
Research and Development
200 rue de la Loi
B-1049 Brussels
BELGIUM

Description:

For each reference material, the distribution is expressed as the curve of the cumulative mass of particles undersize versus particle size. For sieves, for example, this is the mass fraction of particles which passes through a particular sieve. In the case of particles less than 90μm diameter, the particle size is expressed as the equivalent Stokes diameter determined from the settling rate of particles in a viscous fluid. For larger particles, the equivalent volume diameter determined by sieving was preferred.

Certified property:

Standard	Material	Property	Size range (μm)
CRM 066	Quartz powder	Stokes diameter	0.35 - 3.50
CRM 067	Quartz powder	Stokes diameter	2.4 - 32.0
CRM 068	Quartz sand	Volume diameter	160 - 630
CRM 069	Quartz powder	Stokes diameter	14 - 90
CRM 070	Quartz powder	Stokes diameter	1.2 - 20
CRM 130	Quartz powder	Volume diameter	50 - 220
CRM 131	Quartz powder	Volume diameter	480 - 1800
CRM 132	Quartz gravel	Volume diameter	1400 - 5000

Order information:

CRM 066, 067, 069 and 070 are available in 10-g bottles, CRM 068, 130, 131 and 132 are available in 100-, 200-, 450- and 700-g bottles respectively. All these CRMs can be purchased for BFR4000 per unit. Price includes handling and normal postage and it is subject to change without notice. Please contact BCR at the address shown above.

Reference:

Community Bureau of Reference (BCR) (1992) Reference Materials. Community Bureau of Reference, Commission of the European Communities, Directorate General for Science, Research and Development, 200 rue de la Loi, B-1049 Brussels, Belgium. 75 pp.

CRM 165 - 167

Latex Spheres of Certified Size

Source:

Community Bureau of Reference
Commission of the European Communities
Directorate General for Science
Research and Development
200 rue de la Loi
B-1049 Brussels
BELGIUM

Description:

These standards are suspensions of latex spheres in aqueous solutions of stabilizers. Each standard has a very narrow size distribution of spheres, approximately 99% of the spheres are within ±2% of the certified diameter.

Certified diameter (μm):

Standard	Diameter	Uncertainty (±)
CRM 165	2.223	0.013
CRM 166	4.821	0.019
CRM 167	9.475	0.018

Order information:

CRM 165 through CRM 167 can be purchased for BFR1500, 2000, and 2500 per unit (1 vial) respectively. Price includes handling and normal postage and it is subject to change without notice. Please contact BCR at the address shown above.

Reference:

Community Bureau of Reference (BCR) (1992) Reference Materials. Community Bureau of Reference, Commission of the European Communities, Directorate General for Science, Research and Development, 200 rue de la Loi, B-1049 Brussels, Belgium. 75 pp.

CRM 169 - 175

Certified Surface Area

Source:

Community Bureau of Reference
Commission of the European Communities
Directorate General for Science
Research and Development
200 rue de la Loi
B-1049 Brussels
BELGIUM

Description:

These standards are mineral particulate material with certified surface area determined using the Nitrogen BET Method.

Surface area (m^2/g):

Standard	Material	Specific surface area	Uncertainty (±)	Unit size
CRM 169	Alpha alumina	0.104	0.012	60
CRM 170	Alpha alumina	1.05	0.05	60
CRM 171	Alumina	2.95	0.13	50
CRM 172	Quartz	2.56	0.10	10
CRM 173	Rutile titania	8.23	0.21	46
CRM 175	Tungsten	0.181	0.013	200

Order information:

CRM 169 through CRM 175 can be purchased for BFR2500 per unit. Price includes handling and normal postage and it is subject to change without notice. Please contact BCR at the address shown above.

Reference:

Community Bureau of Reference (BCR) (1992) Reference Materials. Community Bureau of Reference, Commission of the European Communities, Directorate General for Science, Research and Development, 200 rue de la Loi, B-1049 Brussels, Belgium. 75 pp.

M11-01 - M11-08

Surface Area

Source:

Office of Reference Materials
Laboratory of the Government Chemist
Queen's Road, Teddington
Middlesex TW11 0LY
ENGLAND

Description:

These CRMs are certified for surface area.

Available materials:

Material	Specific surface area (m^2/g)	LGC number	Unit size (g)
α-Alumina	0.0686	M11-07	50
α-Alumina	0.229	M11-06	50
α-Alumina	0.692	M11-08	50
α-Alumina	2.09	M11-05	50
Graphitised carbon black	11.1	M11-01	10
Graphitised carbon black	71.3	M11-02	10
Non-porous silica	152.5	M11-03	10
Meso-porous silica	260.4	M11-04	10

Order information:

These samples are for purchase for £95 per unit. Price subject to change without notice. Please contact LGC at the address shown above.

Reference:

Laboratory of the Government Chemist (1991) Certified Reference Materials. Issue No. 2. Office of Reference Materials, Laboratory of the Government Chemist, Queen's Road, Teddington, Middlesex TW11 0LY, England.

SRM 475 - 476

Optical Microscope Linewidth Measurement Standards

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

These SRMs are for use in calibrating optical microscopes used to measure the widths of opaque lines and clear spaces on integrated circuit photomasks. They can also be used to calibrate line spacings and line-to-space ratios. The accuracy of a measured linewidth or line spacing is ±0.5 μm or better. They are not for use with partially transmitting materials, in reflected light with opaque materials, or in a scanning electron microscope. Both SRMs consist of patterns of clear and opaque lines with nominal dimensions ranging from 0.9 to 10.8 μm and line spacing patterns ranging from 2 to 36 μm. SRM 475 is made with anti-reflective chromium on a borosilicate glass substrate. SRM 476 is made with bright chromium.

Order information:

SRM 475 can be purchased for US$5675, and SRM 476 for US$4416. Price subject to change without notice. Please contact NIST at the address shown above.

References:

National Institute of Standards and Technology (1992) Certificate, SRM 475, Optical microscope linewidth measurement standard. National Institute of Standards and Technology, Gaithersburg, MD.

National Institute of Standards and Technology (1990) Certificate, SRM 476, Optical microscope linewidth measurement standard. National Institute of Standards and Technology, Gaithersburg, MD.

SRM 484f

Scanning Electron Microscope Magnification Standard

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

This SRM is intended for use in calibrating the scanning electron microscope magnification scale within the range of 1000X to 20,000X. Each SRM bears an identification number and has been individually measured. SRM 484f consists of thin gold layers separated by layers of nickel of nominal thicknesses of 0.5, 0.5, 1,3, and 5 μm mounted such that the layers are viewed in cross-section. The gold layers appear as thin gold lines in a nickel substrate. The SRM is mounted in copper-filled epoxy within a cylinder of 304 stainless steel. The certified region of each SRM is located relative to a the Knoop indentation. A diagram of this SRM is included in the certificate of analysis.

Certified distances (μm):

Line pair	Nominal spacing	Uncertainty (±)
0 -> 1	0.5	0.021
1 -> 2	0.5	0.020
2 -> 3	1	0.026
3 -> 4	3	0.035
4 -> 5	5	0.052
(0 -> 5)	(10)	(0.100)

The 0 -> 5 line pair value is for information purposes only.

Order information:

SRM 484f can be purchased for US$1206 per unit. Price subject to change without notice. Please contact NIST at the address shown above.

Reference:

National Institute of Standards and Technology (1992) SRM 484f. Scanning electron microscope magnification standard. Certificate of Analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

SRM 659

Particle Size Distribution Standard for Sedigraph Calibration

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

The SRM is a silicon nitride powder intended for use in the calibration and evaluation of equipment used to measure particle size distribution in the 0.2 to 10 μm range. It consists of 2.5 g of powder under argon in a glass vial sealed in a mylar pouch. The particle properties used for selection criteria of a particular silicon nitride powder were size, shape and degree of primary aggregation of the particles. The selected powder has equiaxed primary particles with a mean dimension of approximately 1 μm and a minimal amount of large agglomerates.

Certified size distribution:

Cumulative weight percentile	Value (μm)	Uncertainty
10	0.48	0.10
25	0.81	0.10
50	1.43	0.10
75	2.08	0.11
90	2.80	0.13

Order information:

Price not available at the time of writing. Please contact NIST at the address shown above.

Reference:

National Institute of Standards and Technology (1992) Certificate, SRM 659, Particle Size Distribution Standard for Sedigraph Calibration. National Institute of Standards and Technology, Gaithersburg, MD, USA.

SRM 1003b through 1019a

Glass Spheres and Beads

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

These SRMs are intended for use in calibrating equipment and in evaluating methods for measuring particle size.

Diameter (μm):

SRM	Diameter	Sieve No.	Cost (US$)	Wt./unit (g)
1003b	8-58	-	-	-
1004a	34-120	-	-	-
1017a	100-310	140-50	111	84
1018a	225-780	60-25	110	74
1019a	760-2160	20-10	154	200

Order information:

Cost and unit size are listed above. Not all information available at the time of writing. Price subject to change without notice. Please contact NIST at the address shown above.

References:

National Institute of Standards and Technology (1971) SRM 1017a. Glass spheres for calibrating test sieves. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1973) SRM 1018a. Glass spheres for calibrating test sieves. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1984) SRM 1019a. Glass spheres for calibrating test sieves. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

Trahey, N. M. (ed.) (1992) NIST Standard Reference Materials Catalog 1992-93. NIST Spec. Pub. 260, 162 pp. National Institute of Standards and Technology, Gaithersburg, MD, USA.

SRM 1690 through 1965

Polystyrene Spheres

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

These SRMs are intended for use as primary particle size reference standards for the calibration of particle size measuring instruments including optical and electron microscopes, and flow-through counters. They are suspensions of polystyrene spheres in water at a weight concentration of 0.25-5% with 50 µg/g sodium azide (NaN_3) added as a biocide. SRM 1965 is a microscope slide with two different groupings of SRM 1960 spheres permanently deposited on the surface and sealed in an air chamber. The groupings are a hexagonal array and unordered clusters. SRM 1690 was manufactured aboard the NASA orbiter CHALLENGER during the STS-6 mission in 1983. It is the first space-manufactured material made available for sale.

Diameter (µm):

	Diameter	Uncertainty (±)		Diameter	Uncertainty (±)
SRM 1690	0.895	0.008	SRM 1961	29.64	0.06
SRM 1691	0.269	0.007	SRM 1962	2.978	-
SRM 1692	2.982	0.016	SRM 1963	0.1007	-
SRM 1960	9.89	0.04	SRM 1965	9.94	0.04

Order information:

These SRMs can be purchased for between US$325 to 728 per unit (5-mL vials), and SRM 1965 can be purchased for US$120. Price subject to change without notice. Please contact NIST at the address shown above.

References:

National Institute of Standards and Technology (1985) SRM 1960. Nominal 10-µm diameter polystyrene spheres. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1987) SRM 1961. Nominal 30-µm diameter polystyrene spheres. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1987) SRM 1965. Microsphere slide (10-µm polystyrene spheres). Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

SRM 1690 through 1965 (cont.)

National Institute of Standards and Technology (1982) Certificate, SRM 1690, Nominal One-μm diameter polystyrene spheres. National Institute of Standards and Technology, Gaithersburg, MD.

National Institute of Standards and Technology (1984) Certificate, SRM 1691, Nominal 0.3 μm diameter polystyrene spheres. National Institute of Standards and Technology, Gaithersburg, MD.

National Institute of Standards and Technology (1991) Certificate, SRM 1692, Nominal 3-μm diameter polystyrene spheres. National Institute of Standards and Technology, Gaithersburg, MD.

Trahey, N. M. (ed.) (1992) NIST Standard Reference Materials Catalog 1992-93. NIST Spec. Pub. 260, 162 pp. National Institute of Standards and Technology, Gaithersburg, MD, USA.

SRM 2106 - 2107

Color

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

SRM 2106 is used to illustrate a characteristic color for each of the ISCC-NIST color name blocks in NIST Special Publication 440 (Kelly, 1976). SRM 2106 consists of 251 color chips on 18 constant hue centroid color charts. The centroid colors represent a systematic sampling of the whole color solid. The color chips were measured in 1984 and are issued with the new data as an addendum available upon request. SRM 2107 is a combination of SRM 2106 and NIST Special Publication 440.

Order information:

SRM 2106 can be purchased for US$44 each, and SRM 2107 for US$40. Price subject to change without notice. Please contact NIST at the address shown above.

Reference:

Kelly, K. L. (1976) Color: the universal language and dictionary of names. NBS Special Publication 440, 189 pp. National Bureau of Standards, Gaithersburg, MD, USA.

SRM 2135b

Depth Profiling

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

This SRM is intended for use in calibrating equipment used to measure sputtered depth and erosion rates in surface analysis. It consists of nine alternating metal thin-film layers - five layers of pure chromium and four of pure nickel - on a substrate of pure polished silicon. It is certified for total chromium and total nickel thickness, for individual layer uniformity, for Ni/Cr bi-layer uniformity, and for individual layer thickness.

Order information:

As of this time (Summer 1992), no price has been set for SRM 2135b. Please contact NIST at the address shown above.

References:

Trahey, N. M. (ed.) (1992) NIST Standard Reference Materials Catalog 1992-93. NIST Spec. Pub. 260, 162 pp. National Institute of Standards and Technology, Gaithersburg, MD, USA.

AGV-1

Andesite

Source:

US Geological Survey
Branch of Geochemistry
P. O. Box 25046 MS 973
Denver, CO 80225
USA

Description:

AGV-1 is an andesite from the east wall of Guano Valley, Lake County, Oregon, USA. (Flanagan, 1967). AGV-1 is not a certified reference material. Values for elemental concentrations have been calculated by Abbey (1983) and Gladney *et al.* (1983) using the results of various analysts. Those calculated by Gladney *et al.* (1983) are listed below.

Best available concentrations (μg/g dry weight unless noted):

Element	Value	Uncertainty (±)	Element	Value	Uncertainty (±)
Li	12	2	Y	21	6
Be	2.0	0.4	Zr	225	18
B	7	4	Nb	15	3
O (%)	47.23	0.35	Mo	3	1
F	420	50	Ru (ng/g)	<4000	-
Na (%)	3.15	0.09	Rh (ng/g)	<5	-
Mg (%)	0.922	0.058	Ag (ng/g)	104	30
Al (%)	9.07	0.18	Cd (ng/g)	61	8
Si (%)	27.67	0.27	In (ng/g)	41	6
P	2100	120	Sn	4.2	1.1
Cl	120	26	Sb	4.4	0.4
K (%)	2.41	0.80	I (ng/g)	260	30
Ca (%)	3.53	0.10	Te (ng/g)	2.2	0.3
Sc	12.1	0.9	Cs	1.26	0.12
Ti	6340	300	Ba	1221	16
V	123	12	La	38	3
Cr	12	3	Ce	66	6
Mn	740	60	Pr	6.5	0.9
Fe (%)	4.73	0.13	Nd	34	5
Co	15.1	1.2	Sm	5.9	0.5
Ni	17	4	Eu	1.66	0.11
Cu	60	6	Gd	5.2	0.6
Zn	88	2	Tb	0.71	0.10
Ga	20	3	Dy	3.8	0.4
Ge	1.25	0.13	Ho	0.73	0.08
As	0.84	0.27	Er	1.61	0.22
Br (ng/g)	340	170	Tm	320	50
Rb	67	1	Yb	1.67	0.17
Sr	662	9	Lu (ng/g)	280	30

AGV-1 (cont.)

Element	Value	Uncertainty (±)	Element	Value	Uncertainty (±)
Hf	5.1	0.4	Hg (ng/g)	20	9
Ta	0.92	0.12	Tl	0.7	0.5
W	0.53	0.09	Pb	36	5
Re (ng/g)	0.38	-	Bi (ng/g)	54	4
Os (ng/g)	<0.02	-	Th	6.50	0.37
Au (ng/g)	0.62	0.11	U	1.89	0.25

Major and minor oxide concentrations (%):

Component	Mean	Uncertainty (±)	Component	Mean	Uncertainty (±)
H_2O^+	0.80	0.18	FeO	2.06	0.11
H_2O^-	1.01	0.21	Fe_2O_3	4.47	0.22

Order information:

AGV-1 is available free of charge from the US Geological Survey. Please contact Dr. S. Wilson at the address above.

References:

Abbey, S. (1983) Studies in "standard samples" of silicate rocks and minerals 1969-1982. Paper 83-15, 114 pp. Geological Survey of Canada, Canadian Government Publishing Centre, Supply and Services Canada, Hull, Quebec, Canada.

Flanagan, F. J. (1967) US Geological Survey silicate rock standards. Geochim. Cosmochim. A., 31:289-308.

Gladney, E.S., C.E. Burns, and I. Roelandts (1983) 1982 Compilation of elemental concentrations in eleven United States Geological Survey rock standards. Geostands. Newsletter, 7(1):3-226.

BCS-CRM 368

Dolomite

Source:

Bureau of Analysed Samples Ltd.
Newham Hall, Newby
Middlesbrough, Cleveland TS8 9EA
ENGLAND

Description:

The material. used for this CRM was ground to pass through a 125 μm sieve (120 mesh) and passed through a magnetic separator.

Certified concentrations (μg/g dry weight unless noted):

Component	Value	Component	Value
MgO (%)	20.9	Mn	472
Al_2O_3 (%)	0.17	Fe_2O_3 (%)	0.23
SiO_2 (%)	0.92	Ni	< 4
CaO (%)	30.8	Cu	3
TiO_2 (%)	< 0.01	Zn	83
Cr_2O_3 (%)	< 0.01	Sr	75
Cr	39	Pb	61
MnO (%)	0.06		

Order Information:

BCS-CRM 368 can be purchased for £25 per unit (100 g). Price subject to change without notice. Please contact BAS at the address shown above.

References:

Bureau of Analyzed Samples Ltd. (1971) BCS-CRM No. 368 Dolomite. Certificate of analyses. Bureau of Analyzed Samples Ltd., Newham Hall, Newby, Middlesbrough, Cleveland, England.

Bureau of Analyzed Samples Ltd. (1989) BCS-CRM No. 368 Dolomite, BCS-CRM No. 375 Soda Feldspar, BCS-CRM No. 376 Potash Feldspar, BCS-CRM No. 389 High Purity Magnesite, BCS-CRM No. 395 Bauxite. Supplementary information regarding trace element content. Bureau of Analyzed Samples Ltd., Newham Hall, Newby, Middlesbrough, Cleveland, England.

BCS-CRM 393

Limestone

Source:

Bureau of Analysed Samples Ltd.
Newham Hall, Newby
Middlesbrough, Cleveland TS8 9EA
ENGLAND

Description:

Derbyshire limestone was used for this reference material. It was ground to pass through a 75 μm sieve (200 mesh) and passed through a magnetic separator.

Certified concentrations (percent dry weight):

Component	Value	Component	Value
MgO	0.15	TiO_2	0.009
Al_2O_3	0.12	MnO	0.010
SiO_2	0.70	Fe_2O_3	0.045
S	0.007	SrO	0.019
K_2O	0.02	BaO	0.006
CaO	55.4		

Order Information:

BCS-CRM 393 can be purchased for £25 per unit (100 g). Price subject to change without notice. Please contact BAS at the address shown above.

Reference:

Bureau of Analyzed Samples Ltd. (1984) BCS-CRM No. 393 Limestone. Certificate of analyses. Bureau of Analyzed Samples Ltd., Newham Hall, Newby, Middlesbrough, Cleveland, England.

BCS-CRM 395

Bauxite

Source:

Bureau of Analysed Samples Ltd.
Newham Hall, Newby
Middlesbrough, Cleveland TS8 9EA
ENGLAND

Description:

The material was ground to pass through a 150 μm sieve (100 mesh) and passed through a magnetic separator.

Certified concentrations (μg/g dry weight unless noted):

Component	Value	Component	Value
MgO (%)	0.02	Fe_2O_3 (%)	16.3
Al_2O_3 (%)	52.4	Ni	34
SiO_2 (%)	1.24	Cu	21
CaO (%)	0.05	Zn	43
TiO_2 (%)	1.93	Sr	23
Cr	453	Pb	28
Mn	42		

Order Information:

BCS-CRM 395 can be purchased for £25 per unit (100 g). Price subject to change without notice. Please contact BAS at the address shown above.

References:

Bureau of Analyzed Samples Ltd. (1989) BCS-CRM No. 395 Bauxite. Certificate of analyses. Bureau of Analyzed Samples Ltd., Newham Hall, Newby, Middlesbrough, Cleveland, England.

Bureau of Analyzed Samples Ltd. (1989) BCS-CRM No. 368 Dolomite, BCS-CRM No. 375 Soda Feldspar, BCS-CRM No. 376 Potash Feldspar, BCS-CRM No. 389 High Purity Magnesite, BCS-CRM No. 395 Bauxite. Supplementary information regarding trace element content. Bureau of Analyzed Samples Ltd., Newham Hall, Newby, Middlesbrough, Cleveland, England.

BHVO-1

Basalt

Source:

US Geological Survey
Branch of Geochemistry
P. O. Box 25046 MS 973
Denver, CO 80225
USA

Description:

A basaltic lava from Kilauea caldera, Kilauea volcano, Hawaii, USA, was collected from the surface layer of the pahoehoe lava that flowed from Halemaumau in the fall of 1919 (19° 25'N, 155° 17.5' W). A complete mineralogical description of this material can be found in Flanagan *et al.* (1976). BHVO-1 is not a certified reference material. Values for elemental concentrations have been calculated by Gladney and Goode (1981), Abbey (1982, 1983) and Gladney and Roelandts (1988) using the results of various analysts. Those calculated by Gladney and Roelandts (1988) are listed below.

Best available concentrations (μg/g dry weight unless noted):

Element	Mean	Uncertainty (±)	Number of values	Element	Mean	Uncertainty (±)	Number of values
Li	4.6	1.5	10	Ga	21	2	6
Be	1.1	0.3	7	Ge	1.64	-	2
B	2.5	0.6	8	As	0.40	0.22	6
C	98	51	7	Se (ng/g)	74	44	6
N	22.6	-	1	Br	0.71	-	2
F	385	31	11	Rb	11	2	27
Na (%)	1.68	0.05	38	Sr	403	25	32
Mg (%)	4.36	0.13	33	Y	27.6	1.7	22
Al (%)	7.30	0.11	33	Zr	179	21	27
Si (%)	23.32	0.25	26	Nb	19	2	19
P	1190	110	23	Mo	1.02	0.10	9
S	102	7	4	Ru	<0.46	-	-
Cl	92	8	12	Rh (ng/g)	0.2	-	-
K (%)	0.43	0.029	37	Pd (ng/g)	3.0	0.4	3
Ca (%)	8.15	0.12	32	Ag (ng/g)	55	7	5
Sc	31.8	1.3	36	Cd (ng/g)	69	11	5
Ti	16220	380	31	In (ng/g)	180	-	1
V	317	12	26	Sn	2.1	0.5	8
Cr	289	22	36	Sb	0.159	0.036	12
Mn	1300	62	43	Te (ng/g)	6.4	1.6	3
Fe (%)	8.55	0.15	39	Cs	0.13	0.06	8
Co	45	2	33	Ba	139	14	37
Ni	121	2	29	La	15.8	1.3	53
Cu	136	6	15	Ce	39	4	56
Zn	105	5	15	Pr	5.7	0.4	9

BHVO-1 (cont.)

Element	Mean	Uncertainty (±)	Number of values	Element	Mean	Uncertainty (±)	Number of values
Nd	25.2	2.0	45	W	0.27	0.06	5
Sm	6. 2	0.3	53	Re	<10	-	-
Eu	2.06	0.08	50	Os	<22	-	-
Gd	6.4	0.5	31	Ir (ng/g)	4.4	-	1
Tb	0.96	0.08	35	Pt (ng/g)	2.2	-	1
Dy	5.2	0.3	28	Au (ng/g)	1.6	0.5	10
Ho	0.99	0.08	16	Hg (ng/g)	5.6	-	2
Er	2.4	0.2	18	Tl (ng/g)	58	12	5
Tm (ng/g)	330	40	16	Pb	2.6	0.9	7
Yb	2.02	0.20	57	Bi (ng/g)	18	4	9
Lu (ng/g)	291	26	32	Th	1.08	0.15	32
Hf	4.38	0.22	30	U	0.42	0.06	15
Ta	1.23	0.13	26				

Major and minor oxide concentrations (%):

Component	Mean	Uncertainty (±)	Number of values	Element	Mean	Uncertainty (±)	Number of values
H_2O^+	0.16	0.06	10	K_2O	0.520	0.035	37
H_2O^-	0.05	0.01	3	CaO	11.40	0.17	32
CO_2	0.036	0.019	7	TiO_2	2.71	0.06	31
Na_2O	2.26	0.07	38	MnO	0.168	0.008	43
MgO	7.23	0.22	33	FeO	8.58	0.09	12
Al_2O_3	13.80	0.21	33	Fe_2O_3	2.82	0.24	8
SiO_2	49.94	0.54	26	Cl	0.009	0.001	12
P_2O_5	0.273	0.025	23	F	0.038	0.003	11
				S	0.010	0.001	4

Order information:

BHVO-1 is available free of charge from the US Geological Survey. Please contact Dr. S. Wilson at the address above.

References:

Abbey, S. (1982) An evaluation of USGS III. Geostand. Newsletter, 6(1):47-76.

Abbey, S. (1983) Studies in "standard samples" of silicate rocks and minerals 1969-1982. Paper 83-15, 114 pp. Geological Survey of Canada, Canadian Government Publishing Centre, Supply and Services Canada, Hull, Quebec, Canada.

Flanagan, F. J., T. L. Wright, S. R. Taylor, C. S. Annell, R. C. Christian, and J. I. Dinnin (1976) Basalt, BHVO-1, from Kilauea crater, Hawaii. In: F.J. Flanagan (ed.), Description and analyses of eight new USGS rock standards, USGS Prof. paper 840, p. 33-9. US Government Printing Office, Washington, DC, USA.

Gladney, E.S., and W.E. Goode (1981) Elemental concentrations in eight new United States Geological Survey rock standards: a review. Geostand. Newsletter, 5(1):31-64.

Gladney, E. S., and I. Roelandts (1988) 1987 Compilation of elemental concentration data for USGS BHVO-1, MAG-1, QLO-1, RGM-1, SCo-1, SDC-1, SGR-1 and STM-1. Geostand. Newsletter, 12(2):253-362.

BIR-1

Icelandic Basalt

Source:

US Geological Survey
Branch of Geochemistry
P. O. Box 25046 MS 973
Denver, CO 80225
USA

Description:

This material is basalt from one of the interglacial lava flows known as Reykjavik dolerites. The rock is a coarse-grained olivine tholeiite. Original concentration values for various elements were initially provided by Flanagan (1984). BIR-1 is not a certified reference material. Values for elemental concentrations have been calculated by Abbey (1983), Gladney *et al.* (1983), Flanagan (1986) and Gladney and Roelandts (1988) using the results of various analysts. Those calculated by Gladney and Roelandts (1988) are listed below.

Concentrations (μg/g dry weight unless noted):

Element	Mean	Uncertainty (±)	Number of values	Element	Mean	Uncertainty (±)	Number of values
Li	3.4	0.4	7	Se (ng/g)	18	-	2
Be	0.58	0.07	3	Br	<2	-	-
B	0.33	0.16	3	Rb	1.0	0.9	9
C	66	24	5	Sr	108	14	28
F	44	13	6	Y	16	2	20
Na (%)	1.30	0.08	38	Zr	22	7	14
Mg (%)	5.84	0.17	28	Nb	2.0	0.5	10
Al (%)	8.12	0.27	32	Mo	0.5	0.8	3
Si (%)	22.31	0.24	26	Pd (ng/g)	5.6	0.6	3
P	200	120	21	Rh (ng/g)	0.35	-	1
Cl	26	6	5	Ag (ng/g)	36	-	2
K	220	80	25	Cd (ng/g)	114	38	4
Ca (%)	9.47	0.21	34	Sn	0.69	-	2
Sc	44	4	19	Sb	0.58	0.16	11
Ti	5720	200	36	Te (ng/g)	7	-	1
V	313	23	24	Cs	0.45	0.06	4
Cr	382	38	32	Ba	7.7	2.2	12
Mn	1320	80	36	La	0.88	0.33	18
Fe (%)	7.87	0.16	36	Ce	2.5	1.1	15
Co	51.4	3.4	30	Pr	0.5	0.4	4
Ni	166	16	25	Nd	2.5	0.7	12
Cu	126	5	23	Sm	1.08	0.09	25
Zn	71	9	23	Eu	0.54	0.04	25
Ga	16	2	8	Gd	1.9	0.4	14
Ge	1.45	-	1	Tb (ng/g)	410	50	10
As	0.44	0.48	3	Dy	2.4	0.3	10

BIR-1 (cont.)

Element	Mean	Uncertainty (±)	Number of values	Element	Mean	Uncertainty (±)	Number of values
Ho (ng/g)	500	80	6	Pt (ng/g)	2.8	-	1
Er	1.8	0.3	6	Au (ng/g)	1.56	-	2
Tm (ng/g)	270	70	8	Hg (ng/g)	7.3	-	1
Yb	1.70	0.19	22	Tl (ng/g)	10	-	1
Lu (ng/g)	260	40	15	Pb	3.2	0.8	6
Hf	0.58	0.06	12	Bi (ng/g)	20	-	1
Ta (ng/g)	62	36	5	Th	0.89	0.70	9
W (ng/g)	0.22	-	1	U (ng/g)	25	-	2
Ir (ng/g)	0.15	-	1				

Major and minor oxide concentrations (%):

Component	Mean	Uncertainty (±)	Number of values	Component	Mean	Uncertainty (±)	Number of values
H_2O^+	0.010	0.03	9	K_2O	0.027	0.010	25
H_2O^-	0.07	0.02	5	CaO	13.24	0.29	34
Na_2O	1.75	0.11	38	TiO_2	0.96	0.03	36
MgO	9.68	0.28	28	MnO	0.171	0.010	36
Al_2O_3	15.35	0.51	32	FeO	8.38	0.11	9
SiO_2	47.77	0.51	26	Fe_2O_3	2.08	0.08	7
P_2O_5	0.046	0.028	21	CO_2	0.02	0.01	5

Order information:

BIR-1 is available free of charge from the US Geological Survey. Please contact Dr. S. Wilson at the address above.

References:

Abbey, S. (1983) Studies in "standard samples" of silicate rocks and minerals 1969-1982. Paper 83-15, 114 pp. Geological Survey of Canada, Canadian Government Publishing Centre, Supply and Services Canada, Hull, Quebec, Canada.

Flanagan, F.J. (1984) Three USGS mafic rock reference samples, W-2, DNC-1, and BIR-1. U.S. Geol. Survey Prof. Bull. 1623:1-12. U.S. Geological Survey, Reston, VA, USA.

Flanagan, F.J. (1986) Additions and corrections for USGS Bulletin 1623, Three USGS mafic rock reference samples, W-2, DNC-1, and BIR-1. Open file report 86-220. U.S. Geological Survey, Reston, VA, USA.

Gladney, E.S., C.E. Burns, and I. Roelandts (1983) 1982 Compilation of elemental concentrations in eleven United States Geological Survey rock standards. Geostands. Newsletter, 7(1):3-226.

Gladney, E. S., and I. Roelandts (1988) 1987 Compilation of elemental concentration data for USGS BIR-1, DNC-1 and W-2. Geostand. Newsletter, 12(1):63-118.

DNC-1

Dolerite

Source:

US Geological Survey
Branch of Geochemistry
P. O. Box 25046 MS 973
Denver, CO 80225
USA

Description:

DNC-1 is a Triassic-Jurasic olivine-normative dolerite and it is known locally as Braggtown dolerite. Five hundred pounds of this material was collected from the Braggtown Quarry, near Chapel Hill, NC, USA, and processed for this standard (Flanagan, 1984). The complete petrology of the material can be found in Ragland *et al.* (1968). DNC-1 is not a certified reference material. Original concentration values for various elements were initially provided by Flanagan (1984). Values for elemental concentrations have been calculated by Abbey (1983), Gladney *et al.* (1983), Flanagan (1986) and Gladney and Roelandts (1988) using the results of various analysts. Those calculated by Gladney and Roelandts (1988) are listed below.

Best available concentrations (μg/g dry weight unless noted):

Element	Mean	Uncertainty (±)	Number of values	Element	Mean	Uncertainty (±)	Number of values
Li	5.1	0.5	8	Zn	66	5	22
Be	1.0	0.4	4	Se (ng/g)	200	-	2
B	0.90	0.28	4	Ga	15	2	7
C	125	67	4	Ge	1.26	-	1
F	66	10	7	As	0.2	-	2
Na (%)	1.39	0.07	38	Rb	4.5	2.2	20
Mg (%)	6.06	0.20	32	Sr	145	6	23
Al (%)	9.68	0.26	38	Y	18	3	19
Si (%)	21.97	0.30	28	Zr	41	7	15
P	370	90	21	Nb	3.0	0.7	11
S	392	-	2	Mo	0.7	-	2
Cl	37	8	7	Rh (ng/g)	0.35	-	1
K	1900	130	32	Pd (ng/g)	16	4	3
Ca (%)	8.06	0.16	33	Ag (ng/g)	27	-	2
Sc	31.0	1.4	17	Cd (ng/g)	182	108	4
Ti	2880	100	33	Sb	0.96	0.15	9
V	148	9	20	Te (ng/g)	21	-	1
Cr	285	32	32	Cs	0.34	0.14	5
Mn	1150	70	39	Ba	114	16	26
Fe (%)	6.94	0.10	35	La	3.8	0.4	19
Co	54.7	3.7	32	Ce	10.6	2.4	25
Ni	247	18	24	Pr	1.3	0.6	3
Cu	96	9	20	Nd	4.9	0.2	9

DNC-1 (cont.)

Element	Mean	Uncertainty (±)	Number of values	Element	Mean	Uncertainty (±)	Number of values
Sm	1.38	0.15	22	Ta (ng/g)	98	13	5
Eu	0.59	0.03	20	W (ng/g)	190	-	1
Gd	2.0	0.4	11	Ir (ng/g)	0.52	-	1
Tb (ng/g)	410	30	9	Pt (ng/g)	36	-	2
Dy	2.7	0.4	9	Au (ng/g)	1.99	-	2
Ho (ng/g)	620	140	7	Hg (ng/g)	6.2	-	1
Er	2.0	0.2	5	Tl (ng/g)	26	-	1
Tm (ng/g)	330	50	7	Pb	6.3	1.0	4
Yb	2.01	0.10	18	Bi (ng/g)	20	-	1
Lu (ng/g)	320	40	15	Th	0.20	0.09	7
Hf	1.01	0.07	12	U (ng/g)	100	-	2

Major and minor oxide concentrations (%):

Component	Mean	Uncertainty (±)	Number of values	Component	Mean	Uncertainty (±)	Number of values
H_2O^+	0.68	0.07	11	K_2O	0.229	0.016	32
H_2O^-	0.33	0.07	7	CaO	11.27	0.22	33
Na_2O	1.87	0.09	38	TiO_2	0.48	0.02	33
MgO	10.05	0.33	32	MnO	0.149	0.009	39
Al_2O_3	18.30	0.49	38	FeO	7.39	0.14	8
SiO_2	47.04	0.64	28	Fe_2O_3	1.76	0.14	7
P_2O_5	0.085	0.021	21	CO_2	0.046	0.02	4

Order information:

DNC-1 is available free of charge from the US Geological Survey. Please contact Dr. S. Wilson at the address above.

References:

Abbey, S. (1983) Studies in "standard samples" of silicate rocks and minerals 1969-1982. Paper 83-15, 114 pp. Geological Survey of Canada, Canadian Government Publishing Centre, Supply and Services Canada, Hull, Quebec, Canada.

Flanagan, F.J. (1984) Three USGS mafic rock reference samples, W-2, DNC-1, and BIR-1. U.S. Geol. Survey Prof. Bull. 1623:1-12. U.S. Geological Survey, Reston, VA, USA.

Flanagan, F.J. (1986) Additions and corrections for USGS Bulletin 1623, Three USGS mafic rock reference samples, W-2, DNC-1, and BIR-1. Open file report 86-220. U.S. Geological Survey, Reston, VA, USA.

Gladney, E.S., C.E. Burns, and I. Roelandts (1983) 1982 Compilation of elemental concentrations in eleven United States Geological Survey rock standards. Geostands. Newsletter, 7(1):3-226.

Gladney, E. S., and I. Roelandts (1988) 1987 Compilation of elemental concentration data for USGS BIR-1, DNC-1 and W-2. Geostand. Newsletter, 12(1):63-118.

DNC-1 (cont.)

Ragland, P.C., J. J. W. Rogers, and P. S. Justus (1968) Origin and differentiation of Triassic dolerite magmas, North Carolina, USA. Contributions to Mineralogy and Petrology, 20(1):57-80.

G-2

Granite

Source:

US Geological Survey
Branch of Geochemistry
P. O. Box 25046 MS 973
Denver, CO 80225
USA

Description:

This material is composed of Westerly granite collected from the Sullivan Quarry, Bradford, Long Island, USA (Flanagan 1967). G-2 is not a certified reference material. Values for elemental concentrations calculated by Abbey (1983) and Gladney *et al.* (1983) using the results of various analysts. Those calculated by Gladney *et al.* (1983) are listed below.

Best available concentrations (μg/g dry weight unless noted):

Element	Mean	Uncertainty (±)	Element	Mean	Uncertainty (±)
Li	36	5	Br (ng/g)	230	150
Be	2.4	0.5	Rb	170	3
B	2.2	0.2	Sr	478	3
C	230	50	Y	11.4	2.3
N	41	13	Zr	300	30
O (%)	48.12	0.21	Nb	13	4
F	1260	90	Mo	1.0	0.6
Na (%)	3.02	0.09	Ru	<4	-
Mg (%)	0.460	0.040	Rh (ng/g)	<5	-
Al (%)	8.15	0.12	Ag (ng/g)	45	6
Si (%)	32.24	0.28	Cd (ng/g)	25	11
P	600	40	In	30	2
Cl	69	25	Sn	1.6	0.5
K (%)	3.73	0.12	Sb	0.078	0.032
Ca (%)	1.41	0.07	Te (ng/g)	3.9	1.4
Sc	3.5	0.4	I (ng/g)	310	-
Ti (%)	0.295	0.022	Cs	1.33	0.14
V	36	5	Ba	1880	20
Cr	9	2	La	86	5
Mn	260	40	Ce	159	11
Fe (%)	1.87	0.07	Pr	19	2
Co	4.6	0.4	Nd	53	8
Ni	4.9	2.3	Sm	7.2	0.6
Cu	11	3	Eu	1.41	0.12
Zn	85	7	Gd	4.1	0.8
Ga	22	2	Tb	0.48	0.07
Ge	1.14	0.15	Dy	2.5	0.5
As	0.27	0.12	Ho	0.37	0.02

G-2 (cont.)

Element	Mean	Uncertainty (±)	Element	Mean	Uncertainty (±)
Er	1.2	0.3	Au (ng/g)	1.0	0.2
Tm (ng/g)	170	70	Hg (ng/g)	49	13
Yb	0.78	0.14	Tl	1.02	0.08
Lu (ng/g)	113	24	Pb	31	4
Ta	0.88	0.12	Bi (ng/g)	41	10
W	0.15	0.06	Ra (PCi/g)	0.71	-
Re (ng/g)	<7	-	Th	24.6	1.5
Os (ng/g)	<100	-	U	2.04	0.17
Pt (ng/g)	5.9	-			

Major and minor oxide concentrations (%):

Component	Mean	Uncertainty (±)	Component	Mean	Uncertainty (±)
H_2O^+	0.51	0.09	FeO	1.45	0.08
H_2O^-	0.10	0.04	Fe_2O_3	1.07	0.12

Order information:

G-2 is available free of charge from the US Geological Survey. Please contact Dr. S. Wilson at the address above.

References:

Abbey, S. (1983) Studies in "standard samples" of silicate rocks and minerals 1969-1982. Paper 83-15, 114 pp. Geological Survey of Canada, Canadian Government Publishing Centre, Supply and Services Canada, Hull, Quebec, Canada.

Flanagan, F. J. (1967) U.S. Geological Survey silicate rock standards. Geochim. Cosmochim. Acta, 31:289-308.

Gladney, E.S., C.E. Burns, and I. Roelandts (1983) 1982 Compilation of elemental concentrations in eleven United States Geological Survey rock standards. Geostands. Newsletter, 7(1):3-226.

GBW 07249

Polymetallic Nodule

Source:

National Research Center for CRMs
Office of CRMs
No. 7 District 11
Hepingjie, Chaoyangqu
Beijing, 100013
CHINA

Description:

The material for this CRM was collected from the central part of the Pacific during the HY4-871 cruise of the R/V Haiyang of the Ministry of Geology and Mineral Resources. The sediment was air dried, crumbled to less than 5 mm pieces, mixed, oven dried at 60°C, ground to less than 0.08 mm particles, mixed, and packaged.

Certified concentrations (μg/g dry weight unless noted):

Component	Value	Uncertainty (±)	Component	Value	Uncertainty (±)
Li	11.1	0.7	Sr (%)	0.12	0.01
B	215	26	Y	159	10
Na_2O (%)	2.12	0.06	Zr	659	25
MgO (%)	2.00	0.03	Mo	371	15
Al_2O_3 (%)	3.53	0.07	Sb	28.1	1.1
SiO_2 (%)	13.30	0.08	Ba (%)	0.14	0.01
P_2O_5 (%)	0.73	0.02	La	239	12
S (%)	0.18	0.02	Ce	998	52
Cl (%)	0.85	0.03	Pr	55.1	2.6
K_2O (%)	0.68	0.02	Nd	238	6
CaO	2.81	0.06	Sm	51.9	2.4
Sc	13.4	1.2	Eu	12.7	0.9
TiO_2 (%)	1.71	0.03	Gd	56.2	3.0
V	588	11	Tb	8.6	0.8
Cr	10.0	0.9	Dy	48.9	2.3
Mn (%)	20.92	0.06	Ho	9.9	0.6
Fe (%)	18.71	0.07	Er	26.4	1.6
Co (%)	0.35	0.01	Yb	24.3	1.4
Ni (%)	0.36	0.01	Lu	3.5	0.4
Cu (%)	0.28	0.01	W	61.0	3.6
Zn	563	11	Tl	133	12
Ga	5.5	0.7	Pb	948	20
As	179	22	Tm	3.6	0.4
Rb	8.3	1.6	Th	32.5	2.9
			U	9.3	1.2

GBW 07249 (cont.)

Noncertified concentrations (μg/g dry weight unless noted):

Component	Value
F (%)	289
Org. C (%)	0.07
Nb	64.9

Order information:

GBW 07249 can be purchased for US$240 per unit (60 g). Price subject to change without notice. Please contact NRCCRM at the address above.

Reference:

Institute of Marine Geology (1990) Certificate of certified reference material. Polymetallic nodule. Institute of Marine Geology, Ministry of Geology and Mineral Resources, Qingdao, China.

GSR-1

Biotite Granite

Source:

National Research Center for CRMs
Office of CRMs
No. 7 District 11
Hepingjie, Chaoyangqu
Beijing, 100013
CHINA

Description:

The material used for this CRM is a grey, medium-grained biotite collected at Chenzhou, Hunan, China. There is W, Sn and Mo mineralization in the contact zone between the granite and carbonate rocks.

Certified concentrations (μg/g dry weight unless noted):

Component	Value	Uncertainty (±)	Component	Value	Uncertainty (±)
Li	131	3	Nb	40	1.4
Be	12.4	0.7	Mo	3.5	0.1
B	24	2	Sn	12.5	1
F	2350	80	Sb	0.21	0.03
Na_2O (%)	3.13	0.03	Te	0.021	0.003
MgO (%)	0.42	0.016	Cs	38.4	0.8
Al_2O_3 (%)	13.40	0.04	Ba	343	13
SiO_2 (%)	72.83	0.06	La	54	2
P	405	9	Ce	108	4
Cl	127	11	Pr	12.7	0.5
K_2O (%)	5.01	0.03	Nd	47	2
CaO (%)	1.55	0.02	Sm	9.7	0.5
Sc	6.1	0.2	Eu	0.85	0.04
Ti	1720	30	Gd	9.3	0.4
V	24	1	Tb	1.65	0.06
Mn	463	7	Dy	10.2	0.2
Fe_2O_3 (%)	2.14	0.02	Ho	2.05	0.11
Co	3.4	0.2	Er	6.5	0.2
Ni	2.3	0.3	Yb	7.4	0.2
Cu	3.2	0.4	Lu	1.15	0.06
Zn	28	1	Hf	6.3	0.5
Ga	19	1	Ta	7.2	0.4
Ge	2.0	0.2	W	8.4	0.2
As	2.1	0.16	Tl	1.93	0.26
Rb	466	10	Pb	31	1.3
Sr	106	3	Bi	0.53	0.08
Y	62	2	Tm	1.06	0.06
Zr	167	5	Th	54	1.3
			U	18.8	1

GSR-1 (cont.)

Noncertified concentrations (μg/g dry weight):

Component	Value
S	380
Cr	5.0
Se	0.059
Cd	0.032
In	0.02
Au (ng/g)	0.55
Hg (ng/g)	4.3

Order information:

No price information is available. Please contact NRCCRM at the address above.

Reference:

Institute of Geophysical and Geochemical Exploration (1986) Certificate of geochemical standard reference materials. Institute of Geophysical and Geochemical Exploration, Langfang, Hebei, China.

GSR-2

Hornblende Andesite

Source:

National Research Center for CRMs
Office of CRMs
No. 7 District 11
Hepingjie, Chaoyangqu
Beijing, 100013
CHINA

Description:

The material used for this CRM is hornblende andesite collected in the vicinity of the Meishan iron mine, Nanjiang, China. The material has thin carbonation.

Certified concentrations (μg/g dry weight unless noted):

Component	Value	Uncertainty (±)	Component	Value	Uncertainty (±)
Li	18.3	0.5	Nb	6.8	0.7
Be	1.1	0.07	Mo	0.54	0.05
B	4.7	0.5	Ag	0.071	0.006
F	280	15	Cd	0.061	0.008
Na_2O (%)	3.86	0.04	Sn	0.79	0.11
MgO (%)	1.72	0.03	Sb	0.12	0.02
Al_2O_3 (%)	16.17	0.06	Te	0.017	0.003
SiO_2 (%)	60.62	0.08	Cs	2.3	0.4
P	1030	12	Ba	1020	21
K_2O (%)	1.89	0.02	La	21.8	1
CaO (%)	5.52	0.04	Ce	40	2
Sc	9.5	0.4	Pr	4.9	0.2
Ti	3090	40	Nd	19	1
V	94.5	1.6	Sm	3.4	0.1
Cr	32.4	1.3	Eu	1.02	0.03
Mn	604	7	Gd	2.7	0.2
Fe_2O_3 (%)	4.90	0.03	Tb	0.41	0.03
Co	13.2	0.4	Dy	1.85	0.12
Ni	17	0.5	Ho	0.34	0.014
Cu	55.4	1.1	Er	0.85	0.08
Zn	71	2	Yb	0.89	0.07
Ga	18.1	0.9	Lu	0.12	0.02
Ge	0.93	0.01	Hf	2.9	0.3
As	2.1	0.2	Hg (ng/g)	12	2
Rb	37.6	1.7	Pb	11.3	0.9
Sr	790	16	Bi	0.081	0.010
Y	9.3	0.5	Th	2.6	0.15
Zr	99	5	U	0.90	0.13

GSR-2 (cont.)

Noncertified concentrations (μg/g dry weight):

Component	Value
S	190
Cl	42
Se	0.063
In	0.033
Ta	0.46
W	0.47
Au (ng/g)	0.95
Tm	0.15
Tl	0.16

Order information:

No price information is available. Please contact NRCCRM at the address above.

Reference:

Institute of Geophysical and Geochemical Exploration (1986) Certificate of geochemical standard reference materials. Institute of Geophysical and Geochemical Exploration, Langfang, Hebei, China.

GSR-3

Olivine Basalt

Source:

National Research Center for CRMs
Office of CRMs
No. 7 District 11
Hepingjie, Chaoyangqu
Beijing, 100013
CHINA

Description:

The material used for this CRM was collected at Zhangjiakou, Hebei, China. The principal components are plagioclase, olivine, magnetite and augite.

Certified concentrations (μg/g dry weight unless noted):

Component	Value	Uncertainty (±)	Component	Value	Uncertainty (±)
Li	9.5	0.5	Zr	277	10
Be	2.5	0.2	Nb	68	4
B	3.5	0.7	Mo	2.6	0.1
F	700	26	Ag	0.040	0.005
Na_2O (%)	3.38	0.02	Cd	0.067	0.010
MgO (%)	7.77	0.08	Sn	2.0	0.3
Al_2O_3 (%)	13.83	0.07	Sb	0.083	0.021
SiO_2 (%)	44.64	0.06	Ba	527	12
P	4130	60	La	56	2
S	100	10	Ce	105	5
Cl	114	15	Pr	13.2	0.8
K_2O (%)	2.32	0.03	Nd	54	2
CaO (%)	8.81	0.05	Sm	10.2	0.3
Sc	15.2	0.7	Eu	3.2	0.15
Ti	14200	200	Gd	8.5	0.4
V	167	5	Tb	1.2	0.1
Cr	134	4	Dy	5.6	0.15
Mn	1310	24	Ho	0.88	0.02
Fe_2O_3 (%)	13.40	0.09	Er	2.0	0.14
Co	46.5	1.3	Yb	1.5	0.2
Ni	140	3	Lu	0.19	0.03
Cu	48.6	1.1	Pb	7.2	1.2
Zn	150	4	Tm	0.28	0.02
Ga	24.8	0.6	Hf	6.5	0.4
Ge	0.98	0.14	Ta	4.3	0.4
Rb	37	2	Th	6.0	0.5
Sr	1100	30	U	1.4	0.2
Y	22	1			

GSR-3 (cont.)

Noncertified concentrations (μg/g dry weight):

Component	Value
As	0.79
Se	0.086
In	0.063
Te	0.022
Cs	1.2
W	0.44
Au (ng/g)	0.66
Hg (ng/g)	6.4
Tl	0.12
Bi	0.045

Order information:

No price information is available. Please contact NRCCRM at the address above.

Reference:

Institute of Geophysical and Geochemical Exploration (1986) Certificate of geochemical standard reference materials. Institute of Geophysical and Geochemical Exploration, Langfang, Hebei, China.

GSR-4

Sandstone

Source:

National Research Center for CRMs
Office of CRMs
No. 7 District 11
Hepingjie, Chaoyangqu
Beijing, 100013
CHINA

Description:

The material used for this CRM is a light and dark sandstone sample collected at Tongling, Anhui, China. TIn addition to quartz, the material contains a small amount of muscovite.

Certified concentrations (µg/g dry weight unless noted):

Component	Value	Uncertainty (±)	Component	Value	Uncertainty (±)
Li	11.1	0.3	Y	21.5	1.1
Be	0.97	0.06	Zr	214	5
B	34	4	Nb	5.9	0.5
F	183	12	Mo	0.76	0.08
Na_2O (%)	0.061	0.007	Ag	0.062	0.004
MgO (%)	0.082	0.011	Cd	0.060	0.011
Al_2O_3 (%)	3.52	0.05	Sn	1.1	0.1
SiO_2 (%)	90.36	0.10	Sb	0.60	0.06
P	970	21	Te	0.038	0.007
S	860	20	Pb	29	1.3
K_2O (%)	0.65	0.014	Cs	1.8	0.2
CaO (%)	0.30	0.02	Ba	143	7
Sc	4.2	0.2	La	21	1
Ti	1580	40	Ce	48	2
V	33.4	1.2	Pr	5.4	0.4
Cr	20	1	Nd	21	1
Mn	155	3	Sm	4.7	0.16
Fe_2O_3 (%)	3.22	0.03	Eu	1.02	0.06
Co	6.4	0.2	Gd	4.5	0.2
Ni	16.6	0.4	Tb	0.79	0.06
Cu	19	0.6	Dy	4.1	0.2
Zn	20	1	Ho	0.75	0.08
Ga	5.3	0.5	Er	2.0	0.2
Ge	1.16	0.17	Tm	0.32	0.02
As	9.1	0.7	Yb	1.92	0.08
Pb	29	1.3	Lu	0.30	0.02
Sr	58	2	Hf	6.6	0.4
			W	1.16	0.12

GSR-4 (cont.)

Component	Value	Uncertainty (±)	Component	Value	Uncertainty (±)
Tl	0.36	0.04	Th	7.0	0.2
Pb	7.6	0.4	U	2.1	0.2
Bi	0.18	0.02			

Noncertified concentrations (μg/g dry weight):

Component	Value
Cl	42
Se	0.098
In	0.026
Ta	0.42
Au (ng/g)	1.8
Hg (ng/g)	8.4

Order information:

No price information is available. Please contact NRCCRM at the address above.

Reference:

Institute of Geophysical and Geochemical Exploration (1986) Certificate of geochemical standard reference materials. Institute of Geophysical and Geochemical Exploration, Langfang, Hebei, China.

GSR-5

Shale

Source:

National Research Center for CRMs
Office of CRMs
No. 7 District 11
Hepingjie, Chaoyangqu
Beijing, 100013
CHINA

Description:

The material used for this CRM was collected at Jixian, Tianjin, China. The shale contains some muscovite and dolomite.

Certified concentrations (µg/g dry weight unless noted):

Component	Value	Uncertainty (±)	Component	Value	Uncertainty (±)
Li	44	1	Nb	14.3	0.9
Be	3.0	0.16	Mo	0.35	0.05
B	154	8	Ag	0.047	0.005
F	1290	40	In	0.082	0.016
Na_2O (%)	0.35	0.01	Sn	2.0	0.2
MgO (%)	2.01	0.03	Sb	0.17	0.04
Al_2O_3 (%)	18.82	0.08	Cs	14	1
SiO_2 (%)	59.23	0.10	Ba	450	16
P	690	18	La	62	2
S	60	20	Ce	109	5
K_2O (%)	4.16	0.05	Pr	13.6	1.1
CaO (%)	0.60	0.02	Nd	48	2
Sc	18.5	0.7	Sm	8.4	0.3
Ti	3950	60	Eu	1.7	0.1
V	87	2	Gd	6.7	0.3
Cr	99	2	Tb	1.02	0.05
Mn	173	5	Dy	5.1	0.3
Fe_2O_3 (%)	7.60	0.04	Ho	0.98	0.03
Co	21	0.5	Er	2.7	0.2
Ni	36.8	1	Yb	2.6	0.14
Cu	42	1	Lu	0.41	0.03
Zn	55	2	Hf	2.9	0.2
Ga	25.6	1.6	Ta	1.0	0.2
Ge	3.1	0.27	W	0.79	0.08
As	1.4	0.2	Hg (ng/g)	9.7	1.4
Rb	205	5	Tl	0.71	0.06
Sr	90	4	Pb	8.7	0.9
Y	26	1	Bi	0.23	0.02
Zr	96	5	Tm	0.43	0.02
			Th	12.8	0.6

GSR-5 (cont.)

Component	Value	Uncertainty (±)
U	1.5	0.14

Noncertified concentrations (μg/g dry weight):

Component	Value
Cl	40
Se	0.084
Cd	0.033
Te	0.022
Au (ng/g)	1.0

Order information:

No price information is available. Please contact NRCCRM at the address above.

Reference:

Institute of Geophysical and Geochemical Exploration (1986) Certificate of geochemical standard reference materials. Institute of Geophysical and Geochemical Exploration, Langfang, Hebei, China.

GSR-6

Carbonate Rock

Source:

National Research Center for CRMs
Office of CRMs
No. 7 District 11
Hepingjie, Chaoyangqu
Beijing, 100013
CHINA

Description:

The material used for this CRM was collected at Tongling, Anhui, China. The major component is limestone with a small amount of dolomite.

Certified concentrations (μg/g dry weight unless noted):

Component	Value	Uncertainty (±)	Component	Value	Uncertainty (±)
Li	20.5	1.4	Y	9.1	0.9
Be	0.8	0.1	Zr	62	8
B	16	2	Nb	6.6	1.1
F	406	19	Mo	0.38	0.03
MgO (%)	5.19	0.06	Cd	0.069	0.014
Al_2O_3 (%)	5.03	0.05	Sb	0.43	0.06
SiO_2 (%)	15.60	0.04	Cs	3.2	0.4
P	226	17	Ba	120	6
S	370	90	La	14.6	1.9
K_2O (%)	0.78	0.02	Ce	25.4	1.8
CaO (%)	35.67	0.14	Pr	3.4	0.2
Sc	6.0	0.8	Nd	12.0	0.7
Ti	1960	40	Sm	2.4	0.1
V	36	3	Eu	0.51	0.03
Cr	32	2	Gd	1.9	0.13
Mn	434	12	Tb	0.35	0.03
Fe_2O_3 (%)	2.52	0.03	Dy	1.6	0.1
Co	9.0	0.5	Ho	0.33	0.03
Ni	17.8	0.8	Yb	0.90	0.07
Cu	23.4	0.8	Lu	0.14	0.02
Zn	52	2	Hf	1.8	0.2
Ga	7.1	0.5	W	0.67	0.11
Ge	0.67	0.12	Hg (ng/g)	16	1
As	4.7	0.4	Pb	18.3	1.4
Se	0.099	0.015	Bi	0.16	0.02
Rb	32	2	Tm	0.17	0.02
Sr	913	28	Th	4.1	0.3
			U	1.9	0.17

GSR-6 (cont.)

Noncertified concentrations (μg/g dry weight):

Component	Value
Cl	80
In	0.042
Sn	0.98
Te	0.023
Er	1.1
Ta	0.46
Au (ng/g)	0.94
Tl	0.36

Order information:

No price information is available. Please contact NRCCRM at the address above.

Reference:

Institute of Geophysical and Geochemical Exploration (1986) Certificate of geochemical standard reference materials. Institute of Geophysical and Geochemical Exploration, Langfang, Hebei, China.

IPT 28

Clay (Pára)

Source:

Instituto de Pesquisas Tecnológicas
Agrupamento de Materials de Referência
Cidade Universitária Armando de Salles Oliveira
05508 São Paulo - SP
BRAZIL

Description:

Material for IPT 28 was provided by Celite S/A Indústria e Comércio. The material was dried at 140° C, ground and passed through a 0.074 mm sieve.

Certified concentrations (percent dry weight):

Oxide	Value
Na_2O	0.02
MgO	0.04
Al_2O_3	37.6
SiO_2	45.1
P_2O_5	0.15
K_2O	0.03
CaO	0.09
TiO_2	2.04
Fe_2O_3	0.83

Order Information:

IPT 28 can be purchased for US$180 per unit (50 g). Price subject to change without notice. Please contact IPT at the address shown above.

Reference:

Instituto de Pesquisas Tecnológicas (1979) Amostra padrão 28. Argila Pará. Certificate of analysis. Instituto de Pesquisas Tecnológicas, São Paulo, Brazil.

IPT 32

Plastic Clay (Saracuruna)

Source:

Instituto de Pesquisas Tecnológicas
Agrupamento de Materials de Referência
Cidade Universitária Armando de Salles Oliveira
05508 São Paulo - SP
BRAZIL

Description:

Material for IPT 32 was provided by Klabin Cerâmica S/A. The material was dried at 140° C, ground and passed through a 0.074 mm sieve.

Certified concentrations (percent dry weight):

Oxide	Value
Na_2O	0.16
MgO	0.39
Al_2O_3	28.5
SiO_2	51.8
P_2O_5	0.13
K_2O	0.80
CaO	0.17
TiO_2	1.49
Fe_2O_3	3.46

Order Information:

IPT 32 can be purchased for US$180 per unit (50 g). Price subject to change without notice. Please contact IPT at the address shown above.

Reference:

Instituto de Pesquisas Tecnológicas (1980) Amostra padrão 32. Argila plastica Saracuruna. Certificate of analysis. Instituto de Pesquisas Tecnológicas, São Paulo, Brazil.

IPT 35

Calcitic Limestone

Source:

Instituto de Pesquisas Tecnológicas
Agrupamento de Materials de Referência
Cidade Universitária Armando de Salles Oliveira
05508 São Paulo - SP
BRAZIL

Description:

Material for IPT 35 was provided by S/A Indústrias Votorantim. The material was dried at 110° C, ground and passed through a 0.074 mm sieve.

Certified concentrations (percent dry weight):

Oxide	Value
Na_2O	0.004
MgO	0.70
Al_2O_3	0.24
SiO_2	1.98
P_2O_5	0.008
K_2O	0.10
CaO	53.8
TiO_2	0.013
MnO	0.012
Fe_2O_3	0.14
SrO	0.04

Order Information:

IPT 35 can be purchased for US$160 per unit (80 g). Price subject to change without notice. Please contact IPT at the address shown above.

Reference:

Instituto de Pesquisas Tecnológicas (1980) Amostra padrão 35. Calcário calcítico. Certificate of analysis. Instituto de Pesquisas Tecnológicas, São Paulo, Brazil.

IPT 42

Clay (São Simão)

Source:

Instituto de Pesquisas Tecnológicas
Agrupamento de Materials de Referência
Cidade Universitária Armando de Salles Oliveira
05508 São Paulo - SP
BRAZIL

Description:

Material for IPT 42 was provided by Celite S/A Indústria e Comércio. The material was dried at 140° C, ground and passed through a 0.074 mm sieve.

Certified concentrations (percent dry weight):

Oxide	Value	Uncertainty (±)
Na_2O	0.02	0.005
MgO	0.19	0.02
Al_2O_3	32.2	0.1
SiO_2	51.9	0.1
P_2O_5	0.07	0.01
K_2O	0.47	0.80
CaO	0.05	0.01
TiO_2	0.96	0.04
Fe_2O_3	1.09	0.05

Order Information:

IPT 42 can be purchased for US$180 per unit (50 g). Price subject to change without notice. Please contact IPT at the address shown above.

Reference:

Instituto de Pesquisas Tecnológicas (1981) Amostra padrão 42. Argila São Simão. Certificate of analysis. Instituto de Pesquisas Tecnológicas, São Paulo, Brazil.

IPT 44

Limestone

Source:

Instituto de Pesquisas Tecnológicas
Agrupamento de Materials de Referência
Cidade Universitária Armando de Salles Oliveira
05508 São Paulo - SP
BRAZIL

Description:

Material for IPT 44 was provided by Indústrias Votorantim. The material was dried at 110° C, ground and passed through a 0.074 mm sieve.

Certified concentrations (percent dry weight):

Oxide	Value	Uncertainty (±)
Na_2O	0.002	0.001
MgO	2.93	0.07
Al_2O_3	0.33	0.02
SiO_2	2.69	0.03
P_2O_5	0.013	0.001
K_2O	0.12	0.01
CaO	50.5	0.1
TiO_2	0.019	0.001
MnO	0.015	0.001
Fe_2O_3	0.30	0.02
SrO	0.04	0.005

Order Information:

IPT 44 can be purchased for US$160 per unit (80 g). Price subject to change without notice. Please contact IPT at the address shown above.

Reference:

Instituto de Pesquisas Tecnológicas (1981) Amostra padrão 44. Calcário. Certificate of analysis. Instituto de Pesquisas Tecnológicas, São Paulo, Brazil.

IPT 48

Dolomitic Limestone

Source:

Instituto de Pesquisas Tecnológicas
Agrupamento de Materials de Referência
Cidade Universitária Armando de Salles Oliveira
05508 São Paulo - SP
BRAZIL

Description:

Material for IPT 48 was provided by Indústria Mineradora Pagliato Ltda. The material was dried at 110° C, ground and passed through a 0.074 mm sieve.

Certified concentrations (percent dry weight):

Oxide	Value	Uncertainty (±)
Na_2O	0.013	0.003
MgO	21.2	0.1
Al_2O_3	0.17	0.02
SiO_2	0.45	0.02
P_2O_5	0.022	0.002
K_2O	0.026	0.003
CaO	31.0	0.1
TiO_2	0.006	0.001
MnO	0.014	0.002
Fe_2O_3	0.17	0.01
SrO	0.009	0.001

Order Information:

IPT 48 can be purchased for US$160 per unit (80 g). Price subject to change without notice. Please contact IPT at the address shown above.

Reference:

Instituto de Pesquisas Tecnológicas (1982) Amostra padrão 48. Calcário dolomitico. Certificate of analysis. Instituto de Pesquisas Tecnológicas, São Paulo Brazil.

IPT 61 and 62

Glass Sands

Source:

Instituto de Pesquisas Tecnológicas
Agrupamento de Materials de Referência
Cidade Universitária Armando de Salles Oliveira
05508 São Paulo - SP
BRAZIL

Description:

No information available.

Certified concentrations (percent dry weight):

	IPT 61	IPT 62
Oxide	Value	Value
Al_2O_3	0.054	0.11
SiO_2	99.79	99.62
TiO_2	0.026	0.036
Fe_2O_3	0.014	0.072
ZrO_2	0.010	0.010

Noncertified concentrations (percent dry weight):

	IPT 61	IPT 62
Oxide	Value	Value
Na_2O	0.002	0.002
MgO	0.003	0.004
K_2O	0.007	0.007
CaO	0.004	0.004

Order Information:

IPT 28 can be purchased for US$180 per unit (50 g). Price subject to change without notice. Please contact IPT at the address shown above.

References:

Instituto de Pesquisas Tecnológicas (1985) Amostra padrão 61. Areia quartzosa (0.01% Fe_2O_3) Certificate of analysis. Instituto de Pesquisas Tecnológicas, São Paulo, Brazil.

Instituto de Pesquisas Tecnológicas (1985) Amostra padrão 62. Areia quartzosa (0.07% Fe_2O_3). Certificate of analysis. Instituto de Pesquisas Tecnológicas, São Paulo, Brazil.

MGR-1

Gabbro

Source:

Canada Centre for Mineral and Energy Technology
555 Booth Street
Ottawa K1A 0G1
CANADA

Description:

MGR-1 is an augite-olivine gabbro from Mount Royal, Montreal, Quebec, intruded into sedimentary rocks of the lower Paleozoic.

Recommended values (percent dry weight):

Component	Value	Component	Value
F	0.025	K_2O	0.18
Na_2O	0.71	CaO	14.77
MgO	13.49	TiO_2	3.69
Al_2O_3	8.5	MnO	0.17
SiO_2	39.32	FeO	8.63
P_2O_5	0.06	Fe_2O_3	8.26
S	0.06		

Order information:

This material can be purchased for Canadian $85 per unit (100 g). Price subject to change without notice. Please contact CANMET at the address shown above.

Reference:

Bowman, W. S. (1990) Certified reference materials. CCRMP 90-1E. Canada Centre for Mineral and Energy Technology, Ottawa, Canada. 65 pp.

Nod-A-1

Manganese Nodule

Source:

US Geological Survey
Branch of Geochemistry
P. O. Box 25046 MS 973
Denver, CO 80225
USA

Description:

This reference material was collected in the Blake Plateau (31° 02' N, 78° 22' W) in the Atlantic Ocean (Flanagan and Gottfried, 1980). The material was processed through a roller crusher, dried overnight at about 65°C, and processed in a ball mill. Washing with water did not remove all the soluble sea salt present in the material. During processing, the cover of the mill was not secured in place until the following day. The partly powdered material absorbed sufficient moisture to form a cement-like mixture, which was deposited as layers in the mill as it operated. The layers were removed, broken, redried and re-milled. The material in these layers showed variegated colors from black to purple to dark brown, characteristic of manganese oxides. Nod-A-1 can absorb up to 10% by weight of moisture when exposed overnight to air. Nod-A-1 is not a certified reference material. The original estimates for elemental concentrations by Flanagan and Gottfried (1980) using the results of various analysts are listed below.

Best available concentrations (µg/g dry weight unless noted):

Element	Mean	Uncertainty (±)	Element	Mean	Uncertainty (±)
Na (%)	0.775	0.0056	Co (%)	0.311	0.0011
Mg (%)	2.87	0.0099	Ni (%)	0.636	0.0024
Al (%)	2.05	0.032	Cu (%)	0.1099	0.0010
Si (%)	1.775	0.022	Zn	587	4.6
P (%)	0.60	0.007	Sr	1748	13.7
K (%)	0.50	0.0086	Mo	448	8.7
Ca (%)	11.03	0.039	Ru	18	-
Ti (%)	0.32	0.004	Ba	1670	30.8
V	770	6.2	Pd (ng/g)	2.5	-
Mn (%)	18.545	0.050	Pt (ng/g)	453	-
Fe (%)	10.932	0.042	Pb	846	8.2

Order information:

Nod-A-1 is available free of charge from the US Geological Survey. Please contact Dr. S. Wilson at the address above.

References:

Flanagan, F. J., and D. Gottfried (1980) USGS Rock Standards, III: Manganese-nodule reference samples USGS-Nod-A-1 and USGS-Nod-P-1. Geological Survey Professional Paper 1155, 39 pp. U.S. Geological Survey, Reston, VA, USA.

Nod-P-1

Manganese Nodule

Source:

US Geological Survey
Branch of Geochemistry
P. O. Box 25046 MS 973
Denver, CO 80225
USA

Description:

This reference material was collected in the Pacific Ocean (14° 50' N, 124° 28' W) (Flanagan and Gottfried, 1980). The material was processed through a roller crusher, dried overnight at about 65°C, and processed in a ball mill. Washing with water did not remove all the soluble sea salt present in the material. During processing, the cover of the mill was not secured in place until the following day. The partly powdered material absorbed sufficient moisture to form a cement-like mixture, which was deposited as layers in the mill as it operated. The layers were removed, broken, redried and re-milled. The material in these layers showed variegated colors from black to purple to dark brown, characteristic of manganese oxides. Nod-P-1 can absorb up to 10% by weight of moisture when exposed overnight to air. Nod-P-1 is not a certified reference material. The original estimates for elemental concentrations by Flanagan and Gottfried (1980) using the results of various analysts are listed below.

Best available concentrations (μg/g dry weight unless noted):

Element	Value	Uncertainty (±)	Element	Mean	Uncertainty (±)
Na (%)	1.64	0.0043	Co (%)	0.224	0.0011
Mg (%)	1.990	0.0085	Ni (%)	1.337	0.0064
Al (%)	2.55	0.049	Cu (%)	1.151	0.0049
Si (%)	6.508	0.016	Zn	1595	5.9
P (%)	0.203	0.002	Sr	682	3.3
K (%)	1.05	0.012	Mo	762	4.1
Ca (%)	2.187	0.012	Ru	4.7	-
Ti (%)	0.30	0.002	Ba	3350	27.7
V	567	10.3	Pd (ng/g)	5.6	-
Mn (%)	29.14	0.080	Pt (ng/g)	123	-
Fe (%)	5.78	0.031	Pb	555	5.8

Order information:

Nod-P-1 is available free of charge from the US Geological Survey. Please contact Dr. S. Wilson at the address above.

Nod-P-1 (cont.)

References:

Flanagan, F. J., and D. Gottfried (1980) USGS Rock Standards, III: Manganese-nodule reference samples USGS-Nod-A-1 and USGS-Nod-P-1. Geological Survey Professional Paper 1155, 39 pp. U.S. Geological Survey, Reston, VA, USA.

QLO-1

Quartz Latite

Source:

US Geological Survey
Branch of Geochemistry
P. O. Box 25046 MS 973
Denver, CO 80225
USA

Description:

This reference material is composed of dense black volcanic rock collected in Lake County, Oregon, USA (42° 44.8' N, 119° 58' W). A complete description of QLO-1, including mineralogical information, can be found in Walker *et al.* (1976). QLO-1 is not a certified reference material. Values for elemental concentrations have been calculated by Gladney and Goode (1981), Abbey (1982, 1983) and Gladney and Roelandts (1988) using the results of various analysts. Those calculated by Gladney and Roelandts (1988) are listed below.

Best available concentrations (μg/g dry weight unless noted):

Element	Mean	Uncertainty (±)	Number of values	Element	Mean	Uncertainty (±)	Number of values
Li	25	2	6	Ge	1.34	-	2
Be	1.89	0.17	11	As	3.5	1.8	6
B	36	3	12	Se (ng/g)	9	2	4
C	27	2	5	Br	2.07	-	2
O (%)	47.83	-	2	Rb	74	3	14
F	280	20	13	Sr	336	12	19
Na (%)	3.12	0.10	23	Y	24	3	11
Mg (%)	0.60	0.04	16	Zr	185	16	13
Al (%)	8.56	0.10	18	Nb	10.3	1.3	10
Si (%)	30.61	0.22	16	Mo	2.6	0.3	12
P	1110	70	15	Ru	<0.46	-	-
S	30	15	3	Rh (ng/g)	<0.1	-	-
Cl	219	18	13	Pd (ng/g)	0.1	-	1
K (%)	2.99	0.10	24	Ag (ng/g)	64	5	3
Ca (%)	2.27	0.06	22	Cd (ng/g)	50	-	2
Sc	8.9	1.3	18	In (ng/g)	180	-	1
Ti	3740	200	25	Sn	2.31	0.09	6
V	54	6	16	Sb	2.1	0.4	12
Cr	3.2	1.7	15	Te (ng/g)	<5	-	-
Mn	721	49	30	Cs	1.75	0.19	9
Fe (%)	3.04	0.10	25	Ba	1370	80	21
Co	7.2	0.5	17	La	27	2	15
Ni	5.8	3.6	11	Ce	54	6	18
Cu	29	3	16	Pr	6.01	0.11	6
Zn	61	3	14	Nd	26	6	18
Ga	17	2	7	Sm	4.88	0.16	13

QLO-1 (cont.)

Element	Mean	Uncertainty (±)	Number of values	Element	Mean	Uncertainty (±)	Number of values
Eu	1.43	0.12	12	Re	<10	-	-
Gd	4.7	0.8	15	Os	<22	-	-
Tb	0.71	0.07	12	Ir	<6.8	-	-
Dy	3.8	0.3	8	Pt (ng/g)	<1	-	-
Ho	0.86	0.22	6	Au (ng/g)	1.2	0.3	4
Er	2.3	0.1	5	Hg (ng/g)	6.79	-	1
Tm (ng/g)	370	40	8	Tl (ng/g)	220	40	3
Yb	2.32	0.24	19	Pb	20.4	0.8	8
Lu (ng/g)	370	40	10	Bi (ng/g)	63	3	5
Hf	4.6	0.3	9	Th	4.5	0.5	13
Ta	0.82	0.10	10	U	1.94	0.12	11
W	0.58	0.05	7				

Major and minor oxide concentrations (%):

Component	Mean	Uncertainty (±)	Number of values	Component	Mean	Uncertainty (±)	Number of values
H_2O^+	0.37	0.11	7	K_2O	3.60	0.12	24
H_2O^-	0.18	0.06	5	CaO	3.17	0.08	22
CO_2	0.010	0.001	5	TiO_2	0.624	0.033	25
Na_2O	4.20	0.13	23	MnO	0.093	0.006	30
MgO	1.00	0.07	16	FeO	2.97	0.05	8
Al_2O_3	16.18	0.19	18	Fe_2O_3	1.02	0.13	6
SiO_2	65.55	0.47	16	Cl	0.022	0.002	13
P_2O_5	0.254	0.016	15	F	0.028	0.002	13
				S	0.003	0.002	3

Order information:

QLO-1 is available free of charge from the US Geological Survey. Please contact Dr. S. Wilson at the address above.

References:

Abbey, S. (1982) An evaluation of USGS III. Geostand. Newsletter, 6(1):47-76.

Abbey, S. (1983) Studies in "standard samples" of silicate rocks and minerals 1969-1982. Paper 83-15, 114 pp. Geological Survey of Canada, Canadian Government Publishing Centre, Supply and Services Canada, Hull, Quebec, Canada.

Gladney, E. S., and W. E. Goode (1981) Elemental concentrations in eight new United States Geological Survey rock standards: a review. Geostand. Newsletter, 5(1):31-64.

Gladney, E. S., and I. Roelandts (1988) 1987 Compilation of elemental concentration data for USGS BHVO-1, MAG-1, QLO-1, RGM-1, SCo-1, SDC-1, SGR-1 and STM-1. Geostand. Newsletter, 12(2):253-362.

Walker, G. W., F. J. Flanagan, A. L. Sutton, H. Bastron, S. Berman, J. I. Dinnin, and L. B. Jenkins (1976) Quartz latite (dellenite), QLO-1, from southeastern Oregon. In: F.J. Flanagan (ed.), Description and analyses of eight new USGS rock standards, USGS Prof. paper 840, p.15-20. US Government Printing Office, Washington, DC, USA.

RGM-1

Rhyolite

Source:

US Geological Survey
Branch of Geochemistry
P. O. Box 25046 MS 973
Denver, CO 80225
USA

Description:

The material for RGM-1 was collected from a single block of obsidian (41° 37.2'N, 121° 29.0'W) near the terminal front of a Holocene obsidian flow near Glass Mountain, which is northeast of Mount Shasta in California, USA. A complete mineralogical description of this material can be found in Tatlock *et al.* (1976). RGM-1 is not a certified reference material. Values for elemental concentrations have been calculated by Abbey (1982, 1983), Gladney and Goode (1981) and Gladney and Roelandts (1988) using the results of various analysts. Those calculated by Gladney and Roelandts (1988) are listed below.

Best available concentrations (μg/g dry weight unless noted):

Element	Mean	Uncertainty (±)	Number of values	Element	Mean	Uncertainty (±)	Number of values
Li	57	8	9	Ge	1.26	-	2
Be	2.37	0.17	11	As	3.0	0.4	6
B	28	3	12	Se (ng/g)	6	3	3
C	38	11	5	Br	1.34	0.12	3
O (%)	49.18	-	2	Rb	149	8	15
F	342	30	15	Sr	108	10	19
Na (%)	3.02	0.11	26	Y	25	4	13
Mg (%)	0.166	0.016	19	Zr	219	20	17
Al (%)	7.26	0.10	22	Nb	8.9	0.6	11
Si (%)	34.30	0.25	17	Mo	2.3	0.5	12
P	210	15	14	Ru	<0.46	-	-
S	54	32	4	Rh (ng/g)	<0.1	-	-
Cl	510	50	20	Pd (ng/g)	0.2	-	1
K (%)	3.57	0.08	24	Ag (ng/g)	108	8	4
Ca (%)	0.82	0.05	28	Cd (ng/g)	65	10	4
Sc	4.4	0.3	14	In (ng/g)	150	-	1
Ti	1600	150	26	Sn	4.1	0.4	10
V	13	2	14	Sb	1.26	0.07	12
Cr	3.7	1.2	15	Te (ng/g)	<5	-	-
Mn	282	30	30	Cs	9.6	0.6	10
Fe (%)	1.30	0.04	27	Ba	807	46	24
Co	2.0	0.2	14	La	24.0	1.1	15
Ni	4.4	2.0	10	Ce	47	4	19
Cu	11.6	1.4	16	Pr	4.7	0.5	6
Zn	32	6	16	Nd	19	1	15
Ga	15	2	6	Sm	4.3	0.3	19

RGM-1 (cont.)

Element	Mean	Uncertainty (±)	Number of values	Element	Mean	Uncertainty (±)	Number of values
Eu	0.66	0.08	15	Re	<10	-	-
Gd	3.7	0.4	14	Os	<22	-	-
Tb	0.66	0.06	10	Ir	<6.8	-	-
Dy	4.08	0.12	7	Pt (ng/g)	<1	-	-
Ho	0.95	0.22	5	Au (ng/g)	0.33	-	2
Er	2.6	0.3	5	Hg (ng/g)	21.6	-	1
Tm (ng/g)	370	40	7	Tl (ng/g)	930	220	4
Yb	2.6	0.3	22	Pb	24	3	10
Lu (ng/g)	410	30	10	Bi (ng/g)	274	19	6
Hf	6.2	0.3	11	Th	15.1	1.3	14
Ta	0.95	0.10	11	U	5.8	0.5	11
W	1.50	0.18	8				

Major and minor oxide concentrations (%):

Component	Mean	Uncertainty (±)	Number of values	Component	Mean	Uncertainty (±)	Number of values
H_2O^+	0.59	0.26	8	K_2O	4.30	0.10	24
H_2O^-	0.11	0.02	4	CaO	1.15	0.07	28
CO_2	0.014	0.004	5	TiO_2	0.267	0.025	26
Na_2O	4.07	0.15	26	MnO	0.036	0.004	30
MgO	0.275	0.026	19	FeO	1.27	0.05	8
Al_2O_3	13.72	0.19	22	Fe_2O_3	0.50	0.01	6
SiO_2	73.45	0.54	17	Cl	0.051	0.005	20
P_2O_5	0.048	0.034	14	F	0.034	0.003	15
				S	0.005	0.003	4

Order information:

RGM-1 is available free of charge from the US Geological Survey. Please contact Dr. S. Wilson at the address above.

References:

Abbey, S. (1982) An evaluation of USGS III. Geostand. Newsletter, 6(1):47-76.

Abbey, S. (1983) Studies in "standard samples" of silicate rocks and minerals 1969-1982. Paper 83-15, 114 pp. Geological Survey of Canada, Canadian Government Publishing Centre, Supply and Services Canada, Hull, Quebec, Canada.

Gladney, E. S., and W. E. Goode (1981) Elemental concentrations in eight new United States Geological Survey rock standards: a review. Geostand. Newsletter, 5(1):31-64.

Gladney, E. S., and I. Roelandts (1988) 1987 Compilation of elemental concentration data for USGS BHVO-1, MAG-1, QLO-1, RGM-1, SCo-1, SDC-1, SGR-1 and STM-1. Geostand. Newsletter, 12(2):253-362.

Tatlock, D. B., F. J. Flanagan, H. Bastron, S. Berman, and A. L. Sutton (1976) Rhyolite, RGM-1, from Glass Mountain, California. In: F.J. Flanagan (ed.), Description and analyses of eight new USGS rock standards, USGS Prof. paper 840, p. 11-14. US Government Printing Office, Washington, DC.

SARM 1

Granite

Source:

South Africa Bureau of Standards
Private Bag X191
Pretoria, Transvaal 0001
REPUBLIC OF SOUTH AFRICA

Description:

SARM 1 is one of six materials in the NIMROC series. This reference material is a granitic rock-type which consists mainly of quartz and K-feldspar, and has smaller amounts of mica and Na-feldspar. The reference material is used in the analysis of rock samples, some non-metalliferous ores, and geochemical samples. Orders of magnitude for S, Co and P are available from SABS.

Certified concentrations (μg/g dry weight unless noted):

Component	Value	Component	Value
F	4200	Sr	10
Na_2O (%)	3.36	Y	143
Al_2O_3 (%)	12.08	Zr	300
SiO_2 (%)	75.7	Nb	53
K_2O (%)	4.99	La	109
CaO (%)	0.78	Ce	195
Ti	540	Nd	72
Cr	12	Sm	15.8
Mn	160	Eu	0.35
FeO (%)	1.30	Tb	3
Cu	12	Yb	14.2
Zn	50	Pb	40
Ga	27	Th	51
Rb	325		

Noncertified concentrations (μg/g dry weight unless noted):

Component	Value	Component	Value
Li	12	Gd	14
MgO (%)	0.06	Dy	17
V	2	Tm	2
Fe_2O_3 (%)	0.6	Lu	2
Ni	8	U	15
Ba	120		

SARM 1 (cont.)

Order information:

SARM 1 can be purchased for US$100 per unit (100 g). Price subject to change. Please contact SABS at the address shown above.

Reference:

South African Committee for Certified Reference Materials (1992) Catalogue of certified reference materials. South Africa Bureau of Standards, Private Bag X191, Pretoria, Transvaal 0001, South Africa. 36 pp.

SARM 2

Syenite

Source:

South Africa Bureau of Standards
Private Bag X191
Pretoria, Transvaal 0001
REPUBLIC OF SOUTH AFRICA

Description:

SARM 1 is one of six materials in the NIMROC series. This reference material is a syenitic rock-type which consists mainly of K-feldspar and has minor amounts of quartz, Na-feldspar, and alkali-amphiboles. The reference material is used in the analysis of silicate samples, but can also be used as an RM for the analysis of non-metalliferous raw materials and geochemical prospecting samples. Orders of magnitude for Li, F, Si, S, Y, Nb, Gd, Tb, Tm, Lu and U are available from SABS.

Certified concentrations (µg/g dry weight unless noted):

Component	Value	Component	Value
Na_2O (%)	0.43	FeO (%)	0.3
MgO (%)	0.46	Fe_2O_3 (%)	1.11
Al_2O_3 (%)	17.34	Cu	19
P_2O_5 (%)	0.12	Ga	11
P	520	Rb	530
K_2O (%)	15.35	Sr	62
CaO (%)	0.68	BaO (%)	0.27
Ti	265	Ba	2400
V	10	Ce	11.9
Cr	12	Eu	0.30
Mn	80	Th	1.0

Noncertified concentrations (µg/g dry weight unless noted):

Component	Value	Component	Value
Co	3	Nd	6
Ni	7	Sm	1
Zn	10	Dy	0.4
Zr	33	Yb	0.07
La	5	Pb	5

SARM 2 (cont.)

Order information:

SARM 2 can be purchased for US$100 per unit (100 g). Price subject to change. Please contact SABS at the address shown above.

Reference:

South African Committee for Certified Reference Materials (1992) Catalogue of certified reference materials. South Africa Bureau of Standards, Private Bag X191, Pretoria, Transvaal 0001, South Africa. 36 pp.

SARM 3

Lujaurite

Source:

South Africa Bureau of Standards
Private Bag X191
Pretoria, Transvaal 0001
REPUBLIC OF SOUTH AFRICA

Description:

SARM 3 is one of six materials in the NIMROC series. This rock-type Is a Lujaurite and is an undersaturated igneous rock which consists of nepheline, sphene, aegirine, magnetite, and some feldspar. This reference material is useful for the analysis of silicate rocks, but can be used in the analysis of some non-metalliferous ores and for geochemical exploration reference material. Because of its unusual trace element concentrations it is also a valuable trace element reference material. Orders of magnitude for Co, Ni, Gd, Dy and Tm are available from SABS.

Certified concentrations (µg/g dry weight unless noted):

Component	Value	Component	Value
F	4400	Cu	13
Na_2O (%)	8.37	Zn	395
MgO (%)	0.28	Pb	190
Al_2O_3 (%)	13.64	SrO (%)	0.54
SiO_2 (%)	52.40	Sr	4600
P	260	Y	22
Cl (%)	0.12	ZrO_2 (%)	1.49
K_2O (%)	5.51	Zr	11000
CaO (%)	3.22	Nb_2O_5 (%)	0.14
TiO_2 (%)	0.48	Nb	960
Ti	2900	Ba	450
V	81	Nd	48
MnO (%)	0.77	Eu	1.2
Mn	6000	Pb	43
FeO (%)	1.13	Th	66
Fe_2O_3 (%)	8.78	U	14

Noncertified concentrations (µg/g dry weight unless noted):

Component	Value	Component	Value
Li	48	Ce	240
S	650	Yb	3
Cr	10	Sm	5
Ga	54	Tb	0.7
La	250	Lu	0.4

SARM 3 (cont.)

Order information:

SARM 3 can be purchased for US$100 per unit (100 g). Price subject to change. Please contact SABS at the address shown above.

Reference:

South African Committee for Certified Reference Materials (1992) Catalogue of certified reference materials. South Africa Bureau of Standards, Private Bag X191, Pretoria, Transvaal 0001, South Africa. 36 pp.

SARM 4

Norite

Source:

South Africa Bureau of Standards
Private Bag X191
Pretoria, Transvaal 0001
REPUBLIC OF SOUTH AFRICA

Description:

SARM 4 is one of six materials in the NIMROC series. This rock-type is a norite which consists of orthopyroxene, plagioclase, magnetite, ilmenite, and clinopyroxene and minor amounts of quartz and alteration products. It is a useful silicate reference material for intermediate rocks but is also used for the analysis of geochemical exploration samples. Orders of magnitude for Li, F, Si, S, Rb, Nb, Gd, Tb, Dy, Tm, Pb, Th and U are available from SABS.

Certified concentrations (μg/g dry weight unless noted):

Component	Value	Component	Value
Na_2O (%)	2.46	FeO (%)	7.47
MgO (%)	7.50	Co	58
Al_2O_3 (%)	16.50	Ni	120
K_2O (%)	0.25	Cu	14
CaO (%)	11.50	Zn	68
Ti	1200	Ga	16
TiO_2 (%)	0.20	Sr	260
V	220	Ba	102
Mn	1400	Eu	0.63
MnO (%)	0.18		

Noncertified concentrations (μg/g dry weight unless noted):

Component	Value	Component	Value
P	130	La	3
Cr	30	Nd	3
Zr	23	Sm	0.8
Y	7	Yb	0.7
Ce	6	Lu	0.2

Order information:

SARM 4 can be purchased for US$100 per unit (100 g). Price subject to change. Please contact SABS at the address shown above.

Reference:

South African Committee for Certified Reference Materials (1992) Catalogue of certified reference materials. South Africa Bureau of Standards, Private Bag X191, Pretoria, Transvaal 0001, South Africa. 36 pp.

SARM 5

Pyroxenite

Source:

South Africa Bureau of Standards
Private Bag X191
Pretoria, Transvaal 0001
REPUBLIC OF SOUTH AFRICA

Description:

SARM 5 is one of six materials in the NIMROC series. This rock-type is a pyroxenite which consists of orthopyroxene, clinopyroxene, and plagioclase and minor amounts of olivine and chromite. This reference material is used for the analysis of mafic silicate rocks but can also be used for the analysis of geochemical exploration samples. Orders of magnitude for Li, F, Si, S, Rb, Zr, Nb, Ce, Nd, Sm, Gd, Tb, Dy, Tm, Lu, Pb, Th and U are available from SABS.

Certified concentrations (µg/g dry weight unless noted):

Component	Value	Component	Value
Na_2O (%)	0.37	FeO (%)	10.59
MgO (%)	25.33	Fe_2O_3 (%)	0.87
Al_2O_3 (%)	4.18	Co	110
P	90	Cr	24000
K_2O (%)	0.09	Cr_2O_3 (%)	3.50
CaO (%)	2.66	Ni	555
Ti	1200	Cu	18
TiO_2 (%)	0.20	Zn	100
V	230	Sr	32
Mn	1700	Ba	46
MnO (%)	0.22		

Noncertified concentrations (µg/g dry weight unless noted):

Component	Value	Component	Value
Ga	8	Yb	0.6
Y	5	Eu	0.2
La	2		

Order information:

SARM 5 can be purchased for US$100 per unit (100 g). Price subject to change. Please contact SABS at the address shown above.

SARM 5 (cont.)

Reference:

South African Committee for Certified Reference Materials (1992) Catalogue of certified reference materials. South Africa Bureau of Standards, Private Bag X191, Pretoria, Transvaal 0001, South Africa. 36 pp.

SARM 6

Dunite

Source:

South Africa Bureau of Standards
Private Bag X191
Pretoria, Transvaal 0001
REPUBLIC OF SOUTH AFRICA

Description:

SARM 6 is one of six materials in the NIMROC series. This rock-type is a dunite and consists of olivine and orthopyroxene and minor amounts of clinopyroxene, plagioclase, and chromite. This reference material is used in the analysis of basic silicate rock samples and can also be used for the analysis of non-metalliferous ores and geochemical exploration samples. Orders of magnitude for Li, F, Si, S, Ga, Rb, Y, Zr, Nb, Ce, Nd, Sm, Eu, Gd, Tb, Dy, Tm, Yb, Lu, Pb, Th and U are available from SABS.

Certified concentrations (μg/g dry weight unless noted):

Component	Value	Component	Value
MnO (%)	0.22	MgO (%)	43.51
NiO (%)	0.26	Zn	90
CaO (%)	0.28	Ti	120
Cr_2O_3 (%)	0.42	Co	208
Fe_2O_3 (%)	0.71	Mn	1700
Cu	10	Ni	2040
FeO (%)	14.63	Cr	2900
V	40		

Noncertified concentrations (μg/g dry weight unless noted):

Component	Value	Component	Value
P	40	La	0.2
Ba	10	Na_2O (%)	0.04
Sr	3	K_2O (%)	0.01
Al_2O_3 (%)	0.3		

Order information:

SARM 6 can be purchased for US$100 per unit (100 g). Price subject to change. Please contact SABS at the address shown above.

SARM 6 (cont.)

Reference:

South African Committee for Certified Reference Materials (1992) Catalogue of certified reference materials. South Africa Bureau of Standards, Private Bag X191, Pretoria, Transvaal 0001, South Africa. 36 pp.

SARM 39

Kimberlite

Source:

South Africa Bureau of Standards
Private Bag X191
Pretoria, Transvaal 0001
REPUBLIC OF SOUTH AFRICA

Description:

SARM 39 comes from the Kimberley area in the Cape Province. It consists of large round grains of olivine, ilmenite, garnet, mica and pyroxene which are set in a fine grained micro-crystalline matrix. Orders of magnitude for As, Ga, Se, W, Au, Br, Cs, Eu, Hf, La, Lu, Sc, Sm, Ta, Tb, Yb and Sb are available from SABS.

Certified concentrations (µg/g dry weight unless noted):

Component	Value	Component	Value
Al_2O_3 (%)	4.29	Co	77
SiO_2 (%)	33.44	Ni	994
P_2O_5 (%)	1.46	Cu	58
K_2O (%)	1.04	Zn	70
CaO (%)	9.69	Rb	52
TiO_2 (%)	1.58	MgO (%)	26.24
V	109	Y	17
Cr_2O_3 (%)	0.19	Zr	239
MnO (%)	0.17	Nb	110
Fe_2O_3 (%)	9.29	Ba	1700

Noncertified concentrations (µg/g dry weight unless noted):

Component	Value	Component	Value
Na_2O (%)	0.5	Mo	5
S (%)	0.15	Ce	85
FeO (%)	4.0	Pb	25
Ga	10	Th	10
Sr	1400		

Order information:

SARM 39 can be purchased for US$50 per unit (100 g). Price subject to change. Please contact SABS at the address shown above.

SARM 39 (cont.)

Reference:

South African Committee for Certified Reference Materials (1992) Catalogue of certified reference materials. South Africa Bureau of Standards, Private Bag X191, Pretoria, Transvaal 0001, South Africa. 36 pp.

SARM 40

Carbonatite

Source:

South Africa Bureau of Standards
Private Bag X191
Pretoria, Transvaal 0001
REPUBLIC OF SOUTH AFRICA

Description:

SARM 40 comes from the Kimberley area in the Cape Province. It consists of large round grains of olivine, ilmenite, garnet, mica and pyroxene which are set in a fine grained micro-crystalline matrix. Orders of magnitude for As, Ga, Se, W, Au, Br, Cs, Eu, Hf, La, Lu, Sc, Sm, Ta, Tb, Yb and Sb are available from SABS.

Certified concentrations (μg/g dry weight unless noted):

Component	Value	Component	Value
Al_2O_3 (%)	0.41	MnO (%)	0.18
SiO_2 (%)	3.08	Fe_2O_3 (%)	2.75
P_2O_5 (%)	2.05	Zn	25
CaO (%)	49.77	MgO (%)	1.97
TiO_2 (%)	0.05	Y	33
V	27	Zr	87

Noncertified concentrations (μg/g dry weight unless noted):

Component	Value	Component	Value
Na_2O (%)	0.05	Rb	10
S (%)	0.05	Sr	1600
K_2O (%)	0.03	Nb	10
Cr	35	Mo	10
FeO (%)	0.4	Ba	310
Co	20	Ce	160
Ni	25	Pb	20
Cu	10	Th	12
Ga	10		

Order information:

SARM 40 can be purchased for US$50 per unit (100 g). Price subject to change. Please contact SABS at the address shown above.

SARM 40 (cont.)

Reference:

South African Committee for Certified Reference Materials (1992) Catalogue of certified reference materials. South Africa Bureau of Standards, Private Bag X191, Pretoria, Transvaal 0001, South Africa. 36 pp.

SARM 41

Carbonaceous Shale

Source:

South Africa Bureau of Standards
Private Bag X191
Pretoria, Transvaal 0001
REPUBLIC OF SOUTH AFRICA

Description:

SARM 41 comes from the Marico District of the Transvaal. This is an extremely fine-grained rock consisting of quartz, sericite, chlorite, clays and carbonaceous materials. Orders of magnitude for As, Ga, Se, W, Au, Br, Cs, Eu, Hf, La, Lu, Sc, Sm, Ta, Tb, Yb and Sb are available from SABS.

Certified concentrations (µg/g dry weight unless noted):

Component	Value	Component	Value
Na_2O (%)	0.93	Fe_2O_3 (%)	4.23
Al_2O_3 (%)	13.50	Ni	122
SiO_2 (%)	56.67	Cu	53
P_2O_5 (%)	0.05	Zn	76
K_2O (%)	1.39	Pb	59
CaO (%)	1.50	MgO (%)	8.10
TiO_2 (%)	0.55	Sr	54
V	139	Y	17
Cr	123	Zr	146
MnO (%)	0.06	Nb	8
		Ba	820

Noncertified concentrations (µg/g dry weight unless noted):

Component	Value	Component	Value
S (%)	0.15	Mo	5
FeO (%)	0.3	Ce	60
Co	15	Pb	30
Ga	20	Th	12

Order information:

SARM 41 can be purchased for US$50 per unit (100 g). Price subject to change. Please contact SABS at the address shown above.

Reference:

South African Committee for Certified Reference Materials (1992) Catalogue of certified reference materials. South Africa Bureau of Standards, Private Bag X191, Pretoria, Transvaal 0001, South Africa. 36 pp.

SARM 43

Magnesite

Source:

South Africa Bureau of Standards
Private Bag X191
Pretoria, Transvaal 0001
REPUBLIC OF SOUTH AFRICA

Description:

SARM 43 comes from the Kaapmuiden area of the Eastern Transvaal. It consists mainly of magnesite with small amounts of quartz, magnetite, chlorite and secondary hematite. Orders of magnitude for As, Ga, Se, W, Au, Br, Cs, Eu, Hf, La, Lu, Sc, Sm, Ta, Tb, Yb and Sb are available from SABS.

Certified concentrations (μg/g dry weight unless noted):

Component	Value	Component	Value
SiO_2 (%)	5.99	Ni	252
CaO (%)	0.75	Sr	8
Fe_2O_3 (%)	0.26	MgO (%)	44.11
Co	4		

Noncertified concentrations (μg/g dry weight unless noted):

Component	Value	Component	Value
Na_2O (%)	0.05	MnO (%)	0.01
Al_2O_3 (%)	0.06	FeO (%)	0.1
P_2O_5 (%)	0.02	Cu	15
S (%)	0.04	Zn	10
K_2O (%)	0.04	Ba	25
TiO_2 (%)	0.01	Ce	20
Cr	195		

Order information:

SARM 43 can be purchased for US$50 per unit (100 g). Price subject to change. Please contact SABS at the address shown above.

Reference:

South African Committee for Certified Reference Materials (1992) Catalogue of certified reference materials. South Africa Bureau of Standards, Private Bag X191, Pretoria, Transvaal 0001, South Africa. 36 pp.

SARM 44

Sillimanite Schist

Source:

South Africa Bureau of Standards
Private Bag X191
Pretoria, Transvaal 0001
REPUBLIC OF SOUTH AFRICA

Description:

SARM 44 comes from the Pofadder District in the Northern Cape Province. It consists of sillimanite, muscovite, biotite, chlorite and magnetite. Orders of magnitude for As, Ga, Se, W, Au, Br, Cs, Eu, Hf, La, Lu, Sc, Sm, Ta, Tb, Yb and Sb are available from SABS.

Certified concentrations (μg/g dry weight unless noted):

Component	Value	Component	Value
Al_2O_3 (%)	58.80	Fe_2O_3 (%)	2.06
SiO_2 (%)	34.84	Zn	271
P_2O_5 (%)	0.10	Rb	13
K_2O (%)	0.18	Sr	5
CaO (%)	0.14	Y	84
TiO_2 (%)	1.83	Zr	406
V	395	Nb	96
Cr	384	Th	50
MnO (%)	0.03		

Noncertified concentrations (μg/g dry weight unless noted):

Component	Value	Component	Value
Na_2O (%)	0.05	Ga	55
S (%)	0.03	MgO (%)	0.1
FeO (%)	1.0	Mo	15
Co	8	Ba	50
Ni	15	Ce	220
Cu	10	Pb	30

Order information:

SARM 44 can be purchased for US$50 per unit (100 g). Price subject to change. Please contact SABS at the address shown above.

Reference:

South African Committee for Certified Reference Materials (1992) Catalogue of certified reference materials. South Africa Bureau of Standards, Private Bag X191, Pretoria, Transvaal 0001, South Africa. 36 pp.

SARM 45

Kinzingite

Source:

South Africa Bureau of Standards
Private Bag X191
Pretoria, Transvaal 0001
REPUBLIC OF SOUTH AFRICA

Description:

SARM 45 comes from the Augrabies area of the Northern Cape Province. It consists primarily of biotite, quartz, orthoclase, garnet and accessory amounts of epidote, sillimanite, sericite and chlorite. Orders of magnitude for As, Ga, Se, W, Au, Br, Cs, Eu, Hf, La, Lu, Sc, Sm, Ta, Tb, Yb and Sb are available from SABS.

Certified concentrations (µg/g dry weight unless noted):

Component	Value	Component	Value
Na_2O (%)	0.84	Fe_2O_3 (%)	12.60
Al_2O_3 (%)	26.22	Co	41
SiO_2 (%)	49.62	Ni	80
P_2O_5 (%)	0.08	Cu	11
K_2O (%)	3.18	Zn	74
CaO (%)	0.78	Rb	142
TiO_2 (%)	1.82	MgO (%)	3.39
V	266	Sr	92
Cr	256	Y	63
MnO (%)	0.10	Zr	322
		Nb	27

Noncertified concentrations (µg/g dry weight unless noted):

Component	Value	Component	Value
S (%)	0.05	Ce	100
FeO (%)	10.0	Pb	20
Ga	35	Th	21
Ba	900		

Order information:

SARM 45 can be purchased for US$50 per unit (100 g). Price subject to change. Please contact SABS at the address shown above.

SARM 45 (cont.)

Reference:

South African Committee for Certified Reference Materials (1992) Catalogue of certified reference materials. South Africa Bureau of Standards, Private Bag X191, Pretoria, Transvaal 0001, South Africa. 36 pp.

SARM 47

Serpentinite

Source:

South Africa Bureau of Standards
Private Bag X191
Pretoria, Transvaal 0001
REPUBLIC OF SOUTH AFRICA

Description:

SARM 47 comes from the M'Sauli mine in the Eastern Transvaal. This is a completely serpentinized dunite with antigorite, magnetite, epidote and prehnite present. Orders of magnitude for As, Ga, Se, W, Au, Br, Cs, Eu, Hf, La, Lu, Sc, Sm, Ta, Tb, Yb and Sb are available from SABS.

Certified concentrations (μg/g dry weight unless noted):

Component	Value	Component	Value
Al_2O_3 (%)	1.09	Co	79
SiO_2 (%)	36.30	Ni	2221
Cr_2O_3 (%)	0.29	Zn	45
MnO (%)	0.06	MgO (%)	42.09
Fe_2O_3 (%)	4.14		

Noncertified concentrations (μg/g dry weight unless noted):

Component	Value	Component	Value
Na_2O (%)	0.05	Cu	5
P_2O_5 (%)	0.02	Ga	5
S (%)	0.02	Sr	3
K_2O (%)	0.02	Y	5
CaO (%)	0.1	Ba	75
TiO_2 (%)	0.01	Ce	20
V	16	Pb	60
FeO (%)	0.4		

Order information:

SARM 47 can be purchased for US$50 per unit (100 g). Price subject to change. Please contact SABS at the address shown above.

Reference:

South African Committee for Certified Reference Materials (1992) Catalogue of certified reference materials. South Africa Bureau of Standards, Private Bag X191, Pretoria, Transvaal 0001, South Africa. 36 pp.

SARM 48

Fluorspar Granite

Source:

South Africa Bureau of Standards
Private Bag X191
Pretoria, Transvaal 0001
REPUBLIC OF SOUTH AFRICA

Description:

SARM 48 comes from the Buffalo mine in the Northern Transvaal. It consists of quartz, orthoclase, microcline, albite and smaller amounts of hornblende and fluorite. Orders of magnitude for As, Ga, Se, W, Au, Br, Cs, Eu, Hf, La, Lu, Sc, Sm, Ta, Tb, Yb and Sb are available from SABS.

Certified concentrations (μg/g dry weight unless noted):

Component	Value	Component	Value
Na_2O (%)	3.22	Zn	53
Al_2O_3 (%)	11.24	Rb	291
SiO_2 (%)	67.11	MgO (%)	0.18
K_2O (%)	4.26	Sr	29
CaO (%)	8.90	Y	436
TiO_2 (%)	0.10	Zr	300
Cr	23	Nb	202
MnO (%)	0.02	Pb	135
Fe_2O_3 (%)	0.58	Th	113

Noncertified concentrations (μg/g dry weight unless noted):

Component	Value	Component	Value
P_2O_5 (%)	0.09	Mo	5
V	8	Ba	290
FeO (%)	0.2	Ce	850
Cu	10		

Order information:

SARM 48 can be purchased for US$50 per unit (100 g). Price subject to change. Please contact SABS at the address shown above.

Reference:

South African Committee for Certified Reference Materials (1992) Catalogue of certified reference materials. South Africa Bureau of Standards, Private Bag X191, Pretoria, Transvaal 0001, South Africa. 36 pp.

SARM 49

Quartz

Source:

South Africa Bureau of Standards
Private Bag X191
Pretoria, Transvaal 0001
REPUBLIC OF SOUTH AFRICA

Description:

SARM 49 comes from the Pietersburg area of the Northern Transvaal. Apart from the quartz, accessory amounts of muscovite, chlorite and sericite are present. Orders of magnitude for As, Ga, Se, W, Au, Br, Cs, Eu, Hf, La, Lu, Sc, Sm, Ta, Tb, Yb and Sb are available from SABS.

Certified concentrations (µg/g dry weight unless noted):

Component	Value
SiO_2 (%)	99.6

Noncertified concentrations (µg/g dry weight unless noted):

Component	Value	Component	Value
Na_2O (%)	0.05	TiO_2	0.01
MgO (%)	0.05	MnO (%)	0.01
Al_2O_3 (%)	0.05	Fe_2O_3 (%)	0.05
K_2O (%)	0.01	Sr	5
CaO (%)	0.01		

Order information:

SARM 49 can be purchased for US$50 per unit (100 g). Price subject to change. Please contact SABS at the address shown above.

Reference:

South African Committee for Certified Reference Materials (1992) Catalogue of certified reference materials. South Africa Bureau of Standards, Private Bag X191, Pretoria, Transvaal 0001, South Africa. 36 pp.

SARM 50

Dolerite

Source:

South Africa Bureau of Standards
Private Bag X191
Pretoria, Transvaal 0001
REPUBLIC OF SOUTH AFRICA

Description:

SARM 50 comes from the Jamestown District of the Eastern Cape Province. It consists mainly of plagioclase and clinopyroxene with minor amounts of olivine, magnetite and ilmenite. Orders of magnitude for As, Ga, Se, W, Au, Br, Cs, Eu, Hf, La, Lu, Sc, Sm, Ta, Tb, Yb and Sb are available from SABS.

Certified concentrations (μg/g dry weight unless noted):

Component	Value	Component	Value
Na_2O (%)	2.30	FeO (%)	8.49
Al_2O_3 (%)	15.28	Co	40
SiO_2 (%)	51.56	Cu	84
P_2O_5 (%)	0.15	Zn	81
K_2O (%)	0.61	Rb	14
CaO (%)	10.80	MgO (%)	7.57
TiO_2 (%)	0.86	Sr	195
V	216	Y	23
Cr	357	Zr	86
MnO (%)	0.17	Ba	220
Fe_2O_3 (%)	11.0		

Noncertified concentrations (μg/g dry weight unless noted):

Component	Value	Component	Value
S (%)	0.03	Ce	30
Ni	85	Pb	25
Nb	10	Th	6

Order information:

SARM 50 can be purchased for US$50 per unit (100 g). Price subject to change. Please contact SABS at the address shown above.

SARM 50 (cont.)

Reference:

South African Committee for Certified Reference Materials (1992) Catalogue of certified reference materials. South Africa Bureau of Standards, Private Bag X191, Pretoria, Transvaal 0001, South Africa. 36 pp.

SCo-1

Cody Shale

Source:

US Geological Survey
Branch of Geochemistry
P. O. Box 25046 MS 973
Denver, CO 80225
USA

Description:

The material for SCo-1 was collected in 1963 from a bulldozer cut in an abandoned road on the west side of Teapot Dome in Natrona County, Wyoming, USA. It is from the upper part of the Cody Shale, typical of Upper Cretaceous silty marine shales, intermediate between fine-grained offshore marine shales common farther to the east and the coarser nearshore marine siltstones and sandstone. A complete mineralogical description of this material can be found in Schultz *et al.* (1976). SCo-1 is not a certified reference material. Values for elemental concentrations have been calculated by Abbey (1982, 1983), Gladney and Goode (1981) and Gladney and Roelandts (1988) using the results of various analysts. Those calculated by Gladney and Roelandts (1988) are listed below.

Best available concentrations (µg/g dry weight unless noted):

Element	Mean	Uncertainty (±)	Number of values	Element	Mean	Uncertainty (±)	Number of values
Li	45	3	5	Cu	28.7	1.9	16
Be	1.84	0.20	7	Zn	103	8	15
B	72	6	15	Ga	15	3	9
C	8100	1200	7	Ge	1.21	-	1
O (%)	50.77	-	2	As	12.4	1.4	13
F	770	60	10	Se (ng/g)	890	60	7
Na (%)	0.667	0.046	21	Br	1.03	-	2
Mg (%)	1.64	0.11	19	Rb	112	4	12
Al (%)	7.23	0.11	15	Sr	174	16	20
Si (%)	29.32	0.31	16	Y	26	4	13
P	900	90	15	Zr	160	30	16
S	630	90	10	Nb	11	3	8
Cl	51	10	12	Mo	1.37	0.16	9
K (%)	2.30	0.07	21	Ru	<0.46	-	-
Ca (%)	1.87	0.14	24	Rh (ng/g)	<1.0	-	-
Sc	10.8	1.1	16	Pd (ng/g)	1.0	0.3	3
Ti	3760	390	22	Ag (ng/g)	134	7	3
V	131	13	18	Cd (ng/g)	140	12	5
Cr	68	5	17	In (ng/g)	110	-	1
Mn	408	30	22	Sn	3.7	0.8	10
Fe (%)	3.59	0.13	22	Sb	2.50	0.13	14
Co	10.5	0.8	18	Te (ng/g)	77	-	1
Ni	27	4	17	Cs	7.8	0.7	11

SCo-1 (cont.)

Element	Mean	Uncertainty (±)	Number of values	Element	Mean	Uncertainty (±)	Number of values
Ba	570	30	19	Hf	4.6	0.3	12
La	29.5	1.1	19	Ta	0.92	0.09	10
Ce	62	6	22	W	1.4	0.2	5
Pr	6.6	0.9	9	Re	<10	-	-
Nd	26	2	21	Os	<22	-	-
Sm	5.3	0.3	21	Ir	<6.8	-	-
Eu	1.19	0.12	22	Pt (ng/g)	<1	-	-
Gd	4.6	0.7	19	Au (ng/g)	2.1	0.4	4
Tb	0.70	0.06	13	Hg (ng/g)	52.3	-	1
Dy	4.2	0.5	14	Tl (ng/g)	720	130	3
Ho	0.97	0.06	8	Pb	31	3	9
Er	2.5	0.4	11	Bi (ng/g)	370	70	5
Tm (ng/g)	420	100	12	Th	9.7	0.5	10
Yb	2.27	0.24	21	U	3.0	0.2	11
Lu (ng/g)	338	33	13				

Major and minor oxide concentrations (%):

Element	Mean	Uncertainty (±)	Number of values	Element	Mean	Uncertainty (±)	Number of values
H_2O^+	3.69	0.60	4	K_2O	2.77	0.08	21
H_2O^-	2.11	0.44	4	CaO	2.62	0.20	24
CO_2	2.97	0.44	7	TiO_2	0.628	0.065	22
Na_2O	0.899	0.062	21	MnO	0.053	0.004	22
MgO	2.72	0.18	19	FeO	0.90	0.16	8
Al_2O_3	13.67	0.21	15	Fe_2O_3	4.19	0.19	7
SiO_2	62.78	0.66	16	Cl	0.005	0.001	12
P_2O_5	0.206	0.021	15	F	0.077	0.006	10
				S	0.063	0.009	10

Order information:

SCo-1 is available free of charge from the US Geological Survey. Please contact Dr. S. Wilson at the address above.

References:

Abbey, S. (1982) An evaluation of USGS III. Geostand. Newsletter, 6(1):47-76.

Abbey, S. (1983) Studies in "standard samples" of silicate rocks and minerals 1969-1982. Paper 83-15, Geological Survey of Canada, Canadian Government Publishing Centre, Supply and Services Canada, Hull, Quebec, Canada,114 pp.

Gladney, E.S., and W.E. Goode (1981) Elemental concentrations in eight new United States Geological Survey rock standards: a review. Geostand. Newsletter, 5(1):31-64.

Gladney, E. S., and I. Roelandts (1988) 1987 Compilation of elemental concentration data for USGS BHVO-1, MAG-1, QLO-1, RGM-1, SCo-1, SDC-1, SGR-1 and STM-1. Geostand. Newsletter, 12(2):253-362.

Schultz, L.G., H.A. Tourtelot, and F.J. Flanagan (1976) Cody Shale, SCo-1, from Natrona County, Wyoming. In: F.J. Flanagan (ed.), Description and analyses of eight new USGS rock standards, USGS Prof. paper 840, US Government Printing Office, Washington, DC, USA, pp. 21-23.

SDC-1

Mica Schist

Source:

US Geological Survey
Branch of Geochemistry
P. O. Box 25046 MS 973
Denver, CO 80225
USA

Description:

Mica schist was excavated from a sewer tunnel at an estimated depth of 80 ft in the northern part of Rock Creek Park in Washington, DC, USA. A more complete description of SDC-1, including mineralogical information, can be found in Flanagan and Carroll (1976). SDC-1 is not a certified reference material. Values for elemental concentrations have been calculated by Abbey (1982, 1983), Gladney and Goode (1981) and Gladney and Roelandts (1988) using the results of various analysts. Those calculated by Gladney and Roelandts (1988) are listed below.

Best available concentrations (μg/g dry weight unless noted):

Element	Mean	Uncertainty (±)	Number of values	Element	Mean	Uncertainty (±)	Number of values
Li	34	3	5	Ge	1.54	-	2
Be	3.0	0.5	11	As	0.218	0.012	4
B	12.8	1.8	10	Se (ng/g)	32	6	4
C	270	90	6	Br	0.097	-	1
F	595	27	11	Rb	127	7	12
Na (%)	1.52	0.07	23	Sr	183	9	15
Mg (%)	1.02	0.06	17	Y	40	6	12
Al (%)	8.33	0.18	17	Zr	290	30	9
Si (%)	30.75	0.20	16	Nb	18	3	9
P	690	110	15	Mo	0.25	0.14	6
S	650	110	8	Ru	<0.46	-	-
Cl	32	9	12	Rh (ng/g)	<0.1	-	-
K (%)	2.72	0.08	22	Pd (ng/g)	1.1	-	2
Ca (%)	1.00	0.05	21	Ag (ng/g)	41	6	4
Sc	17	2	15	Cd (ng/g)	80	50	4
Ti	6050	220	20	In (ng/g)	120	-	1
V	102	12	13	Sn	2.98	0.18	7
Cr	64	7	18	Sb	0.54	0.05	10
Mn	880	60	28	Te (ng/g)	6.2	-	2
Fe (%)	4.82	0.16	25	Cs	4.0	0.2	9
Co	17.9	1.2	16	Ba	630	60	19
Ni	38	8	18	La	42	3	19
Cu	30	3	15	Ce	93	7	19
Zn	103	8	15	Pr	9.8	1.1	7
Ga	21.2	1.4	5	Nd	40	4	19

SDC-1 (cont.)

Element	Mean	Uncertainty (±)	Number of values	Element	Mean	Uncertainty (±)	Number of values
Sm	8.2	0.5	20	W	0.80	0.06	6
Eu	1.71	0.12	16	Re	<10	-	-
Gd	7.2	0.4	14	Os	<22	-	-
Tb	1.18	0.14	11	Ir	<6.8	-	-
Dy	6.7	0.9	10	Pt (ng/g)	1.1	-	1
Ho	1.5	0.3	6	Au (ng/g)	1.2	0.6	4
Er	4.1	0.7	6	Tl (ng/g)	700	150	3
Tm (ng/g)	650	100	9	Hg (ng/g)	22.7	-	1
Yb	4.0	0.7	18	Pb	25	2	8
Lu (ng/g)	530	110	11	Bi (ng/g)	260	40	6
Hf	8.3	0.2	8	Th	12.1	0.9	11
Ta	1.21	0.19	9	U	3.14	0.20	8

Major and minor oxide concentrations (%):

Component	Mean	Uncertainty (±)	Number of values	Component	Mean	Uncertainty (±)	Number of values
H_2O^+	1.81	0.14	7	K_2O	3.28	0.10	22
H_2O^-	0.10	0.06	3	CaO	1.40	0.07	21
CO_2	0.099	0.033	6	TiO_2	1.01	0.04	20
Na_2O	2.05	0.09	23	MnO	0.114	0.008	28
MgO	1.69	0.10	17	FeO	3.93	0.15	8
Al_2O_3	15.75	0.34	17	Fe_2O_3	2.62	0.15	6
SiO_2	65.85	0.43	16	Cl	0.003	0.001	12
P_2O_5	0.158	0.025	15	F	0.060	0.003	11
				S	0.065	0.011	8

Order information:

SDC-1 is available free of charge from the US Geological Survey. Please contact Dr. S. Wilson at the address above.

References:

Abbey, S. (1982) An evaluation of USGS III. Geostand. Newsletter, 6(1):47-76.

Abbey, S. (1983) Studies in "standard samples" of silicate rocks and minerals 1969-1982. Paper 83-15, Geological Survey of Canada, Canadian Government Publishing Centre, Supply and Services Canada, Hull, Quebec, Canada, 114 pp.

Flanagan, F.J., and G.V. Carroll (1976) Mica schist, SDC-1, from Rock Creek Park, Washington, D.C. In: F.J. Flanagan (ed.), Description and analyses of eight new USGS rock standards, USGS Prof. paper 840, US Government Printing Office, Washington, DC, USA, pp. 29-32.

Gladney, E.S., and W.E. Goode (1981) Elemental concentrations in eight new United States Geological Survey rock standards: a review. Geostand. Newsletter, 5(1):31-64.

SDC-1 (cont.)

Gladney, E. S., and I. Roelandts (1988) 1987 Compilation of elemental concentration data for USGS BHVO-1, MAG-1, QLO-1, RGM-1, SCo-1, SDC-1, SGR-1 and STM-1. Geostand. Newsletter, 12(2):253-362.

SDO-1

Shale

Source:

US Geological Survey
Branch of Geochemistry
P. O. Box 25046 MS 973
Denver, CO 80225
USA

Description:

The material for this reference sample was collected from the Huron Member of the Ohio Shale near Morehead, KY. It can be used to establish analytical accuracy in the analysis of organic- and sulfur-rich sedimentary rocks. The sample is moderately radioactive. SDO-1 is not a certified reference material. The recommended values from Kane *et al.* (1990) are listed below.

Best available concentrations (µg/g dry weight unless noted):

Component	Mean	Uncertainty (±)	Component	Mean	Uncertainty (±)
Li	28.6	5.5	Sn	3.7	1.2
Be	3.3	0.57	Sb	4.1 - 4.8	
B	128	11	Cs	6.9	1.2
F	697	88.5	Ba	397	38
Sc	13.2	1.5	La	38.5	4.4
Ti	8.3		Ce	79.3	7.8
V	160	21	Pr	8.9	0.66
Cr	66.4	7.6	Nd	36.6	3.3
Co	46.8	6.3	Sm	7.7	0.81
Ni	99.5	9.9	Eu	1.6	0.22
Cu	60.2	9.6	Gd	7.4	1.9
Zn	64.1	6.9	Tb	1.2	0.24
Ga	16.8	1.8	Dy	6.0	0.65
Ge	1.3		Ho	1.2	0.11
As	68.5	8.6	Er	3.6	0.55
Se	1.9 - 6.8		Tm	0.45	0.08
Br	5		Yb	3.4	0.46
Rb	126	3.9	Lu	0.54	0.14
Sr	75.1	11.0	Hf	4.7	0.75
Y	40.6	6.5	Ta	1.1	0.13
Zr	165	24	W	3.3	
Nb	11.4	1.2	Au	0.002 - 0.0035	
Mo	134	21	Hg	0.19	0.08
Ag	0.094 - 0.17		Pb	27.9	5.2
Cd	<2 - <10		Bi	2 - <10	
In	<0.2		U	48.8	6.5

SDO-1 (cont.)

Major and minor oxide concentrations (%):

Component	Mean	Uncertainty (±)	Component	Mean	Uncertainty (±)
H	1.34	0.06	SiO_2	49.28	0.63
H_2O	1.21	0.50	P_2O_5	0.11	0.007
C	9.95	0.44	K_2O	3.35	0.061
CO_2	1.01	0.021	CaO	1.05	0.047
N	0.347	0.043	TiO_2	0.71	0.031
Na_2O	0.38	0.26	MnO	0.1042	0.005
MgO	1.54	0.038	Fe_2O_3	9.34	0.21
Al_2O_3	12.27	0.23	S	5.35	0.044

Order information:

SDO-1 is available free of charge from the US Geological Survey. Please contact Dr. S. Wilson at the address above.

References:

Kane, J. S., B. F. Arbogast, and J. S. Leventhal (1990) Characterization of Devonian Ohio shale SDO-1 as a USGS geochemical reference sample. Geostand. Newsletter, 14:169-96.

U. S. Geological Survey (1991) Certificate, report of analysis, reference shale sample SDO-1. USGS, Reston, VA, USA.

SGR-1

Green River Shale

Source:

US Geological Survey
Branch of Geochemistry
P. O. Box 25046 MS 973
Denver, CO 80225
USA

Description:

SGR-1 is not a certified reference material. Values for elemental concentrations have been calculated by Abbey (1982, 1983), Gladney and Goode (1981) and Gladney and Roelandts (1988) using the results of various analysts. Those calculated by Gladney and Roelandts (1988) are listed below.

Best available concentrations (μg/g dry weight unless noted):

Element	Mean	Uncertainty (±)	Number of values	Element	Mean	Uncertainty (±)	Number of values
H (%)	3.04	-	2	Se (ng/g)	3500	280	8
Li	147	26	5	Rb	83	6	9
Be	1.06	0.16	6	Sr	420	30	18
B	54	3	11	Y	13.0	1.7	7
C	31600	3000	5	Zr	53	12	12
F	1960	240	9	Nb	5.2	1.5	6
Na (%)	2.22	0.10	14	Mo	35.1	0.9	11
Mg (%)	2.68	0.12	17	Ru	<0.46	-	-
Al (%)	3.45	0.11	17	Rh (ng/g)	<0.1	-	-
Si (%)	13.19	0.10	13	Pd (ng/g)	5.2	2.4	3
P	1430	290	16	Ag (ng/g)	16-184	-	3
S	15300	1100	9	Cd (ng/g)	930	140	4
Cl	32	12	7	In (ng/g)	96	-	1
K (%)	1.38	0.08	15	Sn	1.9	0.6	6
Ca (%)	5.99	0.12	13	Sb	3.4	0.5	13
Sc	4.6	0.7	12	Te (ng/g)	248	-	1
Ti	1520	150	20	Cs	5.2	0.3	9
V	128	6	19	Ba	290	40	22
Cr	30	3	17	La	20.3	1.8	14
Mn	267	34	26	Ce	36	4	14
Fe (%)	2.12	0.10	20	Pr	3.9	0.3	5
Co	11.8	1.5	19	Nd	15.5	1.7	15
Ni	29	5	21	Sm	2.7	0.3	16
Cu	66	9	18	Eu	0.56	0.09	13
Zn	74	9	12	Gd	2.0	0.4	11
Ga	11	2	5	Tb	0.36	0.04	9
Ge	1.57	-	1	Dy	1.9	0.3	7
As	67	5	9	Ho	0.38	0.05	4

SGR-1 (cont.)

Element	Mean	Uncertainty (±)	Number of values	Element	Mean	Uncertainty (±)	Number of values
Er	1.11	0.14	5	Ir	<6.8	-	-
Tm (ng/g)	170	30	7	Pt (ng/g)	3.0	-	1
Yb	0.94	0.16	13	Au (ng/g)	8.9	2.1	4
Lu (ng/g)	140	30	8	Hg (ng/g)	313	-	2
Hf	1.39	0.14	9	Tl (ng/g)	330	-	2
Ta	0.42	0.12	8	Pb	38	4	8
W	2.57	0.06	5	Bi (ng/g)	940	80	4
Re	<10	-	-	Th	4.78	0.21	10
Os	<22	-	-	U	5.4	0.4	10

Major and minor oxide concentrations (%):

Element	Mean	Uncertainty (±)	Number of values	Element	Mean	Uncertainty (±)	Number of values
H_2O^-	0.45	-	1	K_2O	1.66	0.10	15
H_2O^+	19.37	-	1	CaO	8.38	0.17	13
CO_2	11.58	1.10	5	TiO_2	0.264	0.025	20
Na_2O	2.99	0.13	14	MnO	0.034	0.004	26
MgO	4.44	0.20	17	FeO	1.41	-	2
Al_2O_3	6.52	0.21	17	Fe_2O_3	1.46	-	2
SiO_2	28.24	0.21	13	Cl	0.003	1.10	7
P_2O_3	0.328	0.066	16	F	0.196	0.024	9
				S	1.53	0.11	9

Order information:

SGR-1 is available free of charge from the US Geological Survey. Please contact Dr. S. Wilson at the address above.

References:

Abbey, S. (1982) An evaluation of USGS III. Geostand. Newsletter, 6(1):47-76.

Abbey, S. (1983) Studies in "standard samples" of silicate rocks and minerals 1969-1982. Paper 83-15, 114 pp. Geological Survey of Canada, Canadian Government Publishing Centre, Supply and Services Canada, Hull, Quebec, Canada.

Gladney, E. S., and W. E. Goode (1981) Elemental concentrations in eight new United States Geological Survey rock standards: a review. Geostand. Newsletter, 5(1):31-64.

Gladney, E. S., and I. Roelandts (1988) 1987 Compilation of elemental concentration data for USGS BHVO-1, MAG-1, QLO-1, RGM-1, SCo-1, SDC-1, SGR-1 and STM-1. Geostand. Newsletter, 12(2):253-362.

SRM 69b

Bauxite (Arkansas)

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

This SRM is a fine powder with a nominal particle size of <0.08 mm, and is intended for use primarily in evaluating chemical and instrumental methods of analysis. It is 30% kaolinite, 60% gibbsite and 10% siderite.

Certified concentrations (percent):

Component	Value	Uncertainty (±)
MgO	0.085	0.008
Al_2O_3	48.8	0.2
SiO_2	13.43	0.10
P_2O_5	0.118	0.004
SO_3	0.551	0.006
K_2O	0.068	0.009
CaO	0.13	0.02
TiO_2	1.90	0.05

Component	Value	Uncertainty (±)
V_2O_5	0.028	0.003
Cr_2O_3	0.011	0.002
MnO	0.110	0.005
Fe_2O_3	7.14	0.12
ZnO	0.0035	0.0005
ZrO_2	0.29	0.07

Order Information:

SRM 69b can be purchased for US$109 per unit (60 g). Price subject to change without notice. Please contact NIST at the address shown above.

Reference:

National Institute of Standards and Technology (1991) SRM 69b. Bauxite (Arkansas). Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

SRM 81a

Glass Sand

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

This SRM is a fine powder, 95% of the particles are < 106 μm..

Certified concentrations (percent dry weight unless noted):

Component	Value	Range
Al_2O_3	0.66	0.62 - 0.69
TiO_2	0.12	0.10 - 0.14
Cr_2O_3 (μg/g)	46	33 - 58
Fe_2O_3	0.082	0.075 - 0.089
ZrO_2	0.034	0.025 - 0.042

Order Information:

SRM 81a can be purchased for US$173 per unit (75 g). Price subject to change without notice. Please contact NIST at the address shown above.

Reference:

National Institute of Standards and Technology (1978) SRM 81a. Glass sand. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

SRM 88b

Dolomitic Limestone

Source:

National Institute of Standards and Technology
Gaithersburg, MD 20899
USA

Description:

SRM 88b is a powdered dolomitic limestone that has been crushed and passed through a No. 60 sieve (nominal sieve opening of 250 μm). This material was collected near Skokie, Illinois, USA.

Certified concentrations (percent dry weight):

Oxide	Value	Uncertainty (±)	Oxide	Value	Uncertainty (±)
CO_2	46.37	0.12	K_2O	0.1030	0.0024
Na_2O	0.0290	0.0007	CaO	29.95	0.05
MgO	21.03	0.07	MnO	0.0160	0.0012
Al_2O_3	0.336	0.013	Fe_2O_3	0.277	0.002
SiO_2	1.13	0.02	SrO	0.0076	0.0003
P_2O_5	0.0044	0.0003			

Noncertified concentrations (μg/g dry weight unless noted):

Oxide	Value	Oxide	Value
Sc_2O_3	0.56	CeO_2	4.7
TiO_2 (%)	0.016	Eu_2O_3	0.15
Cr_2O_3	3.4	HfO_2	0.16
CoO	1.3	ThO_2	0.35
Cs_2O	0.17		

Order Information:

SRM 88b can be purchased for US$173 per unit (75-grams bottle). Price subject to change without notice. Please contact NIST at the address shown above.

Reference:

National Institute of Standards and Technology (1986) SRM 88b. Dolomitic limestone. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

SRM 97b

Flint Clay

Source:

National Institute of Standards and Technology
Gaithersburg, MD 20899
USA

Description:

SRM 97b is a finely powdered flint clay obtained from a stock pile near the Harbison-Walker Refractories Co. Mine on Anderson Creek, Pike Township, Clearfield County, Pennsylvania, USA. Approximately 220 kg of flint clay were air dried and processed by the same method used to prepare US Geological Survey rock standards. After processing, the material was delivered to NIST where it was again mixed and bottled.

Certified concentrations (percent dry weight):

Element	Value	Uncertainty (±)	Element	Value	Uncertainty (±)
Li	0.055	0.001	Ca	0.0249	0.0026
Na	0.0492	0.0023	Ti	1.43	0.04
Mg	0.113	0.002	Cr	0.0227	0.0012
Al	20.76	0.15	Mn	0.0047	0.0005
Si	19.81	0.04	Fe	0.831	0.008
K	0.513	0.023	Sr	0.0084	0.0002

Noncertified concentrations (µg/g dry weight unless noted):

Element	Value	Zr (%)	0.05
		Cs	3.4
P (%)	0.02	Ba (%)	0.018
Sc	22	Sb	2.2
Co	3.8	Eu	0.84
Zn	87	Hf	13
Rb	33	Th	36

Order information:

SRM 97b can be purchased for US$218 per unit (60 g). Price subject to change without notice. Please contact NIST at the address shown above.

Reference:

National Institute of Standards and Technology (1988) SRM 97b. Flint clay. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

SRM 98b

Plastic Clay

Source:

National Institute of Standards and Technology
Gaithersburg, MD 20899
USA

Description:

SRM 98b is a finely powdered clay obtained from the underclay of the Clarion coal bed at the Harbison-Walker Refractories Co. plant at Clearfield, Clearfield County, Pennsylvania, USA. Approximately 220 kg of plastic clay were air dried and processed by the same method used to prepare US Geological Survey rock standards. After processing, the material was delivered to NIST where it was again mixed and bottled.

Certified concentrations (percent dry weight):

Element	Value	Uncertainty (±)	Element	Value	Uncertainty (±)
Li	0.0215	0.0003	Ca	0.0759	0.0035
Na	0.1496	0.0066	Ti	0.809	0.012
Mg	0.358	0.012	Cr	0.0119	0.0005
Al	14.30	0.20	Mn	0.0116	0.0005
Si	26.65	0.16	Fe	1.18	0.01
K	2.81	0.07	Sr	0.0189	0.0008

Noncertified concentrations (μg/g dry weight unless noted):

Element	Value	Element	Value
P(%)	0.03	Sb	1.6
Sc	22	Cs	16.5
Co	16.3	Ba(%)	0.07
Zn(%)	0.011	Eu	1.3
Rb(%)	0.018	Hf	7.2
Zr(%)	0.022	Th	21

Order information:

SRM 98b can be purchased for US$218 per unit (60 g). Price subject to change without notice. Please contact NIST at the address shown above.

Reference:

National Institute of Standards and Technology (1988) SRM 98b. Plastic clay. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

SRM 120c

Florida Phosphate Rock

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

The material for this SRM was ground and blended. Approximately 70% passed through a 75 μm (200 mesh) screen). Method dependent concentrations are also reported using the procedures of the Association of Florida Phosphate Chemists.

Certified concentrations (percent):

Component	Value	Uncertainty (±)	Component	Value	Uncertainty (±)
Na_2O	0.52	0.02	V_2O_3	0.016	0.002
Al_2O_3	1.30	0.04	MnO	0.027	0.002
K_2O	0.147	0.004	Fe_2O_3	1.08	0.03
TiO_2	0.103	0.006	U_3O_8	0.0135	0.0002

Noncertified concentrations (percent):

Component	Value	Component	Value
S (total)	0.37	As_2O_3	0.0009
Cr_2O_3	0.01	SrO	0.1
CoO	0.001	PbO	0.003
NiO	0.004	MoO_3	0.002
CuO	0.0016	Eu_2O_3	0.0005
ZnO	0.009		

Order information:

SRM 120c can be purchased for US$131 (90 g). Price subject to change without notice. Please contact NIST at the address shown above.

References:

National Institute of Standards and Technology (1988) Certificate, SRM 120c, Florida phosphate rock. National Institute of Standards and Technology, Gaithersburg, MD, USA.

SRM 278

Obsidian Rock

Source:

National Institute of Standards and Technology
Gaithersburg, MD 20899
USA

Description:

Obsidian rock from Clear Lake, Newberry Crater, Oregon, was crushed, ground, sieved to <200 mesh, and mixed in a cone blender to ensure homogeneity. SRM 278, a natural glass, is hydroscopic and contains water that cannot be driven off by drying at low temperatures.

Certified concentrations (μg/g dry weight unless noted):

Component	Value	Uncertainty (±)	Component	Value	Uncertainty (±)
Na_2O (%)	4.84	0.05	Fe_2O_3 (%)	2.04	0.02
P_2O_5 (%)	0.036	0.003	Ni	3.6	0.3
Al_2O_3 (%)	14.15	0.15	Cu	5.9	0.2
SiO_2 (%)	73.05	0.13	Rb	127.5	0.3
K_2O (%)	4.16	0.02	Sr	63.5	0.1
CaO (%)	0.983	0.002	Tl	0.54	0.04
TiO_2 (%)	0.245	0.007	Pb	16.4	16.4
MnO (%)	0.052	0.002	Th	12.4	0.3
FeO (%)	1.36	0.02	U	4.58	0.04

Noncertified concentrations (μg/g dry weight unless noted):

Component	Value	Component	Value
B	25	Ba	1140
C (%)	0.05	Ce	62.2
CO_2 (%)	0.01	Eu	0.84
F (%)	0.05	Sm	5.7
MgO (%)	0.23	Gd	5.3
Sc	5.1	Tb	1.0
Cr	6.1	Yb	4.5
Co	1.5	Lu	0.73
Zn	55	Hf	8.4
Sb	1.5	Ta	1.2
Cs	5.5		

Order information:

SRM 278 can be purchased for US$197 (35 g). Price subject to change without notice. Please contact NIST at the address shown above.

References:

National Institute of Standards and Technology (1992) Certificate, SRM 278, Obsidian rock. National Institute of Standards and Technology, Gaithersburg, MD, USA.

SRM 600

Bauxite (Australian-Darling Range)

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

This SRM is a fine powder with a nominal particle size of <0.08 mm, and is intended for use primarily in evaluating chemical and instrumental methods of analysis.

Certified concentrations (percent):

Component	Value	Uncertainty (±)	Component	Value	Uncertainty (±)
Na_2O	0.022	0.007	TiO_2	1.31	0.04
MgO	0.05	0.01	V_2O_5	0.060	0.007
Al_2O_3	40.0	0.4	Cr_2O_3	0.024	0.004
SiO_2	20.3	0.4	MnO	0.013	0.004
P_2O_5	0.039	0.007	Fe_2O_3	17.0	0.3
SO_3	0.155	0.006	ZnO	0.003	0.002
K_2O	0.23	0.02	ZrO_2	0.060	0.009
CaO	0.22	0.02			

Order Information:

SRM 600 can be purchased for US$109 per unit (90 g). Price subject to change without notice. Please contact NIST at the address shown above.

Reference:

National Institute of Standards and Technology (1991) SRM 600. Bauxite (Australian-Darling Range). Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

SRM 688

Basalt Rock

Source:

National Institute of Standards and Technology
Gaithersburg, MD 20899
USA

Description:

SRM 278 is a finely powdered basalt rock obtained from a Cenozoic basalt flow near Jackpot, Nevada, USA. Approximately 600 lbs. of basalt rock were crushed, ground and sieved to <200 mesh. The material was mixed in a cone blender to ensure homogeneity.

Certified concentrations (μg/g dry weight unless noted):

Component	Value	Uncertainty (±)	Component	Value	Uncertainty (±)
Na_2O (%)	2.15	0.03	MnO (%)	0.167	0.002
Al_2O_3 (%)	17.36	0.09	Fe_2O_3 (%)	10.35	0.04
SiO_2 (%)	48.4	0.1	Rb	1.91	0.01
P_2O_5 (%)	0.134	0.003	Sr	169.2	0.7
K_2O (%)	0.187	0.008	Pb	3.3	0.2
TiO_2 (%)	1.17	0.01	Th	0.33	0.02
Cr	332	9			

Noncertified concentrations (μg/g dry weight unless noted):

Component	Value	Component	Value
F (%)	0.02	Ba	200
CO_2 (%)	0.05	Ce	13.3
MgO (%)	8.4	Sm	2.79
CaO (%)	12.17	Eu	1.07
Sc	38.1	Tb	0.448
V	250	Yb	2.09
Co	49.7	Lu	0.34
Ni	150	Hf	1.6
Cu	96	U	0.37
Zn	58.0		

Order information:

SRM 688 can be purchased for US$197 per unit (60 g). Price subject to change without notice. Please contact NIST at the address shown above.

SRM 688 (cont.)

Reference:

National Institute of Standards and Technology (1981) SRM 688. Basalt rock. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

SRM 696

Bauxite (Surinam)

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

This SRM is a fine powder with a nominal particle size of <0.08 mm, and is intended for use primarily in evaluating chemical and instrumental methods of analysis. It is 5% kaolinite, 80% gibbsite, 10% pyrite and 5% anatase.

Certified concentrations (percent):

Component	Value	Uncertainty (±)	Component	Value	Uncertainty (±)
MgO	0.012	0.003	TiO_2	2.64	0.05
Al_2O_3	54.5	0.3	V_2O_5	0.072	0.006
SiO_2	3.79	0.10	Cr_2O_3	0.047	0.003
P_2O_5	0.050	0.006	MnO	0.004	0.001
SO_3	0.150	0.002	Fe_2O_3	8.70	0.10
K_2O	0.009	0.003	ZnO	0.0014	0.0007
CaO	0.018	0.002	ZrO_2	0.14	0.02

Order Information:

SRM 696 can be purchased for US$109 per unit (60 g). Price subject to change without notice. Please contact NIST at the address shown above.

Reference:

National Institute of Standards and Technology (1991) SRM 696. Bauxite (Surinam). Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

SRM 697

Bauxite (Dominican)

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

This SRM is a fine powder with a nominal particle size of <0.08 mm, and is intended for use primarily in evaluating chemical and instrumental methods of analysis. It is 15% kaolinite, 50% gibbsite, 10% boehmite, 20% hematite and 5% anatase.

Certified concentrations (percent):

Component	Value	Uncertainty (±)	Component	Value	Uncertainty (±)
MgO	0.18	0.02	TiO_2	2.52	0.05
Al_2O_3	45.8	0.2	V_2O_5	0.063	0.005
SiO_2	6.81	0.07	Cr_2O_3	0.100	0.005
P_2O_5	0.97	0.06	MnO	0.41	0.03
SO_3	0.0770	0.0018	Fe_2O_3	20.0	0.2
K_2O	0.062	0.007	ZnO	0.037	0.003
CaO	0.71	0.03	ZrO_2	0.065	0.007

Order Information:

SRM 697 can be purchased for US$109 per unit (60 g). Price subject to change without notice. Please contact NIST at the address shown above.

Reference:

National Institute of Standards and Technology (1991) SRM 697. Bauxite (Dominican). Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

SRM 698

Bauxite (Jamaican)

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

This SRM is a fine powder with a nominal particle size of <0.08 mm, and is intended for use primarily in evaluating chemical and instrumental methods of analysis. It is 75% gibbsite, 20% hematite and 5% anatase.

Certified concentrations (percent):

Component	Value	Uncertainty (±)	Component	Value	Uncertainty (±)
MgO	0.058	0.008	TiO_2	2.38	0.07
Al_2O_3	48.2	0.4	V_2O_5	0.064	0.005
SiO_2	0.69	0.03	Cr_2O_3	0.080	0.006
P_2O_5	0.37	0.01	MnO	0.38	0.03
SO_3	0.143	0.004	Fe_2O_3	19.6	0.2
K_2O	0.010	0.002	ZnO	0.029	0.002
CaO	0.62	0.02	ZrO_2	0.061	0.009

Order Information:

SRM 698 can be purchased for US$109 per unit (60 g). Price subject to change without notice. Please contact NIST at the address shown above.

Reference:

National Institute of Standards and Technology (1991) SRM 698. Bauxite (Jamaican). Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

STM-1

Nepheline Syenite

Source:

US Geological Survey
Branch of Geochemistry
P. O. Box 25046 MS 973
Denver, CO 80225
USA

Description:

The sample of peralkaline nepheline syenite was collected from a sill that underlies Table Mountain (44° 28.6' N, 123° 50.2' W) in the Oregon Coast Range, USA. A complete mineralogical description of this material can be found in Snavely *et al.* (1976). STM-1 is not a certified reference material. Values for elemental concentrations have been calculated by Abbey (1982, 1983), Gladney and Goode (1981) and Gladney and Roelandts (1988) using the results of various analysts. Those calculated by Gladney and Roelandts (1988) are listed below.

Best available concentrations (μg/g dry weight unless noted):

Element	Mean	Uncertainty (±)	Number of values	Element	Mean	Uncertainty (±)	Number of values
Li	32	8	10	Ge	1.38	-	2
Be	9.6	0.6	13	As	4.6	0.6	5
B	6.4	1.7	7	Se (ng/g)	7.7	2.0	4
C	70	40	6	Br	2.3	1.5	3
F	910	50	13	Rb	118	6	13
Na (%)	6.63	0.15	23	Sr	700	30	17
Mg (%)	0.061	0.012	18	Y	46	5	13
Al (%)	9.73	0.12	20	Zr	1210	120	14
Si (%)	27.85	0.23	16	Nb	268	12	9
P	690	60	19	Mo	5.2	0.9	16
S	43	20	3	Ru	<0.46	-	-
Cl	460	40	16	Rh (ng/g)	<0.1	-	-
K (%)	3.55	0.06	20	Pd (ng/g)	0.4	-	2
Ca (%)	0.780	0.042	21	Ag (ng/g)	79	8	5
Sc	0.61	0.07	11	Cd (ng/g)	270	60	3
Ti	810	70	20	In (ng/g)	120	-	2
V	8.7	5.2	5	Sn	6.8	1.2	10
Cr	4.3	2.6	15	Sb	1.66	0.15	13
Mn	1700	120	32	Te (ng/g)	6.0	-	1
Fe (%)	3.65	0.07	22	Cs	1.54	0.08	7
Co	0.90	0.15	9	Ba	560	60	23
Ni	3.0	1.6	9	La	150	6	20
Cu	4.6	2.0	17	Ce	259	18	17
Zn	235	22	17	Pr	19.0	1.4	4
Ga	36	5	8	Nd	79	7	16

STM-1 (cont.)

Element	Mean	Uncertainty (±)	Number of values	Element	Mean	Uncertainty (±)	Number of values
Sm	12.6	1.0	18	W	3.6	0.4	8
Eu	3.6	0.3	18	Re	<10	-	-
Gd	9.5	0.8	13	Os	<22	-	-
Tb	1.55	0.16	11	Ir	<6.8	-	-
Dy	8.1	0.5	7	Pt (ng/g)	<1	-	-
Ho	1.9	0.4	8	Au (ng/g)	0.40	-	2
Er	4.2	0.4	6	Tl (ng/g)	260	50	3
Tm (ng/g)	690	160	6	Hg (ng/g)	15.3	-	1
Yb	4.4	0.4	19	Pb	17.7	1.8	8
Lu (ng/g)	600	100	10	Bi (ng/g)	130	30	5
Hf	28	2	11	Th	31	3	13
Ta	18.6	1.2	10	U	9.06	0.13	9

Major and minor oxide concentrations (%):

Element	Mean	Uncertainty (±)	Number of values	Element	Mean	Uncertainty (±)	Number of values
H_2O^+	1.50	0.11	10	K_2O	4.28	0.07	20
H_2O^-	0.19	0.04	4	CaO	1.09	0.06	21
CO_2	0.026	0.015	6	TiO_2	0.135	0.012	20
Na_2O	8.94	0.20	23	MnO	0.220	0.015	32
MgO	0.101	0.020	18	FeO	2.09	0.03	9
Al_2O_3	18.39	0.23	20	Fe_2O_3	2.87	0.02	5
SiO_2	59.64	0.49	16	Cl	0.046	0.004	16
P_2O_5	0.158	0.014	19	F	0.091	0.005	13
				S	0.004	0.002	3

Order information:

STM-1 is available free of charge from the US Geological Survey. Please contact Dr. S. Wilson at the address above.

References:

Abbey, S. (1982) An evaluation of USGS III. Geostand. Newsletter, 6(1):47-76.

Abbey, S. (1983) Studies in "standard samples" of silicate rocks and minerals 1969-1982. Paper 83-15, 114 pp. Geological Survey of Canada, Canadian Government Publishing Centre, Supply and Services Canada, Hull, Quebec, Canada.

Gladney, E. S., and W. E. Goode (1981) Elemental concentrations in eight new United States Geological Survey rock standards: a review. Geostand. Newsletter, 5(1):31-64.

Gladney, E. S., and I. Roelandts (1988) 1987 Compilation of elemental concentration data for USGS BHVO-1, MAG-1, QLO-1, RGM-1, SCo-1, SDC-1, SGR-1 and STM-1. Geostand. Newsletter, 12(2):253-362.

SY-2 - SY-3

Syenites

Source:

Canada Centre for Mineral and Energy Technology
555 Booth Street
Ottawa K1A 0G1
CANADA

Description:

SY-2 is a syenite from the Bancroft area of eastern Ontario. SY-3 is a batch syenite from the same source as SY-2 that was ground autogeneously with lumps of a concentrate containing uranite, allanite and betafite to increase the concentrations of U, Th and the rare earths.

Recommended values (percent dry weight):

	SY-2	SY-3
Component	Value	Value
F	0.51	0.66
Na_2O	4.34	4.15
MgO	2.7	2.67
Al_2O_3	12.12	11.8
SiO_2	60.1	59.68
P_2O_5	0.43	0.54
S	0.011	0.05
K_2O	4.48	4.2
CaO	7.98	8.26
TiO_2	0.14	0.15
MnO	0.32	0.32
FeO	3.62	3.58
Fe_2O_3	2.28	2.44

Order information:

These materials can be purchased for Canadian $85 per unit (100 g). Price subject to change without notice. Please contact CANMET at the address shown above.

Reference:

Bowman, W. S. (1990) Certified reference materials. CCRMP 90-1E. Canada Centre for Mineral and Energy Technology, Ottawa, Canada. 65 pp.

W-2

Diabase

Source:

US Geological Survey
Branch of Geochemistry
P. O. Box 25046 MS 973
Denver, CO 80225
USA

Description:

Eight hundred pounds of material was collected from Bull Run Quarry, near Centreville, VA, USA, at the same site that the earlier W-1 reference material was obtained and processed for this standard (Flanagan, 1984). The complete petrology of the material can be found in Chayes (1951). W-2 is not a certified reference material. Original concentration values for various elements was initially provided by Flanagan (1984). Values for elemental concentrations using the results of various analysts have been calculated by Abbey (1983), Gladney *et al.* (1983), Flanagan (1986) and Gladney and Roelandts (1988). Those calculated by Gladney and Roelandts (1988) are listed below.

Best available concentrations (μg/g dry weight unless noted):

Element	Mean	Uncertainty (±)	Number of values	Element	Mean	Uncertainty (±)	Number of values
Li	9.3	0.7	8	Ga	20	3	10
Be	1.3	0.2	4	Ge	1.04	-	1
B	12.0	1.30	4	As	1.24	0.36	6
C	151	80	6	Se (ng/g)	102	-	2
F	205	39	7	Br	<2	-	-
Na (%)	1.59	0.09	38	Rb	20	3	30
Mg (%)	3.84	0.11	31	Sr	194	17	28
Al (%)	8.12	0.12	33	Y	24	3	21
Si (%)	24.49	0.30	28	Zr	94	9	17
P	570	70	21	Nb	7.9	1.4	14
S	79	28	3	Mo	0.6	0.4	3
Cl	190	40	9	Pd (ng/g)	11	-	2
K	5200	210	34	Ag (ng/g)	46	-	2
Ca (%)	7.77	0.21	37	Cd (ng/g)	104	27	4
Sc	35	3	21	Sb	0.79	0.17	10
Ti	6350	180	35	Te (ng/g)	2.1	-	1
V	262	14	23	Cs	0.99	0.08	8
Cr	93	6	30	Ba	182	23	26
Mn	1260	70	38	La	11.4	1.8	25
Fe (%)	7.51	0.16	38	Ce	24	2	23
Co	44	6	38	Pr	5.9	5.2	3
Ni	70	8	29	Nd	14	5	15
Cu	103	12	24	Sm	3.25	0.23	22
Zn	77	5	24	Eu	1.10	0.08	22

W-2 (cont.)

Element	Mean	Uncertainty (±)	Number of values	Element	Mean	Uncertainty (±)	Number of values
Gd	3.6	0.5	10	Ta (ng/g)	500	70	11
Tb (ng/g)	630	120	11	W (ng/g)	263	-	1
Dy	3.8	0.4	10	Au (ng/g)	1.2	-	1
Ho (ng/g)	760	90	6	Hg (ng/g)	7.9	-	1
Er	2.5	0.6	5	Tl (ng/g)	200	-	1
Tm (ng/g)	380	70	7	Pb	9.3	3.1	6
Yb	2.05	0.12	20	Bi (ng/g)	30	-	1
Lu (ng/g)	330	70	15	Th	2.2	0.4	17
Hf	2.56	0.14	14	U (ng/g)	530	80	9

Major and minor oxide concentrations (%):

Element	Mean	Uncertainty (±)	Number of values	Element	Mean	Uncertainty (±)	Number of values
H_2O^+	0.55	0.04	11	K_2O	0.627	0.025	34
H_2O^-	0.23	0.05	7	CaO	10.87	0.29	37
Na_2O	2.14	0.12	38	TiO_2	1.06	0.03	35
MgO	6.37	0.18	31	MnO	0.163	0.009	38
Al_2O_3	15.35	0.23	33	FeO	8.31	0.09	8
SiO_2	52.44	0.64	28	Fe_2O_3	1.52	0.14	8
P_2O_5	0.131	0.016	21	CO_2	0.055	0.029	6

Order information:

W-2 is available free of charge from the US Geological Survey. Please contact Dr. S. Wilson at the address above.

References:

Abbey, S. (1983) Studies in "standard samples" of silicate rocks and minerals 1969-1982. Paper 83-15, 114 pp. Geological Survey of Canada, Canadian Government Publishing Centre, Supply and Services Canada, Hull, Quebec, Canada.

Chayes, F. (1951) Modal analyses of the granite and diabase test rocks. U.S. Geol. Survey Prof. Bull. 980:59-68. U.S. Geological Survey, Reston, VA, USA.

Flanagan, F. J. (1984) Three USGS mafic rock reference samples, W-2, DNC-1, and BIR-1. U.S. Geol. Survey Prof. Bull. 1623:1-12. U.S. Geological Survey, Reston, VA, USA.

Flanagan, F. J. (1986) Additions and corrections for USGS Bulletin 1623, Three USGS mafic rock reference samples, W-2, DNC-1, and BIR-1. Open file report 86-220. U.S. Geological Survey, Reston, VA, USA.

Gladney, E. S., and I. Roelandts (1988) 1987 Compilation of elemental concentration data for USGS BIR-1, DNC-1 and W-2. Geostand. Newsletter, 12(1):63-118.

Gladney, E. S., C. E. Burns, and I. Roelandts (1983) 1982 Compilation of elemental concentrations in eleven United States Geological Survey rock standards. Geostands. Newsletter, 7(1):3-226.

Snavely, P. D., N. S. MacLeod, F. J. Flanagan, S. Berman, H. G. Neiman, and H. Bastron (1976) Nepheline syenite, STM-1, from Table Mountain, Oregon. In: F. J. Flanagan (ed.), Description and analyses of eight new USGS rock standards, USGS Prof. paper 840, p. 7-10. US Government Printing Office, Washington, DC.

BCSS-1, MESS-1, PACS-1 and BEST-1

Marine and Estuarine Sediments

Source:

National Research Council of Canada
Marine Analytical Chemistry Standards Program
Institute for Environmental Chemistry
Montreal Road
Ottawa, ON K1A OR9
CANADA

Description:

Sediment for BCSS-1 was collected in the Baie des Chaleurs, Gulf of St. Lawrence; for MESS-1 in the Miramichi Estuary, Gulf of St. Lawrence; and for PACS-1 in Esquimalt Harbour, British Columbia. The sediments were freeze-dried, screened to pass through a 125-μm screen, blended, bottled, and radiation-sterilized. The materials may contain sea salt. Semiquantitative analysis results for MESS-1 and BCSS-1 are available in the NRCC description sheet (1987). BEST-1 is an estuarine sediment from the Beaufort Sea and only has certified values for Hg.

Certified concentrations (μg/g dry weight unless noted):

Component	BCSS-1		MESS-1		PACS-1	
	Value	Uncertainty (±)	Value	Uncertainty (±)	Value	Uncertainty (±)
Be	1.3	0.3	1.9	0.2	-	-
C (%)	2.19	0.09	2.99	0.09	3.69	0.11
Na_2O (%)	2.72	0.21	2.50	0.15	4.40	0.11
MgO (%)	2.44	0.23	1.44	0.09	2.41	0.09
Al_2O_3 (%)	11.83	0.41	11.03	0.38	12.23	0.22
SiO_2 (%)	66.1	1.0	67.5	1.9	55.7	0.5
P_2O_5 (%)	0.154	0.016	0.146	0.014	0.233	0.018
S (%)	0.36	0.05	0.72	0.05	1.32	0.08
Cl (%)	1.12	0.05	0.82	0.07	2.39	0.09
K_2O (%)	2.17	0.04	2.24	0.04	1.50	0.09
CaO (%)	0.76	0.074	0.674	0.064	2.92	0.13
TiO_2 (%)	0.734	0.024	0.905	0.028	0.703	0.011
V	93.4	4.9	72.4	5.3	127	5
Cr	123	14	71	11	113	8
Mn	229	15	513	25	470	12
Fe_2O_3 (%)	4.70	0.14	4.36	0.25	6.96	0.12
Co	11.4	2.1	10.8	1.9	17.5	1.1
Ni	55.3	3.6	29.5	2.7	44.1	2.0
Cu	18.5	2.7	25.1	3.8	452	16
Zn	119	12	191	17	824	22
As	11.1	1.4	10.6	1.2	211	11
Se	0.43	0.06	0.34	0.06	1.09	0.11
Sr	-	-	-	-	277	-

Component	BCSS-1 Value	BCSS-1 Uncertainty (±)	MESS-1 Value	MESS-1 Uncertainty (±)	PACS-1 Value	PACS-1 Uncertainty (±)
Mo	-	-	-	-	12.9	0.9
Cd	0.25	0.04	0.59	0.10	2.38	0.20
Sn	1.85	0.20	3.98	0.44	41.1	3.1
Sb	0.59	0.06	0.73	0.08	171	14
Hg	-	-	-	-	4.57	0.16
Pb	22.7	3.4	34.0	6.1	404	20
Tributyl Sn	-	-	-	-	1.27	0.22
Dibutyl Sn	-	-	-	-	1.16	0.18
Monobutyl Sn	-	-	-	-	0.28	0.17

BEST-1

Hg	0.092	0.009

Order information:

BCSS-1, MESS-1 and PCSS-1 can be purchased for US$125 per unit (80 g, 65 g and 60 g respectively). BEST-1 can be purchased for US$75 per unit (50 g) or will be shipped free of charge with each order of BCSS-1 and/or MESS-1. Price subject to change without notice. Please contact NRCC at the address above.

References:

National Research Council Canada (1990) BCSS-1, MESS-1, PACS-1, BEST-1. Marine sediment reference materials for trace metals and other constituents. Description sheet. National Research Council Canada, Institute for Environmental Chemistry, Ottawa, K1A 0R6, Canada.

CRM 277

Trace Elements in Estuarine Sediment

Source:

Community Bureau of Reference
Commission of the European Communities
Directorate General for Science
Research and Development
200 rue de la Loi
B-1049 Brussels
BELGIUM

Description:

This material consists lyophilized sediment from the Scheldt estuary. Information on aqua regia soluble concentrations is available in the report.

Certified concentrations (µg/g dry weight):

Element	Value	Uncertainty (±)	Element	Value	Uncertainty (±)
Sc	9.0	0.12	As	47.3	1.6
Cr	192	7	Se	2.04	0.18
Ni	43.4	1.6	Cd	11.9	0.4
Cu	101.7	1.6	Hg	1.77	0.06
Zn	547	12	Pb	146	3

Noncertified concentrations (µg/g dry weight unless noted):

Element	Value	Element	Value
Be	1.6	Co	17
Na (mg/g)	12	Br	87
Mg (mg/g)	10	Mo	1.5
Al (mg/g)	48	Sb	4.0
Si (mg/g)	230	Cs	6.5
P (mg/g)	4.1	Ba	329
K (mg/g)	16	La	45
Ca (mg/g)	60	Ce	80
Ti (mg/g)	3.0	Eu	1.5
V	102	Th	9.0
Mn (mg/g)	1.6	U	3.0
Fe (mg/g)	45.5		

Order information:

CRM 277 can be purchased for BFR5000 per unit (40 g). Price includes handling and normal postage and it is subject to change without notice. Please contact BCR at the address shown above.

References:

Community Bureau of Reference (BCR) (1988) BCR CRM 277, trace element in estuarine sediment. Certificate of analysis. Community Bureau of Reference, Commission of the European Communities, Directorate General for Science, Research and Development, 200 rue de la Loi, B-1049 Brussels, Belgium.

Community Bureau of Reference (BCR) (1992) Reference Materials. Community Bureau of Reference, Commission of the European Communities, Directorate General for Science, Research and Development, 200 rue de la Loi, B-1049 Brussels, Belgium. 75 pp.

CRM 280

Trace Elements in Lake Sediment

Source:

Community Bureau of Reference
Commission of the European Communities
Directorate General for Science
Research and Development
200 rue de la Loi
B-1049 Brussels
BELGIUM

Description:

This material consists lyophilized sediment from Lake Maggiore. Information on aqua regia soluble concentrations is available in the report.

Certified concentrations (µg/g dry weight):

Element	Value	Uncertainty (±)	Element	Value	Uncertainty (±)
Sc	12.8	0.7	As	51.0	2.4
Cr	114	4	Se	0.68	0.06
Ni	73.6	2.6	Cd	1.6	0.1
Cu	70.5	1.5	Hg	0.670	0.019
Zn	291	4	Pb	80.2	2.3

Noncertified concentrations (µg/g dry weight unless noted):

Element	Value	Element	Value
Be	3.0	Br	11
Na (mg/g)	18	Mo	2.0
Mg (mg/g)	16	Ag	1.2
Al (mg/g)	81	Sn	11
Si (mg/g)	262	Sb	1.4
P (mg/g)	1.5	Cs	6.5
K (mg/g)	28	Ba	617
Ca (mg/g)	17	La	39
Ti (mg/g)	4.0	Ce	70
V	101	Eu	1.2
Mn (mg/g)	1.3	Tl	0.7
Fe (mg/g)	42	Th	15
Co	20	U	8.0
Ga	19		

CRM 280 (cont.)

Order information:

CRM 280 can be purchased for BFR5000 per unit (30 g). Price includes handling and normal postage and it is subject to change without notice. Please contact BCR at the address shown above.

References:

Community Bureau of Reference (BCR) (1988) BCR CRM 280, trace element in lake sediment. Certificate of analysis. Community Bureau of Reference, Commission of the European Communities, Directorate General for Science, Research and Development, 200 rue de la Loi, B-1049 Brussels, Belgium.

Community Bureau of Reference (BCR) (1992) Reference Materials. Community Bureau of Reference, Commission of the European Communities, Directorate General for Science, Research and Development, 200 rue de la Loi, B-1049 Brussels, Belgium. 75 pp.

CRM 320

Trace Elements in River Sediment

Source:

Community Bureau of Reference
Commission of the European Communities
Directorate General for Science
Research and Development
200 rue de la Loi
B-1049 Brussels
BELGIUM

Description:

This material consists lyophilized sediment from the river Toce. Information on aqua regia soluble concentrations and concentrations of additional elements is available in the report.

Certified concentrations (µg/g dry weight):

Element	Value	Uncertainty (±)	Element	Value	Uncertainty (±)
Sc	15.25	0.36	As	76.7	3.4
Cr	138	7	Se	0.214	0.034
Ni	75.2	1.4	Cd	0.533	0.026
Cu	44.1	1.0	Hg	1.03	0.13
Zn	142	3	Pb	42.3	1.6

Noncertified concentrations (µg/g dry weight unless noted):

Element	Value	Element	Value
Be	2.5	Ga	20
Na (mg/g)	20	Mo	0.6
Mg (mg/g)	20	Sn	6.0
Al (mg/g)	82	Sb	0.6
Si (mg/g)	278	Cs	5.0
P (mg/g)	1.1	Ba	531
K (mg/g)	25	La	46
Ca (mg/g)	22	Ce	95
Ti (mg/g)	5.0	Eu	1.5
V	105	Tl	0.5
Mn (mg/g)	0.8	Th	18
Fe (mg/g)	45	U	6
Co	19		

Order information:

CRM 320 can be purchased for BFR5000 per unit (40 g). Price includes handling and normal postage and it is subject to change without notice. Please contact BCR at the address shown above.

References:

Community Bureau of Reference (BCR) (1988) BCR CRM 320, trace element in river sediment. Certificate of analysis. Community Bureau of Reference, Commission of the European Communities, Directorate General for Science, Research and Development, 200 rue de la Loi, B-1049 Brussels, Belgium.

Community Bureau of Reference (BCR) (1992) Reference Materials. Community Bureau of Reference, Commission of the European Communities, Directorate General for Science, Research and Development, 200 rue de la Loi, B-1049 Brussels, Belgium. 75 pp.

CS-1, HS-1 and HS-2

Polychlorinated Biphenyls in Marine Sediments

Source:

National Research Council of Canada
Marine Analytical Chemistry Standards Program
Institute for Marine Biosciences
1411 Oxford Street
Halifax, Nova Scotia B3H 3Z1
CANADA

Description:

Sediment for CS-1 was collected in the Laurentian Channel midway between Nova Scotia and Newfoundland, Canada. The material is a clean carbonaceous clay. Sediment for HS-1 and HS-2 was collected in a Nova Scotia harbor in Canada. The material is an organic and sulfur rich sediment from an active harbor. The sediments were freeze-dried, homogenized in a modified cement mixer, and subsampled into solvent-rinsed quart-sized steel cans that contain about 200 g of material. A description of the preparation and analysis of these materials can be found in the NRCC description sheets (1982).

Certified concentrations (µg/kg):

CRM	Compound	Value	Uncertainty (±)
CS-1	PCB (as Aroclor 1254)	1.15	0.60
HS-1	PCB (as Aroclor 1254)	21.8	1.1
HS-2	PCB (as Aroclor 1254)	111.8	2.5

HS-1			HS-2		
Congener	Value	Uncertainty (±)	Congener	Value	Uncertainty (±)
101	1.62	0.21	101	5.42	0.34
138	1.98	0.28	138	6.92	0.52
151	0.48	0.08	151	1.37	0.07
153	2.27	0.28	153	6.15	0.67
170	0.27	0.05	170	1.07	0.15
180	1.17	0.15	180	3.70	0.33
194	0.23	0.04	194	0.61	0.07
196	0.45	0.04	196	1.13	0.12
199	0.57	0.07	199	1.39	0.09
209	0.33	0.10	209	0.90	0.14

Order information:

CS-1 can be purchased for US$150, and HS-1 and HS-2 for US$185 per unit (200-g can). Price subject to change without notice. Please contact NRCC at the address above.

Reference:

National Research Council Canada (1982) Marine sediments reference materials, polychlorinated biphenyls, description sheet. National Research Council Canada, Institute for Marine Biosciences, Halifax, Nova Scotia, Canada.

EC-1

Hamilton Harbour Sediment

Source:

National Water Research Institute
Canada Centre for Inland Waters
867 Lakeshore Road, P. O. Box 5050
Burlington, Ontario L7R 4A6
CANADA

Description:

The sediment used for EC-1 was obtained from a landfill site in Hamilton Bay, Ontario, located in the Great Lakes basin of Canada. The sediment was freeze dried, ground to < 200-mesh particle size, and subsampled into bottles.

Certified concentrations (μg/g dry weight):

Compound	Value	Uncertainty (±)	Compound	Value	Uncertainty (±)
Anthracene	1.2	0.6	Benzo[ghi]perylene	4.9	1.3
Benz[a]anthracene	8.7	1.6	Fluoranthene	23.2	4.1
Benzo[b]fluoranthene	7.9	1.8	Indeno[1,2,3-cd]pyrene	5.7	1.2
Benzo[k]fluoranthene	4.4	1.0	Phenanthrene	15.8	2.5
Benzo[a]pyrene	5.3	1.3	Pyrene	16.7	3.9
Benzo[e]pyrene	5.3	1.3	Total PCBs	2.00	0.15

Noncertified concentrations (μg/g dry weight):

Compound	Value	Uncertainty (±)
Chrysene/triphenylene	9.2	1.9
Dibenz[a,h]anthracene	1.3	0.4
Perylene	1.1	0.4

Order information:

EC-1 can be purchased for Canadian $250 per unit (10 g). Foreign purchasers will be charged an additional $50 per sample to cover shipping and handling charges. Price subject to change without notice. Please contact NWRI at the address shown above.

References:

Lee, H. - B., G. Dookhran, and A. S. Y. Chau (1987) Analytical reference materials. Part VI. Development and certification of a sediment reference material for selected polynuclear aromatic hydrocarbons. Analyst, 112:31-5.

Lee, H. - B., and A. S. Y. Chau (1987) Analytical reference materials. Part VII. Development and certification of a sediment reference material for total polychlorinated biphenyls. Analyst, 112:37-40.

National Water Research Institute (1990) Certified reference material EC-1, polychlorinated biphenyls in sediment. Certificate of Analysis, Research and Applications Branch, National Water Research Institute, Burlington, Ontario, Canada.

National Water Research Institute (1992) Certified reference material EC-1, polynuclear aromatic hydrocarbons in sediment. Certificate of Analysis, Research and Applications Branch, National Water Research Institute, Burlington, Ontario, Canada.

EC-2

Lake Ontario Sediment

Source:

National Water Research Institute
Canada Centre for Inland Waters
867 Lakeshore Road, P. O. Box 5050
Burlington, Ontario L7R 4A6
CANADA

Description:

The sediment used for EC-2 was obtained from Lake Ontario, near the Niagara River, North America. The sediment was freeze dried, ground to < 200-mesh particle size, and subsampled into bottles.

Certified concentrations:

Compound (ng/g)	Value	Uncertainty (±)	Compound (µg/g)	Value	Uncertainty (±)
1,2,3,4-Tetrachloro= benzene	36.5	4.8	Benz[a]anthracene	1.42	0.51
1,2,3,5-Tetrachloro= benzene	5.2	0.7	Benzo[b]fluoranthene	2.48	0.86
1,2,4,5-Tetrachloro= benzene	84.0	9.8	Benzo[k]fluoranthene	1.93	0.72
1,2,3-Trichlorobenzene	6.1	1.3	Benzo[ghi]perylene	1.47	0.65
1,2,4-Trichlorobenzene	80.7	5.2	Benzo[a]pyrene	1.21	0.56
1,3,5-Trichlorobenzene	34.3	10.8	Benzo[e]pyrene	1.91	0.72
1,2-Dichlorobenzene	18.1	2.5	Dibenz[a,h]anthracene	0.49	0.21
1,3-Dichlorobenzene	74.4	10.1	Fluoranthene	3.55	0.83
1,4-Dichlorobenzene	84.4	17.6	Indeno[1,2,3-cd]pyrene	1.55	0.53
Hexachlorobenzene	200.6	26.4	Pyrene	2.92	0.63
Hexachlorobutadiene	21.3	3.2			
Pentachlorobenzene	48.6	4.8			

Noncertified concentrations (µg/g dry weight unless noted):

Compound	Value	Uncertainty (±)	Compound	Value	Uncertainty (±)
Acenaphthylene	0.12	0.05	Perylene	0.80	0.51
Acenaphthene	0.20	0.08	Phenanthrene	1.41	0.31
Anthracene	0.11	0.05	Naphthalene	1.47	1.10
Chrysene/triphenylene	3.60	1.47	Total PCBs	1.16	0.15
Fluorene	2.14	0.80	Octachlorostyrene (ng/g)	30.6	9.2

EC-2 (cont.)

Order information:

EC-2 can be purchased for Canadian $250 per unit (10 g). Foreign purchasers will be charged an additional $50 per sample to cover shipping and handling charges. Price subject to change without notice. Please contact NWRI at the address shown above.

References:

Lee, H. - B., R. L. Hong-You, and A. S. Y. Chau (1986) Analytical reference materials. Part VI. Development of a sediment reference material for chlorobenzenes and hexachlorobutadiene. Analyst, 111:81-5.

Lee, H. - B., R. L. Hong-You, and A. S. Y. Chau (1987) Analytical reference materials. Part V. Development and certification of a sediment reference material for selected polynuclear aromatic hydrocarbons. Analyst, 112:31-5.

National Water Research Institute (1992) Certified reference material EC-2, polynuclear aromatic hydrocarbons in sediment. Certificate of Analysis, Research and Applications Branch, National Water Research Institute, Burlington, Ontario, Canada.

National Water Research Institute (1992) Certified reference material EC-2, polychlorinated biphenyls in sediment. Certificate of Analysis, Research and Applications Branch, National Water Research Institute, Burlington, Ontario, Canada.

National Water Research Institute (1992) Certified reference material EC-2, chlorobenzenes in sediment. Certificate of Analysis, Research and Applications Branch, National Water Research Institute, Burlington, Ontario, Canada.

EC-3

Niagara River Plume Sediment

Source:

National Water Research Institute
Canada Centre for Inland Waters
867 Lakeshore Road, P. O. Box 5050
Burlington, Ontario L7R 4A6
CANADA

Description:

The sediment used for EC-3 was obtained from the Niagara river plume, North America. The sediment was freeze dried, ground to < 200-mesh particle size, and subsampled into bottles.

Certified concentrations (ng/g dry weight):

Compound	Value	Uncertainty (±)	Compound	Value	Uncertainty (±)
Benzo[a]pyrene	386	100	1,2,3,4-Tetrachloroben=		
Benzo[e]pyrene	450	98	zene	44.3	10.2
Benz[a]anthracene	312	56	1,3,5-Trichlorobenzene	113.6	19.0
Fluoranthene	558	92	1,2,3-Trichlorobenzene	8.9	2.4
Phenanthrene	293	66	1,2-Dichlorobenzene	20.7	6.2
Pyrene	436	94	1,3-Dichlorobenzene	105.4	35.0
			Hexachlorobenzene	279.0	66.2
			Hexachlorobutadiene	61.3	13.8
			Pentachlorobenzene	65.4	16.4

Noncertified concentrations (ng/g dry weight):

Compound	Value	Uncertainty (±)	Compound	Value	Uncertainty (±)
1,2,3,5-Tetrachloroben=			Acenaphthylene	25	16
zene	13.6	2.6	Acenaphthene	22	18
1,2,4-Trichlorobenzene	141.2	27.4	Anthracene	59	22
1,4-Dichlorobenzene	108.2	23.6	Benzo[b]fluoranthene	505	176
1,2,4,5-Tetrachloroben=			Benzo[k]fluoranthene	271	208
zene	155.6	34.8	Benzo[ghi]perylene	348	140
Octachlorostyrene	41.0	12.4	Chrysene/triphenylene	458	118
Total PCBs	660	108	Dibenz[a,h]anthracene	109	34
			Fluorene	42	42
			Indeno[1,2,3-cd]=		
			pyrene	359	72
			Naphthalene	35	40
			Perylene	195	42

EC-3 (cont.)

Order information:

EC-3 can be purchased for Canadian $250 per unit (10 g). Foreign purchasers will be charged an additional $50 per sample to cover shipping and handling charges. Price subject to change without notice. Please contact NWRI at the address shown above.

References:

National Water Research Institute (1992) Certified reference material EC-3, chlorobenzenes in sediment. Certificate of Analysis, Research and Applications Branch, National Water Research Institute, Burlington, Ontario, Canada.

National Water Research Institute (1992) Certified reference material EC-3, polychlorinated biphenyls in sediment. Certificate of Analysis, Research and Applications Branch, National Water Research Institute, Burlington, Ontario, Canada.

National Water Research Institute (1992) Certified reference material EC-3, polynuclear aromatic hydrocarbons in sediment. Certificate of Analysis, Research and Applications Branch, National Water Research Institute, Burlington, Ontario, Canada.

EC-4

Toronto Harbour Sediment

Source:

National Water Research Institute
Canada Centre for Inland Waters
867 Lakeshore Road, P. O. Box 5050
Burlington, Ontario L7R 4A6
CANADA

Description:

The sediment used for EC-4 was obtained from the Toronto Harbour, North America. The sediment was freeze dried, ground to < 200-mesh particle size, and subsampled into bottles.

Noncertified concentrations (ng/g dry weight):

Compound	Value	Uncertainty (±)	Compound	Value	Uncertainty (±)
Acenaphthylene	47	24	1,2,3,4-Tetrachloroben-zene	1.6	0.8
Acenaphathene	33	18	1,2,3,5-Tetrachloroben-zene	0.34	0.36
Anthracene	121	30	1,2,4,5-Tetrachloroben-zene	2.4	1.8
Benz[a]anthracene	633	230	1,2,3-Trichlorobenzene	1.9	0.8
Benzo[b]fluoranthene	725	286	1,2,4-Trichlorobenzene	6.7	2.2
Benzo[k]fluoranthene	458	164	1,3,5-Trichlorobenzene	4.4	1.8
Benzo[a]pyrene	718	248	1,2-Dichlorobenzene	6.8	3.6
Benzo[e]pyrene	687	140	1,3-Dichlorobenzene	6.8	2.8
Benzo[ghi]perylene	533	202	Hexachlorobenzene	2.2	1.2
Chrysene/triphenylene	999	302	Hexachlorobutadiene	0.55	0.26
Dibenz[a,h]anthracene	222	180	Pentachlorobenzene	1.9	0.8
Fluoranthene	1076	248	Octachlorostyrene	1.04	0.50
Fluorene	83	64			
Indeno[1,2,3-cd]pyrene	510	166			
Naphthalene	63	28			
Perylene	266	86			
Phenanthrene	620	100			
Pyrene	1079	278			
Total PCBs	557	125			

Order information:

EC-4 can be purchased for Canadian $250 per unit (10 g). Foreign purchasers will be charged an additional $50 per sample to cover shipping and handling charges. Price subject to change without notice. Please contact NWRI at the address shown above.

EC-4 (cont.)

References:

National Water Research Institute (1992) Certified reference material EC-4, chlorobenzenes in sediment. Certificate of Analysis, Research and Applications Branch, National Water Research Institute, Burlington, Ontario, Canada.

National Water Research Institute (1992) Certified reference material EC-4, polychlorinated biphenyls in sediment. Certificate of Analysis, Research and Applications Branch, National Water Research Institute, Burlington, Ontario, Canada.

National Water Research Institute (1992) Certified reference material EC-4, polynuclear aromatic hydrocarbons in sediment. Certificate of Analysis, Research and Applications Branch, National Water Research Institute, Burlington, Ontario, Canada.

EC-5

Humber River Sediment

Source:

National Water Research Institute
Canada Centre for Inland Waters
867 Lakeshore Road, P. O. Box 5050
Burlington, Ontario L7R 4A6
CANADA

Description:

The sediment used for EC-5 was obtained from the Humber River, North America. The sediment was freeze dried, ground to < 200-mesh particle size, and subsampled into bottles.

Noncertified concentrations (ng/g dry weight):

Compound	Value	Uncertainty (±)	Compound	Value	Uncertainty (±)
Acenaphthylene	42	18	1,2,3,5-Tetrachloroben-zene	0.64	0.26
Acenaphathene	32	22			
Anthracene	109	36	1,2,4,5-Tetrachloroben-zene	3.3	1.0
Benz[a]anthracene	393	80			
Benzo[b]fluoranthene	424	146	1,2,3,4-Tetrachloroben-zene	2.5	0.6
Benzo[k]fluoranthene	227	72			
Benzo[a]pyrene	382	104	1,2,3-Trichlorobenzene	3.8	1.6
Benzo[e]pyrene	385	110	1,2,4-Trichlorobenzene	8.3	1.4
Benzo[ghi]perylene	272	88	1,3,5-Trichlorobenzene	6.8	2.6
Chrysene/triphenylene	510	100	1,2-Dichlorobenzene	7.4	5.0
Dibenz[a,h]anthracene	143	40	1,3-Dichlorobenzene	7.1	3.8
Fluoranthene	773	136	1,4-Dichlorobenzene	29.0	11.0
Fluorene	67	30	Hexachlorobenzene	2.4	0.4
Naphthalene	36	14	Hexachlorobutadiene	0.88	0.32
Indeno[1,2,3-cd]pyrene	283	82	Octachlorostyrene	0.89	0.22
Perylene	181	48	Pentachlorobenzene	2.2	0.6
Phenanthrene	483	74			
Pyrene	778	172			
Total PCBs (µg/g)	597	163			

Order information:

EC-5 can be purchased for Canadian $250 per unit (10 g). Foreign purchasers will be charged an additional $50 per sample to cover shipping and handling charges. Price subject to change without notice. Please contact NWRI at the address shown above.

EC-5 (cont.)

References:

National Water Research Institute (1992) Certified reference material EC-5, chlorobenzenes in sediment. Certificate of Analysis, Research and Applications Branch, National Water Research Institute, Burlington, Ontario, Canada.

National Water Research Institute (1992) Certified reference material EC-5, polynuclear aromatic hydrocarbons in sediment. Certificate of Analysis, Research and Applications Branch, National Water Research Institute, Burlington, Ontario, Canada.

National Water Research Institute (1992) Certified reference material EC-5, polychlorinated biphenyls in sediment. Certificate of Analysis, Research and Applications Branch, National Water Research Institute, Burlington, Ontario, Canada.

EC-6

Great Lakes Sediment

Source:

National Water Research Institute
Canada Centre for Inland Waters
867 Lakeshore Road, P. O. Box 5050
Burlington, Ontario L7R 4A6
CANADA

Description:

The sediments used for these CRMs were obtained from the Great Lakes Basin, North America. The sediment was freeze dried, ground to < 200-mesh particle size, and subsampled into bottles.

Noncertified concentrations (ng/g dry weight):

Compound	Value	Uncertainty (±)	Compound	Value	Uncertainty (±)
Acenaphthylene	14	6	1,2,3,4-Tetrachloroben-		
Acenaphathene	7	4	zene	0.4	-
Anthracene	35	12	1,2,4,5-Tetrachloroben-		
Benz[a]anthracene	206	22	zene	1.7	0.28
Benzo[b]fluoranthene	347	64	1,2,3-Trichlorobenzene	3.8	1.6
Benzo[k]fluoranthene	188	78	1,2,4-Trichlorobenzene	2.55	0.42
Benzo[a]pyrene	315	32	1,3,5-Trichlorobenzene	1.9	0.56
Benzo[ghi]perylene	211	22	Hexachlorobenzene	4.45	1.28
Chrysene/triphenylene	303	22	Hexachlorobutadiene	0.75	0.14
Dibenz[a,h]anthracene	46	14	Hexachloroethylene	0.8	-
Fluoranthene	338	6	Octachlorostyrene	3.15	1.00
Fluorene	17	8	Pentachlorobenzene	1.45	0.14
Naphthalene	69	32	Total PCBs	105	38
Indeno[1,2,3-cd]pyrene	197	6			
Phenanthrene	145	28			
Pyrene	376	6			

Order information:

EC-6 can be purchased for Canadian $250 per unit (10 g). Foreign purchasers will be charged an additional $50 per sample to cover shipping and handling charges. Price subject to change without notice. Please contact NWRI at the address shown above.

References:

National Water Research Institute (1990) Certified reference material EC-6, chlorobenzenes in sediment. Certificate of Analysis (draft), Research and Applications Branch, National Water Research Institute, Burlington, Ontario, Canada.

EC-6 (cont.)

National Water Research Institute (1990) Certified reference material EC-6, polychlorinated biphenyls in sediment. Certificate of Analysis (draft), Research and Applications Branch, National Water Research Institute, Burlington, Ontario, Canada.

National Water Research Institute (1990) Certified reference material EC-6, polynuclear aromatic hydrocarbons in sediment. Certificate of Analysis (draft), Research and Applications Branch, National Water Research Institute, Burlington, Ontario, Canada.

EC-7

Great Lakes Sediment

Source:

National Water Research Institute
Canada Centre for Inland Waters
867 Lakeshore Road, P. O. Box 5050
Burlington, Ontario L7R 4A6
CANADA

Description:

The sediments used for these CRMs were obtained from the Great Lakes Basin, North America. The sediment was freeze dried, ground to < 200-mesh particle size, and subsampled into bottles.

Noncertified concentrations (ng/g dry weight):

Compound	Value	Uncertainty (±)	Compound	Value	Uncertainty (±)
Acenaphthylene	19	2	1,2,3,4-Tetrachloroben-zene	0.9	0.3
Acenaphathene	3	2			
Anthracene	22	10	1,2,4,5-Tetrachloroben-zene	20.0	3.6
Benz[a]anthracene	125	6			
Benzo[b]fluoranthene	118	14	1,2,4-Trichlorobenzene	5.4	1.2
Benzo[k]fluoranthene	84	4	1,3,5-Trichlorobenzene	16.5	3.2
Benzo[a]pyrene	146	24	Hexachlorobenzene	59.7	12.4
Benzo[ghi]perylene	99	10	Hexachlorobutadiene	10.5	2.4
Chrysene/triphenylene	227	24	Hexachloroethylene	1.0	0.7
Dibenz[a,h]anthracene	34	12	Octachlorostyrene	18.8	6.2
Fluoranthene	225	22	Pentachlorobenzene	8.5	1.8
Fluorene	13	4			
Naphthalene	32	4			
Indeno[1,2,3-cd]pyrene	72	4			
Phenanthrene	187	16			
Pyrene	358	30			
Total PCBs	21	6			

Order information:

EC-7 can be purchased for Canadian $250 per unit (10 g). Foreign purchasers will be charged an additional $50 per sample to cover shipping and handling charges. Price subject to change without notice. Please contact NWRI at the address shown above.

References:

National Water Research Institute (1990) Certified reference material EC-7, chlorobenzenes in sediment. Certificate of Analysis (draft), Research and Applications Branch, National Water Research Institute, Burlington, Ontario, Canada.

National Water Research Institute (1990) Certified reference material EC-7, polychlorinated biphenyls in sediment. Certificate of Analysis (draft), Research and Applications Branch, National Water Research Institute, Burlington, Ontario, Canada.

National Water Research Institute (1990) Certified reference material EC-7, polynuclear aromatic hydrocarbons in sediment. Certificate of Analysis (draft), Research and Applications Branch, National Water Research Institute, Burlington, Ontario, Canada.

GBW 07309 - 07312

Stream Sediments

Source:

National Research Center for CRMs
Office of CRMs
No. 7 District 11
Hepingjie, Chaoyangqu
Beijing, 100013
CHINA

Description:

No information available.

Certified concentrations (μg/g dry weight unless noted):

	GBW 07309	GBW 07310	GBW 07311	GBW 07312
Component	Value	Value	Value	Value
Li	30	13.0	70.6	39.0
Be	1.8	0.9	26	8.2
B	54	26	68	24
Org. C (%)	-	-	-	0.4
F	494	149	1650	1250
Na_2O (%)	1.44	-	0.46	0.44
MgO (%)	2.39	0.12	0.62	0.47
Al_2O_3 (%)	10.58	2.84	10.37	9.3
SiO_2 (%)	64.89	88.89	76.25	77.29
P	670	271	255	235
S	150	90	170	940
Cl	-	-	290	-
K_2O (%)	1.99	0.125	3.28	2.91
CaO (%)	5.35	0.7	0.47	1.16
Sc	11.1	4.1	7.4	5.1
Ti	5500	1270	2100	1510
V	97	107	46.8	46.6
Cr	85	136	40	35
Mn	620	1013	2490	1400
Fe_2O_3	4.86	3.86	4.39	4.88
Co	14.4	15.3	8.5	8.8
Ni	32.3	30.2	14.3	12.8
Cu	32.1	22.6	78.6	1230
Zn	78	46	373	498
Ga	14.0	6.4	18.5	14.1
Ge	1.28	0.40	1.81	1.87
As	8.4	25	188	115
Se	0.16	0.28	0.20	0.25

GBW 07309 - 07312 (cont.)

	GBW 07309	GBW 07310	GBW 07311	GBW 07312
Component	Value	Value	Value	Value
Rb	80	9.2	408	270
Sr	166	25.3	29	24.4
Y	26.6	13.8	42.7	29.3
Zr	370	70	153	234
Nb	17.7	6.8	25	15.4
Mo	0.64	1.2	5.9	8.4
Ag	0.089	0.27	3.2	1.15
Cd	0.26	1.12	2.3	4.0
In	0.056	0.067	1.86	0.96
Sn	2.6	1.4	370	54
Sb	0.81	6.3	14.9	24.3
Te	-	-	-	0.29
I	-	1.6	2.0	1.8
Cs	5.1	2.3	17.4	7.9
Ba	430	42	260	206
La	40	13	30	32.7
Ce	78	38	58	61
Pr	9.2	3.2	7.4	6.9
Nd	34	11.8	27	25.6
Sm	6.3	2.4	6.2	5.0
Eu	1.33	0.47	0.60	0.61
Gd	5.5	2.25	5.9	4.4
Tb	0.87	0.42	1.13	0.82
Dy	5.1	2.2	7.2	4.8
Ho	0.96	0.45	1.4	0.94
Er	2.8	1.3	4.6	3.1
Tm	0.44	0.2	0.74	0.53
Yb	2.8	1.2	5.1	3.7
Lu	0.45	0.19	0.78	0.58
Hf	9.7	1.8	5.4	8.3
Ta	1.3	-	5.7	3.2
W	1.76	1.63	126	37.4
Hg (ng/g)	83	280	72	56
Tl	0.49	0.21	2.9	1.76
Pb	23	27	636	285
Bi	0.42	0.38	50	10.9
Th	12.4	5.0	23.3	21.4
U	2.6	2.1	9.1	7.8

Noncertified concentrations (μg/g dry weight unless noted):

	GBW 07309	GBW 07310	GBW 07311	GBW 07312
Component	Value	Value	Value	Value
Org. C (%)	0.47	0.40	0.24	0.40
Na_2O (%)	-	0.04	-	-
Cl	50	53	-	163
FeO (%)	1.52	0.24	0.34	1.19
Br	1.5	2.4	2.3	1.7
Te	0.04	0.09	0.38	-
I	0.61	-	-	-
Ta	-	0.52	-	-
Au (ng/g)	1.3	-	3.6	5.6

Order information:

These CRMs can be purchased for US$70 per unit (70 g). Price subject to change without notice. Please contact NRCCRM at the address above.

Reference:

National Research Center for CRMs (1992) Catalog of certified reference materials (addendum to catalog 1991). State Bureau of Technical Supervision, National Research Center for CRMs, Office of CRMs, Hepingjie, Chaoyangqu, Beijing, China. 11 pp.

GBW 07313

Marine Sediment

Source:

National Research Center for CRMs
Office of CRMs
No. 7 District 11
Hepingjie, Chaoyangqu
Beijing, 100013
CHINA

Description:

The material for this CRM was collected from the central part of the Pacific during the HY4-871 cruise of the R/V Haiyang of the Ministry of Geology and Mineral Resources. The sediment was air dried, crumbled to less than 5 mm pieces, mixed, oven dried at 60°C, ground to less than 0.08 mm particles, mixed, and packaged.

Certified concentrations (μg/g dry weight unless noted):

Component	Value	Uncertainty (±)	Component	Value	Uncertainty (±)
Li	60.0	1.5	Sr	267	15
B	125	9	Y	104	5
Na_2O (%)	4.81	0.05	Zr	177	10
MgO (%)	3.38	0.05	Mo	7.2	0.5
Al_2O_3 (%)	13.75	0.09	Sb	1.85	0.35
SiO_2 (%)	53.86	0.06	Cs	9.4	0.7
P_2O_5 (%)	0.45	0.01	Ba (%)	0.44	0.02
S (%)	0.31	0.02	La	67.8	2.9
Cl (%)	4.07	0.04	Ce	92	8
K_2O (%)	2.95	0.05	Pr	20.1	1.9
CaO	1.71	0.03	Nd	91.8	3.9
Sc	25.6	2.9	Sm	21.5	1.3
TiO_2 (%)	0.67	0.01	Eu	5.3	0.3
V	112	5	Gd	22.0	1.2
Cr	58.4	1.3	Tb	3.4	0.3
MnO (%)	0.43	0.01	Dy	19.9	1.8
Fe_2O_3 (%)	6.58	0.07	Ho	4.3	0.2
Co	76.7	1.2	Er	11	0.7
Ni	150	4	Yb	9.8	1.1
Cu	424	8	Lu	1.46	0.19
Zn	160	3	W	5.5	0.6
Ga	23.7	1.7	Pb	29.3	1.1
As	5.8	0.8	Tm	1.54	0.14
Rb	97.3	2.6	Th	13.9	1.1
			U	1.98	0.47

Noncertified concentrations (μg/g dry weight unless noted):

Component	Value
F (%)	0.13
Org. C (%)	0.25
FeO (%)	0.29
Nb	15.1

Order information:

GBW 07313 can be purchased for US$175 per unit (50 g). Price subject to change without notice. Please contact NRCCRM at the address above.

References:

Institute of Marine Geology (1990) Certificate of certified reference material. Marine sediment. Institute of Marine Geology, Ministry of Geology and Mineral Resources, Qingdao, China.

National Research Center for CRMs (1992) Catalog of certified reference materials (addendum to catalog 1991). State Bureau of Technical Supervision, National Research Center for CRMs, Office of CRMs, Hepingjie, Chaoyangqu, Beijing, China. 11 pp.

GBW 08301

River Sediment

Source:

National Research Center for CRMs
Office of CRMs
No. 7 District 11
Hepingjie, Chaoyangqu
Beijing, 100013
CHINA

Description:

No information available.

Certified concentrations (μg/g dry weight unless noted):

Component	Value	Component	Value
Cr	90	Se	0.39
Mn	975	Cd	2.45
Fe (%)	3.94	Ba	375
Co	16.5	Hg	0.22
Cu	53	Pb	79
As	56		

Noncertified concentrations (μg/g dry weight unless noted):

Component	Value
Be	3.5
V	96
Ni	32
Zn	251

Order information:

GBW 08302 can be purchased for US$50 per unit (100 g). Price subject to change without notice. Please contact NRCCRM at the address above.

Reference:

National Research Center for CRMs (1992) Catalog of certified reference materials (addendum to catalog 1991). State Bureau of Technical Supervision, National Research Center for CRMs, Office of CRMs, Hepingjie, Chaoyangqu, Beijing, China. 11 pp.

GSD-9

River Sediment

Source:

National Research Center for CRMs
Office of CRMs
No. 7 District 11
Hepingjie, Chaoyangqu
Beijing, 100013
CHINA

Description:

The material for this CRM is a river sediment collected on the margin of a sand bar in the Yangtse River, upstream from the city of Wuhan, Hubei, China.

Certified concentrations (μg/g dry weight unless noted):

Component	Value	Uncertainty (±)	Component	Value	Uncertainty (±)
Li	30	0.6	Zr	370	10
Be	1.8	0.1	Nb	17.7	0.8
B	54	3.6	Mo	0.64	0.05
F	494	15	Ag	0.089	0.006
Na_2O (%)	1.44	0.02	Cd	0.26	0.02
MgO (%)	2.39	0.03	In	0.056	0.005
Al_2O_3 (%)	10.58	0.05	Sn	2.6	0.2
SiO_2 (%)	64.89	0.06	Sb	0.81	0.08
P	670	11	Cs	5.1	0.5
S	150	20	Ba	430	8
K_2O (%)	1.99	0.03	La	40	1.3
CaO (%)	5.35	0.04	Ce	78	4
Sc	11.1	0.3	Pr	9.2	0.5
Ti	5500	70	Nd	34	1.3
V	97	2	Sm	6.3	0.2
Cr	85	2.7	Eu	1.33	0.04
Mn	620	8	Gd	5.5	0.2
Fe_2O_3 (%)	4.86	0.04	Tb	0.87	0.06
Co	14.4	0.4	Dy	5.1	0.2
Ni	32.3	0.8	Ho	0.96	0.04
Cu	32.1	0.6	Er	2.8	0.2
Zn	78	1.4	Yb	2.8	0.13
Ga	14.0	0.4	Lu	0.45	0.02
Ge	1.28	0.11	Hf	9.7	0.9
As	8.4	0.4	Ta	1.3	0.1
Se	0.16	0.03	W	1.76	0.1
Rb	80	1.5	Hg (ng/g)	83	6
Sr	166	4	Tl	0.49	0.05
Y	26.6	1.0	Pb	23	1
			Bi	0.42	0.02

GSD-9 (cont.)

Component	Value	Uncertainty (±)	Component	Value	Uncertainty (±)
Tm	0.44	0.05	U	2.6	0.3
Th	12.4	0.4			

Noncertified concentrations (μg/g dry weight unless noted):

Component	Value
Cl	50
Br	1.5
Te	0.04
I	0.61
Au (ng/g)	1.3

Order information:

No price information is available. Please contact NRCCRM at the address above.

Reference:

Institute of Geophysical and Geochemical Exploration (1986) Certificate of geochemical standard reference materials. Institute of Geophysical and Geochemical Exploration, Langfang, Hebei, China.

GSD-10

Stream Sediment

Source:

National Research Center for CRMs
Office of CRMs
No. 7 District 11
Hepingjie, Chaoyangqu
Beijing, 100013
CHINA

Description:

The material for this CRM was collected from a tributary stream in Yishan, Guangxi, China. The drainage basin rocks are carbonates.

Certified concentrations (μg/g dry weight unless noted):

Component	Value	Uncertainty (±)	Component	Value	Uncertainty (±)
Li	13.0	0.3	Nb	6.8	0.6
Be	0.9	0.1	Mo	1.2	0.05
B	26	2	Ag	0.27	0.010
F	149	14	Cd	1.12	0.05
MgO (%)	0.12	0.017	In	0.067	0.010
Al_2O_3 (%)	2.84	0.04	Sn	1.4	0.17
SiO_2 (%)	88.89	0.12	Sb	6.3	0.3
P	271	7	I	1.6	0.3
S	90	10	Cs	2.3	0.3
K_2O (%)	0.125	0.007	Ba	42	3
CaO (%)	0.70	0.015	La	13.0	0.5
Sc	4.1	0.2	Ce	38	2
Ti	1270	30	Pr	3.2	0.2
V	107	2	Nd	11.8	0.8
Cr	136	4	Sm	2.4	0.08
Mn	1013	11	Eu	0.47	0.02
Fe_2O_3 (%)	3.86	0.04	Gd	2.25	0.13
Co	15.3	0.4	Tb	0.42	0.05
Ni	30.2	0.6	Dy	2.2	0.14
Cu	22.6	0.6	Ho	0.45	0.04
Zn	46	1.3	Er	1.3	0.09
Ga	6.4	0.5	Yb	1.2	0.1
Ge	0.40	0.04	Lu	0.19	0.02
As	25	1	Hf	1.8	0.2
Se	0.28	0.03	W	1.63	0.13
Rb	9.2	0.8	Hg (ng/g)	280	18
Sr	25.3	1.2	Tl	0.21	0.03
Y	13.8	0.7	Pb	27	1
Zr	70	3	Bi	0.38	0.02
			Tm	0.20	0.02

GSD-10 (cont.)

Component	Value	Uncertainty (±)	Component	Value	Uncertainty (±)
Th	5.0	0.2	U	2.1	0.1

Noncertified concentrations (μg/g dry weight unless noted):

Component	Value
Na_2O (%)	0.04
Cl	53
Br	2.4
Te	0.09
Ta	0.52

Order information:

No price information is available. Please contact NRCCRM at the address above.

Reference:

Institute of Geophysical and Geochemical Exploration (1986) Certificate of geochemical standard reference materials. Institute of Geophysical and Geochemical Exploration, Langfang, Hebei, China.

GSD-11

Stream Sediment

Source:

National Research Center for CRMs
Office of CRMs
No. 7 District 11
Hepingjie, Chaoyangqu
Beijing, 100013
CHINA

Description:

The material for this CRM was collected from the Shizhuyuan ore field in Chenzhou, Hunan, China. The rocks of the drainage basin include biotite granite, carbonates and sandstone. Mineralization of W, Sn, Mo and Bi are known.

Certified concentrations (μg/g dry weight unless noted):

Component	Value	Uncertainty (±)
Li	70.6	0.9
Be	26	1
B	68	3
F	1650	49
Na_2O (%)	0.46	0.01
MgO (%)	0.62	0.03
Al_2O_3 (%)	10.37	0.05
SiO_2 (%)	76.25	0.10
P	255	13
S	170	20
Cl	290	17
K_2O (%)	3.28	0.03
CaO (%)	0.47	0.01
Sc	7.4	0.2
Ti	2100	40
V	46.8	1.2
Cr	40	1
Mn	2490	33
Fe_2O_3 (%)	4.39	0.04
Co	8.5	0.3
Ni	14.3	0.4
Cu	78.6	1.1
Zn	373	6
Ga	18.5	0.6
Ge	1.81	0.13
As	188	6
Se	0.20	0.03
Rb	408	6
Component	Value	Uncertainty (±)
Sr	29	1.4
Y	42.7	2.1
Zr	153	6
Nb	25	1
Mo	5.9	0.3
Ag	3.2	0.2
Cd	2.3	0.07
In	1.86	0.15
Sn	370	29
Sb	14.9	0.7
I	2.0	0.2
Cs	17.4	0.5
Ba	260	8
La	30	0.8
Ce	58	2
Pr	7.4	0.3
Nd	27	1
Sm	6.2	0.2
Eu	0.60	0.04
Gd	5.9	0.3
Tb	1.13	0.06
Dy	7.2	0.4
Ho	1.4	0.1
Er	4.6	0.3
Yb	5.1	0.3
Lu	0.78	0.04
Hf	5.4	0.3

GSD-11 (cont.)

Component	Value	Uncertainty (±)	Component	Value	Uncertainty (±)
Ta	5.7	0.3	Bi	50	2
W	126	4	Tm	0.74	0.06
Hg (ng/g)	72	6	Th	23.3	0.7
Tl	2.9	0.3	U	9.1	0.6
Pb	636	10			

Noncertified concentrations (μg/g dry weight unless noted):

Component	Value
Br	2.3
Te	0.38
Au (ng/g)	3.6

Order information:

No price information is available. Please contact NRCCRM at the address above.

Reference:

Institute of Geophysical and Geochemical Exploration (1986) Certificate of geochemical standard reference materials. Institute of Geophysical and Geochemical Exploration, Langfang, Hebei, China.

GSD-12

Stream Sediment

Source:

National Research Center for CRMs
Office of CRMs
No. 7 District 11
Hepingjie, Chaoyangqu
Beijing, 100013
CHINA

Description:

The material for this CRM was collected from a tributary of the Yangchun ore field, Guangdon, China. The rocks in the drainage basin include sandstone, shale, carbonates, granite and granodiorite. There is Cu, W and Sn mineralization in the area.

Certified concentrations (μg/g dry weight unless noted):

Component	Value	Uncertainty (±)	Component	Value	Uncertainty (±)
Li	39.0	0.6	Y	29.3	1.1
Be	8.2	0.3	Zr	234	8
B	24	1.3	Nb	15.4	0.5
F	1250	24	Mo	8.4	0.3
Na_2O (%)	0.44	0.01	Ag	1.15	0.06
MgO (%)	0.47	0.04	Cd	4.0	0.16
Al_2O_3 (%)	9.30	0.06	In	0.96	0.09
SiO_2 (%)	77.29	0.08	Sn	54	3
P	235	10	Sb	24.3	1.3
S	940	30	Te	0.29	0.05
K_2O (%)	2.91	0.02	I	1.8	0.2
CaO (%)	1.16	0.02	Cs	7.9	0.3
Sc	5.1	0.2	Ba	206	7
Ti	1510	0.18	La	32.7	0.8
V	46.6	1.4	Ce	61	2
Cr	35	1	Pr	6.9	0.7
Mn	1400	19	Nd	25.6	1.7
Fe_2O_3 (%)	4.88	0.04	Sm	5.0	0.2
Co	8.8	0.3	Eu	0.61	0.02
Ni	12.8	0.5	Gd	4.4	0.2
Cu	1230	14	Tb	0.82	0.04
Zn	498	8	Dy	4.8	0.1
Ga	14.1	0.3	Ho	0.94	0.05
Ge	1.87	0.08	Er	3.1	0.2
As	115	3	Yb	3.7	0.2
Se	0.25	0.02	Lu	0.58	0.04
Pb	270	5	Hf	8.3	0.6
Sr	24.4	1.3	Ta	3.2	0.2
			W	37.4	1.0

GSD-12 (cont.)

Component	Value	Uncertainty (±)	Component	Value	Uncertainty (±)
Hg (ng/g)	56	4	Tm	0.53	0.04
Tl	1.76	0.18	Th	21.4	0.7
Pb	285	5	U	7.8	0.4
Bi	10.9	0.5			

Noncertified concentrations (μg/g dry weight unless noted):

Component	Value
Cl	78
Te	0.051
Au (ng/g)	0.55

Order information:

No price information is available. Please contact NRCCRM at the address above.

Reference:

Institute of Geophysical and Geochemical Exploration (1986) Certificate of geochemical standard reference materials. Institute of Geophysical and Geochemical Exploration, Langfang, Hebei, China.

HR-1

Humber River Sediment

Source:

National Water Research Institute
Canada Centre for Inland Waters
867 Lakeshore Road, P. O. Box 5050
Burlington, Ontario L7R 4A6
CANADA

Description:

The sediment used for HR-1 was obtained from the Humber River, North America. The sediment was freeze dried, ground to < 200-mesh particle size, and subsampled into bottles.

Noncertified concentrations (μg/g unless noted):

Element	Value	Uncertainty	Element	Value	Uncertainty
Al (%)	5.94	3.68	Zn	1100	NA
V	73.35	42.4	As	(6.4 - 7.3)	
Mn	586	218	Se	(0.5 - 0.8)	
Fe (%)	3.19	0.72	Cd	3.80	3.28
Co	13.0	20.0	Hg	(0.25 - 0.45)	
Ni	540	205	Pb	143.5	108.6
Cu	81.0	28.1			

Order information:

This CRM can be purchased for Canadian $150 per unit (5 g). Foreign purchasers will be charged an additional $50 per sample to cover shipping and handling charges. Price subject to change without notice. Please contact NWRI at the address shown above.

References:

National Water Research Institute (1990) Certified reference material HR-1, trace metals in sediment. Certificate of Analysis (draft), Research and Applications Branch, National Water Research Institute, Burlington, Ontario, Canada.

HS-3 - HS-6

Polycyclic Aromatic Hydrocarbons in Marine Sediments

Source:

National Research Council of Canada
Marine Analytical Chemistry Standards Program
Institute for Marine Biosciences
1411 Oxford Street
Halifax, Nova Scotia B3H 3Z1
CANADA

Description:

Sediment was collected in four harbors in Nova Scotia, reflecting varying degrees of commercial and industrial activities. The sediments were freeze dried, sieved to pass a 125-µm sieve, homogenized in a modified cement mixer, and stored in solvent-rinsed pint-sized cans holding approximately 200 g of sediment.

Concentrations (µg/g dry weight):

Compound	Value	Uncertainty (±)	Value	Uncertainty (±)
	HS-3		HS-4	
Acenaphthene	4.5	1.5	0.15 *	
Acenaphthylene	0.3	0.1	0.15 *	
Anthracene	13.4	0.5	0.14	0.07
Benzo[a]pyrene	7.4	3.6	0.65	0.08
Benzo[b]fluoranthene	7.7	1.2	0.7	0.15
Benzo[ghi]perylene	5	2	0.58	0.22
Benzo[k]fluoranthene	2.8	2	0.36	0.05
Benz[a]anthracene	14.6	2	0.53	0.05
Chrysene	14.1	2	0.65	0.08
Dibenz[a,h]anthracene	1.3	0.5	0.12	0.05
Fluoranthene	60	9	1.25	0.1
Fluorene	13.6	3.1	0.15	
Indeno[1,2,3-cd]pyrene	5.4	1.3	0.51	0.15
Naphthalene	9	0.7	0.15 *	
Phenanthrene	85	20	0.68	0.08
Pyrene	39	9	0.94	0.12

* Amount present less than 0.15 µg/g.

HS-3 - HS-6 (cont.)

Compound	Value	Uncertainty (±)	Value	Uncertainty (±)
	HS-5		HS-6	
Acenaphthene	0.23	0.1	0.23	0.07
Acenaphthylene	0.15 *		0.19	0.05
Anthracene	0.38	0.15	1.1	0.4
Benzo[a]pyrene	1.7	0.8	2.2	0.4
Benzo[b]fluoranthene	2	1	2.8	0.6
Benzo[ghi]perylene	1.3	0.3	1.78	0.72
Benzo[k]fluoranthene	1	0.4	1.43	0.15
Benz[a]anthracene	2.9	1.2	1.8	0.3
Chrysene	2.8	0.9	2	0.3
Dibenz[a,h]anthracene	0.2	0.1	0.49	0.16
Fluoranthene	8.4	2.6	3.54	0.65
Fluorene	0.4	0.1	0.47	0.12
Indeno[1,2,3-cd]pyrene	1.3	0.7	1.95	0.58
Naphthalene	0.25	0.07	4.1	1.1
Phenanthrene	5.2	1	3	0.6
Pyrene	5.8	1.8	3	0.6

* Amount present less than 0.15 µg/g.

Order information:

These materials can be purchased for US$200 per unit (200 g). Price subject to change without notice. Please contact NRCC at the address above.

Reference:

National Research Council Canada (1981) Marine sediment reference materials, MESS-1 and BCSS-1, description sheet. National Research Council Canada, National Research Council Canada, Institute for Marine Biosciences, Halifax, Nova Scotia, Canada.

IAEA-313 - IAEA-314

Stream Sediments

Source:

International Atomic Energy Agency
Analytical Quality Control Service
Laboratory Seibersdorf
P.O. Box 100
A-1400 Vienna
AUSTRIA

Description:

The material for these SRMs was donated by the Indonesian Atomic Energy Commission.

Concentrations (µg/g) or activities (mBq/g):

	IAEA-313		IAEA-314	
Radionuclide	Activity	Range	Activity	Range
^{226}Ra	342	307 - 379	732	678 - 787
Element	Value	Range	Activity	Range
Th	77.1	74.8 - 79.4	17.8	16.8 - 18.8
U	18.2	17.0 - 19.3	56.8	52.9 - 60.7

Order information:

IAEA-313 and IAEA-314 can each be purchased for US$60 per unit (50 g). Price subject to change. The price includes handling, postage (surface mail in Europe, airmail elsewhere), and insurance. Please contact IAEA at the address shown above.

Reference:

International Atomic Energy Agency (1992) AQCS (Analytical Quality Control Services) Intercomparison Runs Reference Materials 1992. Catalog, 88 pp. International Atomic Energy Agency, Laboratory Seibersdorf, P.O. Box 100, A-1400 Vienna, Austria.

IAEA-357

Sediment from Coastal "Hot Spot"

Source:

International Atomic Energy Agency
Analytical Quality Control Service
Laboratory Seibersdorf
P. O. Box 100
A-1400 Vienna
AUSTRIA

Description:

Approximately 30 kg of sediment were collected from the Lagoon of Venice, Italy. The sediment was frozen, freeze dried, ground, passed through a 250 µm sieve, and homogenized. The material was packaged into glass bottles sealed with Teflon tape.

Recommended concentrations (ng/g dry weight):

Compound	Value	Uncertainty (±)	Compound	Value	Uncertainty (±)
Anthracene	2100	120	p,p'-DDT	35	12
Aroclor 1254	940	202	PCB 52	47	4
Benz[a]anthracene	7400	1200	PCB 101	73	6
Benzo[a]pyrene	6900	1000	PCB 138	74	16
Benzo[e]pyrene	6100	3300	PCB 170	15	5.2
Benzo[ghi]perylene	5200	1000	Phenanthrene	10400	750
Chrysene	8900	1500	Phytane	720	280
HCB	2.4	0.7	Pyrene	15100	2700
Heptachlor	1.5	0.6	Resolved aromatics		
Indeno[1,2,3-cd]=			(µg/g)	130	27
pyrene	4900	600	Sigma alkanes		
p,p'-DDD	30	6	C14-34	14200	5100
p,p'-DDE	25	7			

Information values only (ng/g dry weight):

Compound	Value	Uncertainty (±)	Compound	Value	Uncertainty (±)
Dibenz[a,h]=			PCB 156	10	3.6
anthracene	940	220	PCB 180	27	6
Fluorene	1300	580	PCB 194	5.5	2.7
o,p'-DDD	9.2	2.5	Resolved aromatics		
PCB 28	14	4	(µg/g)	33	18
PCB 44	22	4	Total aromatics		
PCB 105	29	6	(µg/g)	130	27
PCB 118	92	19	UVF ROPME		
PCB 128	15	1	equivalent (µg/g)	4400	1400
PCB 153	64	11			

Order Information:

IAEA-357 can be purchased for US$80 per unit (35 g). Price subject to change. The price includes handling, postage (surface mail in Europe, airmail elsewhere), and insurance. Please contact IAEA at the address shown above.

References:

International Atomic Energy Agency (1990) IAEA-357, sediment for chlorinated and petroleum hydrocarbons. Reference sheet. International Atomic Energy Agency, 19, av. des Castellans, MC-98000, Monaco.

International Atomic Energy Agency (1991) Analytical Quality control Service Programme. Intercomparison runs, certified reference materials, reference materials. 1991. International Atomic Energy Agency, Laboratory Seibersdorf, P.O. Box 100, A-1400 Vienna, Austria. 91 pp.

Villeneuve, J. - P., and L. D. Mee (1992) World-wide and regional intercomparison for the determination of organochlorine compounds and petroleum hydrocarbons in sediment sample IAEA-357. IAEA Report 51. IAEA/MEL, B. P. no. 800., MC-98012, Monaco. 53 pp.

IAEA-367

Sediment from the Pacific Ocean

Source:

International Atomic Energy Agency
Analytical Quality Control Service
Laboratory Seibersdorf
P. O. Box 100
A-1400 Vienna
AUSTRIA

Description:

The material for IAEA-367 was collected by the Lawrence Livermore National Laboratory, USA, at the Enewetak Atoll, Marshall Islands, Pacific Ocean. The sample was dried, ground and homogenized.

Recommended activities (mBq/g):

Radionuclide	Value	Range
^{60}Co	1	0.9 - 1.3
^{90}Sr	102	62 - 129
^{137}Cs	195	190 - 201
$^{239+240}Pu$	38	34.4 - 39.8

Information only activities (from Reference sheet, 1991) (mBq/g):

Radionuclide	Value	Range	Radionuclide	Value	Range
^{40}K	5.2		^{235}U	1..6	
^{155}Eu	1.6	0.9 - 2.2	^{238}U	20.3	
^{226}Ra	10.7		^{238}Pu	0.08	
^{228}Th	0.2		^{241}Am	26.4	24 - 27.7
^{230}Th	19		^{241}Pu	170	154 - 190
^{234}U	24				

Order Information:

IAEA-367 can be purchased for US$60 per unit (100 g). Price subject to change. The price includes handling, postage (surface mail in Europe, airmail elsewhere), and insurance. Please contact IAEA at the address shown above.

References:

International Atomic Energy Agency (1991) IAEA-367 sediment. Reference sheet. International Atomic Energy Agency, 19, av. des Castellans, MC-98000, Monaco.

IAEA-367 (cont.)

International Atomic Energy Agency (1992) AQCS (Analytical Quality Control Services) Intercomparison Runs Reference Materials 1992. Catalog, 88 pp. International Atomic Energy Agency, Laboratory Seibersdorf, P.O. Box 100, A-1400 Vienna, Austria.

IAEA-368

Sediment from the Pacific Ocean

Source:

International Atomic Energy Agency
Analytical Quality Control Service
Laboratory Seibersdorf
P. O. Box 100
A-1400 Vienna
AUSTRIA

Description:

The material for IAEA-368 was collected by the Service Mixte de Sécurité Radiologique of the Commissariat à l'Energie Atomique, Montléry, France, and the Direction des Applications Militaires of the Ministère de la Défense, France, at the Mururoa Atoll in the Pacific Ocean. The sample was dried, ground and homogenized.

Recommended activities (mBq/g):

Radionuclide	Value	Range			Radionuclide	Value	Range		
^{60}Co	0.6	0.5	-	0.7	^{238}U	31	25	-	33
^{155}Eu	3.8	3.4	-	4.3	^{238}Pu	8.5	7.6	-	8.9
^{210}Pb	23.2	19.8	-	27.2	$^{239+240}$Pu	31	29	-	34
^{226}Ra	21.4	20.3	-	22.6					

Information only activities (from Reference sheet, 1991) (mBq/g):

Radionuclide	Value	Range			Radionuclide	Value	Range		
^{40}K	5.4	5	-	8	^{232}Th	0.3	0.06	-	2.30
^{90}Sr	1.8	0.45	-	6.9	^{234}U	35.7	21.5	-	44.8
^{137}Cs	0.34	0.2	-	0.44	^{235}U	1.9	1.6	-	2.6
^{228}Th	1	0	-	2	^{241}Am	1.3	1.2	-	1.5
^{230}Th	26.7								

Order Information:

IAEA-368 can be purchased for US$60 per unit (100 g). Price subject to change. The price includes handling, postage (surface mail in Europe, airmail elsewhere), and insurance. Please contact IAEA at the address shown above.

References:

International Atomic Energy Agency (1991) IAEA-368 sediment. Reference sheet. International Atomic Energy Agency, 19, av. des Castellans, MC-98000, Monaco.

IAEA-368 (cont.)

International Atomic Energy Agency (1992) AQCS (Analytical Quality Control Services) Intercomparison Runs Reference Materials 1992. Catalog, 88 pp. International Atomic Energy Agency, Laboratory Seibersdorf, P.O. Box 100, A-1400 Vienna, Austria.

LKSD-1 - LKSD-4

Lake Sediments

Source:

Canada Centre for Mineral and Energy Technology
555 Booth Street
Ottawa K1A 0G1
CANADA

Description:

LKSD-1 through LKSD-4 are typical lake sediments from the Canadian Shield. The collections were carried out by the Geological Survey of Canada using various dredges and other sampling devices, normally from the center of the lake bottom. LKSD-1 is a mixture of sediments from Joe Lake and Brady Lake, Ontario; LKSD-2, from Calabogie Lake in Ontario, and two locations in the North West Territory; LKSD-3, from Calabogie Lake, a composite from two locations in Manitoba, and a composite of 6 other locations in Ontario; and LKSD-4, from Big Gull Lake in Ontario, and Key and Sea Horse Lakes in Saskatchewan. Thirty-five laboratories provided analytical data and provisionally recommended values. These sediment materials are available as a set of four.

Provisional values:

	LKSD-1	LKSD-2	LKSD-3	LKSD-4
Oxide (percent)	Value	Value	Value	Value
Na_2O	2.0	1.9	2.3	0.7
MgO	1.7	1.7	2.0	0.9
Al_2O_3	7.8	12.3	12.5	5.9
SiO_2	40.1	58.9	58.5	41.6
P_2O_5	0.2	0.3	0.2	0.3
K_2O	1.1	2.6	2.2	0.8
CaO	10.8	2.2	2.3	1.8
TiO_2	0.5	0.6	0.5	0.4
MnO	0.1	0.3	0.2	0.1
Fe_2O_3	4.1	6.2	5.7	4.1

Total elements (µg/g unless noted)

Element	Value	Value	Value	Value
Li	7	20	25	12
Be	1.1	2.5	1.9	1.0
B	49	65	25	22
C (%)	12.3	4.5	4.5	17.7
F	300	590	490	260
S (%)	1.57	0.14	0.14	0.99
Sc	9	13	13	7

LKSD-1 through LKSD-4 (cont.)

Total elements (μg/g unless noted)

Element	Value	Value	Value	Value
Ti	3010	3460	3330	2270
V	50	77	82	49
Cr	31	57	87	33
Mn	700	2020	1440	500
Fe (%)	2.8	4.3	4.0	2.8
Co	11	17	30	11
Ni	16	26	47	31
Cu	44	37	35	31
Zn	331	209	152	194
As	40	11	27	16
Br	11	18	16	49
Rb	24	85	78	28
Sr	250	220	240	110
Y	19	44	30	23
Zr	134	254	178	105
Nb	7	8	8	9
Mo	10	<5	<5	<5
Ag	0.6	0.8	2.7	<0.5
Sn	16	5	3	5
Sb	1.2	1.1	1.3	1.7
Cs	1.5	3.0	2.3	1.7
Ba	430	780	680	330
La	16	68	52	26
Ce	27	108	90	48
Nd	16	58	44	25
Sm	4	11	8	5
Eu	0.9	1.9	1.5	1.1
Tb	0.6	1.4	1.0	1.2
Dy	3.4	7.3	4.9	3.7
Yb	2.0	4.0	2.7	2.0
Lu	0.4	0.6	0.4	0.5
Hf	3.6	7.0	4.8	2.8
Ta	0.3	0.8	0.7	0.4
W	<4	<4	<4	<4
Au (ng/g)	5	3	3	2
Pb	82	44	29	91
Th	2.2	13.4	11.4	5.1
U	9.7	7.6	4.6	31.0

Elements by extraction using concentrated HNO_3 and HCl (μg/g unless noted):

Element	Value	Value	Value	Value
V	27	48	55	32
Cr	12	29	51	21
Mn	460	1840	1220	430
Fe (%)	1.8	3.5	3.5	2.7
Co	9	17	30	11
Ni	11	23	44	32
Cu	44	36	34	30

LKSD-1 through LKSD-4 (cont.)

Elements by extraction using concentrated HNO_3 and HCl (µg/g unless noted):

Element	Value	Value	Value	Value
Zn	337	200	139	189
As	30	9	23	12
Mo	12	2	2	2
Ag	0.6	0.8	2.4	0.2
Cd	1.2	0.8	0.6	1.9
Sb	1.2	1.2	1.4	1.5
Hg (ng/g)	110	160	290	190
Pb	84	40	26	93

Elements by extraction using dilute HNO_3 and HCl (µg/g unless noted):

Element	Value	Value	Value	Value
Mn	410	1840	1300	420
Fe (%)	1.8	3.7	3.6	2.6
Co	8	16	30	9
Ni	12	23	46	31
Cu	44	36	34	31
Zn	335	205	151	195
Ag	0.6	0.8	2.8	0.2
Cd	1.2	0.6	0.4	1.9
Pb	83	34	21	91

Order information:

These sediments are packaged in bottles containing 100 g of each material and can be purchased for Canadian $325 per set. Price subject to change without notice. Please contact CANMET at the address shown above.

Reference:

Bowman, W. S. (1990) Certified reference materials. CCRMP 90-1E. Canada Centre for Mineral and Energy Technology, Ottawa, Canada. 65 pp.

MAG-1

Marine Sediment

Source:

US Geological Survey
Branch of Geochemistry
P. O. Box 25046 MS 973
Denver, CO 80225
USA

Description:

MAG-1 is a fine-grained gray-brown clayey mud from the Wilkinson Basin of the Gulf of Maine, USA. The sample was obtained using a 125-liter Campbell grab sampler from a depth of 282 m at 42° 34.6' N, 69° 32.6' W from the research vessel GOSNOLD. This mud has a very low carbonate content. More than 60% of the sediment weight was seawater of 33-34 ‰ salinity, resulting in approximately 4% evaporate sea water salts in the final material. A more complete description of MAG-1, including mineralogical information, can be found in Manheim *et al.* (1976). MAG-1 is not a certified reference material. Values for elemental concentrations have been calculated by Abbey (1982, 1983), Gladney and Goode (1981) and Gladney and Roelandts (1988) using the results of various analysts. Those calculated by Gladney and Roelandts (1988) are listed below.

Best available concentrations (µg/g dry weight unless noted):

Element	Mean	Uncertainty (±)	Number of values	Element	Mean	Uncertainty (±)	Number of values
H	8660	-	2	Fe (%)	4.75	0.21	22
Li	79	4	8	Co	20.4	1.6	19
Be	3.2	0.4	9	Ni	53	8	21
B	136	6	13	Cu	30	3	17
C	21500	4000	4	Zn	130	6	17
N	800	-	1	Ga	20.4	1.5	5
O (%)	46.10	-	2	Ge	<1	-	-
F	770	80	10	As	9.2	1.2	11
Na (%)	2.84	0.08	16	Se (ng/g)	1160	120	8
Mg (%)	1.81	0.06	16	Br	252	66	4
Al (%)	8.66	0.16	20	Rb	149	6	13
Si (%)	23.52	0.45	17	Sr	146	15	19
P	710	90	12	Y	28	3	15
S	3900	660	12	Zr	126	13	14
Cl	31000	600	11	Nb	12	2	7
K (%)	2.95	0.14	19	Mo	1.6	0.6	8
Ca (%)	0.98	0.07	21	Ru	<0.46	-	-
Sc	17.2	1.0	18	Rh (ng/g)	<0.1	-	-
Ti	4500	400	19	Pd (ng/g)	1.7	0.8	3
V	140	6	16	Ag (ng/g)	80	21	4
Cr	97	8	18	Cd (ng/g)	202	29	7
Mn	760	70	23	In (ng/g)	180	-	1

MAG-1 (cont.)

Element	Mean	Uncertainty (±)	Number of values	Element	Mean	Uncertainty (±)	Number of values
Sn	3.6	1.0	9	Tm (ng/g)	429	23	9
Sb	0.96	0.10	13	Yb	2.61	0.27	22
Te (ng/g)	66	-	1	Lu (ng/g)	400	40	10
I	380	-	1	Hf	3.7	0.5	12
Cs	8.6	0.7	12	Ta	1.11	0.22	11
Ba	479	41	20	W	1.4	0.2	5
La	43	4	21	Re	<10	-	-
Ce	88	9	20	Os	<22	-	-
Pr	9.3	1.3	8	Ir	<6.8	-	-
Nd	38	5	22	Pt (ng/g)	1.0	-	1
Sm	7.5	0.6	21	Au (ng/g)	2.4	0.6	5
Eu	1.55	0.14	20	Hg (ng/g)	17.9	-	1
Gd	5.8	0.7	16	Tl (ng/g)	590	-	2
Tb	0.96	0.09	12	Pb	24	3	15
Dy	5.2	0.3	11	Bi (ng/g)	340	80	7
Ho	1.02	0.10	8	Th	11.9	1.0	13
Er	3.0	0.5	9	U	2.7	0.3	10

Major and minor oxide concentrations (%):

Component	Mean	Uncertainty (±)	Number of values	Component	Mean	Uncertainty (±)	Number of values
H_2O^+	5.6	1.1	3	K_2O	3.55	0.17	19
H_2O^-	2.39	0.16	3	CaO	1.37	0.10	21
CO_2	7.88	1.45	4	TiO_2	0.751	0.067	19
Na_2O	3.83	0.11	16	MnO	0.098	0.009	23
MgO	3.00	0.10	16	FeO	3.06	0.42	6
Al_2O_3	16.37	0.3	20	Fe_2O_3	3.49	0.64	5
SiO_2	50.36	0.96	17	Cl	3.10	0.06	11
P_2O_5	0.163	0.021	12	F	0.077	0.008	10
				S	0.39	0.07	12

Order information:

MAG-1 is available free of charge from the US Geological Survey. Please contact Dr. S. Wilson at the address above.

References:

Abbey, S. (1982) An evaluation of USGS III. Geostand. Newsletter, 6(1):47-76.

Abbey, S. (1983) Studies in "standard samples" of silicate rocks and minerals 1969-1982. Paper 83-15, 114 pp. Geological Survey of Canada, Canadian Government Publishing Centre, Supply and Services Canada, Hull, Quebec, Canada.

Gladney, E. S., and W. E. Goode (1981) Elemental concentrations in eight new United States Geological Survey rock standards: a review. Geostand. Newsletter, 5(1):31-64.

Gladney, E. S., and I. Roelandts (1988) 1987 Compilation of elemental concentration data for USGS BHVO-1, MAG-1, QLO-1, RGM-1, SCo-1, SDC-1, SGR-1 and STM-1. Geostand. Newsletter, 12(2):253-362.

Manheim, F. T., J. C. Hathaway, F. J. Flanagan, and J. D. Fletcher (1976) Marine mud, MAG-1, from the Gulf of Maine. In: F. J. Flanagan (ed.), Description and analyses of eight new USGS rock standards, USGS Prof. paper 840, pp. 25-28. US Government Printing Office, Washington, DC, USA.

NIES 2

Pond Sediment

Source:

National Institute for Environmental Studies
Yatabe-machi
Tsukuba, Ibaraki, 305
JAPAN

Description:

The sediment used for this material was collected in 1977 from the surface layers of the bottom of Sanshiro Pond located within the grounds of the University of Tokyo. The sediment was sieved through a nylon sieve (2 mm) to remove gravel and leaves, filtered under suction with a Buchner funnel to remove the interstitial water, and air-dried on filter paper for two weeks. The dried sediment was ball-milled, sieved to pass through a 200-mesh sieve, homogenized and packaged in acid-washed glass bottles. The bottled samples were radiation sterilized. A complete mineralogical description of NIES No. 2 can be found in Iwata *et al.* (1983a and b).

Certified concentrations (μg/g dry weight unless noted):

Element	Value	Uncertainty (±)	Element	Value	Uncertainty (±)
Na (%)	0.57	0.04	Ni	40	3
Al (%)	10.6	0.5	Cu	210	12
K (%)	0.68	0.06	Zn	343	17
Ca (%)	0.81	0.06	As	12	2
Fe (%)	6.53	0.35	Cd	0.82	0.06
Cr	75	5	Pb	105	6
Co	27	3			

Noncertified concentrations (μg/g dry weight unless noted):

Element	Value	Element	Value
Si (%)	21	Br	17
P (%)	0.14	Rb	42
Ti (%)	0.64	Sr	110
Sc	28	Sb	2.0
V	250	La	17
Mn	770	Hg	1.3

Order information:

NIES No. 2 (20-g bottles) can be obtained free of charge. Please contact Dr. K. Okamoto at the address shown above.

NIES 2 (cont.)

References:

Iwata, Y., H. Haraguchi, J. C. Van Loon, and K. Fuwa (1983a) Mineralogical characterization of the reference material of "pond sediment." Bull. Chem. Soc. Japan, 56(2):434-8.

Iwata, Y., K. Matsumoto, H. Haraguchi, K. Notsu, K. Okamoto and K. Fuwa (1983b) Preparation and evaluation of certified reference "pond sediment (NIES no. 2)." Quarterly J. Plasma Spec., 3(2):72-85.

National Institute for Environmental Studies (1991) NIES certified material, pond sediment. Information sheet. National Institute for Environmental Studies, Yatabe-machi,Tsukuba, Ibaraki, 305, Japan.

SARM 46 through 52

Stream Sediments

Source:

South Africa Bureau of Standards
Private Bag X191
Pretoria, Transvaal 0001
REPUBLIC OF SOUTH AFRICA

Description:

Orders of magnitude for As, Ga, Se, W, Au, Br, Cs, Eu, Hf, La, Lu, Sc, Sm, Ta, Tb, Yb and Sb are available from SABS. No further information available.

Certified concentrations (µg/g dry weight unless noted):

	SARM 46	SARM 51	SARM 52
Element	Value	Value	Value
Na_2O (%)	0.28	0.07	-
MgO (%)	3.16	0.92	0.60
SiO_2 (%)	35.90	33.81	57.81
Al_2O_3 (%)	6.71	11.87	9.38
P_2O_5 (%)	0.11	0.21	0.09
K_2O (%)	0.35	0.33	0.25
CaO (%)	1.32	0.86	0.37
TiO_2 (%)	0.60	0.82	1.30
V	225	181	346
Cr	559	509	-
Cr_2O_3 (%)	-	-	0.19
Fe_2O_3 (%)	28.16	18.36	19.71
Co	56	60	81
Ni	-	178	182
Cu	566	268	219
Zn	5900	2200	264
Sr	25	44	25
Y	-	21	20
Zr	101	121	250
Nb	-	-	11
Rb	-	37	20
Pb	-	5200	1200

Noncertified concentrations (µg/g dry weight unless noted):

	SARM 46	SARM 51	SARM 52
Component	Value	Value	Value
Na_2O (%)	-	-	0.1
S (%)	0.17	0.24	0.02
FeO (%)	18.0	3.0	4.0
Ni	125	-	-
Ga	-	20	15
Mo	10	-	-
Y	20	-	-
Nb	-	9	-
Rb	20	-	-
Pb	1.3	-	-
Ba	180	335	410
Ce	110	120	210
Th	-	10	11

Order information:

These CRMs can be purchased for US$50 per unit (100 g). Price subject to change. Please contact SABS at the address shown above.

Reference:

South African Committee for Certified Reference Materials (1992) Catalogue of certified reference materials. South Africa Bureau of Standards, Private Bag X191, Pretoria, Transvaal 0001, South Africa. 36 pp.

SD-M-2/TM

Marine Sediment

Source:

International Atomic Energy Agency
Analytical Quality Control Service
Laboratory Seibersdorf
P. O. Box 100
A-1400 Vienna
AUSTRIA

Description:

Approximately 80 g of sediment were collected, freeze dried, ground, passed through a 150 µm sieve, and homogenized. The material was packaged into acid cleaned glass bottles with plastic screw caps. This material was produced in cooperation with the Regional Seas Programme of UNEP.

Recommended values (µg/g dry weight unless noted):

Element	Value	Range	Element	Value	Range
Na (mg/g)	13.5	11.8 - 14.3	Cd	0.113	0.108 - 0.149
Al (mg/g)	32.0	15.6 - 55.4	Sb	0.99	0.92 - 1.25
K	17.6	15.0 - 19.2	Cs	8.05	6.30 - 8.87
Ca (mg/g)	112	64 - 134	Ba	252	231 - 310
Sc	10.3	9.9 - 11.4	La	26.2	24.0 - 28.4
V	91.2	72.5 - 97.8	Ce	54.3	47.2 - 55.8
Mn (mg/g)	1.17	1.10 - 1.19	Nd	24.6	18.9 - 39.4
Fe (mg/g)	27.1	25.0 - 28.5	Sm	4.27	3.28 - 4.90
Co	13.6	13.1 - 14.2	Eu	0.85	0.79 - 1.19
Ni	56.1	53.3 - 58.5	Tb	0.52	0.48 - 0.58
Cu	32.7	31.7 - 34.2	Yb	1.62	1.41 - 1.92
Zn	74.8	72.0 - 78.3	Lu	0.243	0.186 - 0.320
As	18.3	17.4 - 19.3	Hf	2.83	2.60 - 3.55
Br	65.7	57.4 - 78.0	Hg	0.054	0.046 - 0.064
Rb	99.7	90 - 119	Pb	22.8	20.1 - 25.6
Sr	540	510 - 568	Th	8.15	7.20 - 9.10
Zr	110	53 - 197	U	2.49	1.44 - 3.50

Order Information:

SD-M-2/TM can be purchased for US$60 per unit (25 g). Price subject to change. The price includes handling, postage (surface mail in Europe, airmail elsewhere), and insurance. Please contact IAEA at the address shown above.

SD-M-2/TM (cont.)

References:

International Atomic Energy Agency (1990) SD-M-2, trace elements in marine sediment. Reference sheet. International Atomic Energy Agency, 19, av. des Castellans, MC-98000, Monaco.

International Atomic Energy Agency (1992) AQCS (Analytical Quality Control Services) Intercomparison Runs Reference Materials 1992. Catalog, 88 pp. International Atomic Energy Agency, Laboratory Seibersdorf, P.O. Box 100, A-1400 Vienna, Austria.

SD-N-2

Marine Sediment

Source:

International Atomic Energy Agency
Analytical Quality Control Service
Laboratory Seibersdorf
P.O. Box 100
A-1400 Vienna
AUSTRIA

Description:

No information available.

Recommended activities (mBq/g):

Radionuclide	Activity	Range
^{40}K	220	189 - 226
^{137}Cs	0.8	0.5 - 1.0
^{232}Th	4.9	4.5 - 5.4

Order information:

SD-N-2 can be purchased for US$110 per unit (5 g). Price subject to change. The price includes handling, postage (surface mail in Europe, airmail elsewhere), and insurance. Please contact IAEA at the address shown above.

Reference:

International Atomic Energy Agency (1992) AQCS (Analytical Quality Control Services) Intercomparison Runs Reference Materials 1992. Catalog, 88 pp. International Atomic Energy Agency, Laboratory Seibersdorf, P.O. Box 100, A-1400 Vienna, Austria.

SES-1

Estuarine Sediment Research Material for Polycyclic Aromatic Hydrocarbons

Source:

National Research Council of Canada
Marine Analytical Chemistry Standards Program
Institute for Marine Biosciences
1411 Oxford Street
Halifax, Nova Scotia B3H 3Z1
CANADA

Description:

SES-1 is a spiked natural estuarine sediment. The sediment was collected in the estuary of a Nova Scotia river, at a site free of commercial or industrial activity. The sediment was freeze dried, sieved to pass a 125-μm sieve and homogenized in a modified cement mixer. A subsample was taken and spiked with a solution of polycyclic aromatic hydrocarbons. The subsample was then returned to the bulk sample and homogenized. The material was stored in solvent-rinsed pint-sized cans holding approximately 200 g of sediment. The material was characterized by Soxhlet extraction with either hexane or dichloromethane and the concentrations of polycyclic aromatic hydrocarbons determined. No differences were observed between results obtained using the two different extraction solvents when analyzed by the same technique. Biases between different analytical techniques were apparent.

Average concentrations (μg/g dry weight):

Compound	Analytical technique				
	Spike	HPLC/ FL	HPLC/ MS	GC/MS	GC/FID
Acenaphthene	7.21	2.9	0.69	0.59	0.67
Anthracene	1.63	0.9	0.02	0.02	0.06
Benz[a]anthracene	1.31	0.8	0.68	0.5	1.00
Benzo[a]pyrene	1.21	0.8	0.29	0.15	0.34
Benzo[b]fluoranthene	1.42	1.2	1.46	-	-
Benzo[k]fluoranthene	1.26	1.0	1.27	-	-
Benzo[ghi]perylene	1.21	0.8	1.39	0.69	1.10
Chrysene	1.32	1.4	1.14	1.1	1.19

SES-1 (cont.)

Compound	Analytical technique			
	Spike	HPLC/ FL	HPLC/ MS	GC/MS	GC/FID
Dibenz[a,h]anthracene	1.30	1.0	1.04	0.6	0.94
Fluoranthene	1.58	1.1	1.94	1.35	1.40
Fluorene	1.42	1.6	0.64	0.55	0.57
Indeno[1,2,3-cd]pyrene	1.28	1.0	1.42	0.8	1.20
Naphthalene	3.62	1.6	2.16	1.7	0.57
Phenanthrene	1.37	1.0	1.47	1.05	1.14
Pyrene	4.09	3.5	2.79	2.4	2.72

Order information:

SES-1 can be purchased for US$150 per unit (200 g). Price subject to change without notice. Please contact NRCC at the address above.

Reference:

National Research Council Canada (1988) SES-1, Estuarine sediment reference material for polycyclic aromatic hydrocarbons, description sheet. National Research Council Canada, Institute for Marine Biosciences, Halifax, Nova Scotia, Canada.

SL-1

Lake Sediment

Source:

International Atomic Energy Agency
Analytical Quality Control Service
Laboratory Seibersdorf
P.O. Box 100
A-1400 Vienna
AUSTRIA

Description:

The lake sediment sample was collected at a water depth of 15 m by the US Department of Agriculture at the Sardis Reservoir, Panola County, Mississippi, USA, and donated to the IAEA. The material was dried at 50°C for 7 days, ground and sieved, and the 0.10-mm fraction collected. This fraction was further homogenized in a rotating plastic drum and 25-gram portions stored in plastic bottles. The homogeneity of the sample was tested by determining the content of several elements by NAA in samples taken from several bottles. By applying F and t tests, it was found that the results do not differ significantly and the material can be considered homogeneous at least for sample weights ≥100 mg. The content of hydroscopic moisture as determined by drying at constant weight was rather small (~ 2.7%), but it may vary with a change in ambient humidity. The results of an intercomparison exercise that resulted in the recommended values for SL-1 can be found in the 1992 IAEA catalog and other recommended values in Dybczynski and Suschny (1979).

Recommended concentrations (μg/g dry weight unless noted):

Element	Value	Range	Element	Value	Range
Na (mg/g)	1.72	1.60 - 1.84	Cd	0.26	0.21 - 0.31
Sc	17.3	16.2 - 18.4	Sb	1.31	1.19 - 1.43
Ti (mg/g)	5.17	4.80 - 5.54	Cs	7.01	6.13 - 7.89
V	170	155 - 185	Ba	639	586 - 692
Cr	104	95.0 - 113	La	52.6	49.5 - 55.7
Mn (mg/g)	3.46	3.30 - 3.62	Ce	117	100 - 134
Fe (mg/g)	67.4	65.7 - 69.1	Nd	43.8	41.0 - 46.6
Co	19.8	18.3 - 21.3	Sm	9.25	8.74 - 9.76
Ni	44.9	36.9 - 52.9	Dy	7.46	5.34 - 9.58
Cu	30.0	24.4 - 35.6	Yb	3.42	2.78 - 4.06
Zn	223	213 - 233	Hf	4.16	3.58 - 4.74
As	27.5	24.6 - 30.4	Pb	37.7	30.3 - 45.1
Br	6.82	5.09 - 8.55	Th	14	13 - 15
Rb	113	102 - 124	U	4..02	3.70 - 4.34

SL-1 (cont.)

Noncertified concentrations (Dybczynski and Suschny, 1979) (μg/g dry weight unless noted):

Element	Value	Element	Value
Li	29	Ag (ng/g)	82
B	39	In	0.20
Mg (%)	2.9	Sn	4
Al (%)	8.9	Te	2
P	831	I	28
S (%)	1.2	Eu	1.6
Cl	10	Gd	12
K (%)	1.5	Tb	1.4
Ca (%)	0.25	Ho	1.3
Ga	24	Tm	0.66
Ge	25	Lu	0.54
Se	2.9	Ta	1.6
Sr	80	W	6
Y	85	Au (ng/g)	10
Zr	241	Ir (ng/g)	8.3
Nb	17	Pt	0.36
Mo	1.3	Hg	0.13
Ru	0.13	Bi	1

Order information:

SL-1 can be purchased for US$110 per unit (25 g). Price subject to change. The price includes handling, postage (surface mail in Europe, airmail elsewhere), and insurance. Please contact IAEA at the address shown above.

Reference:

International Atomic Energy Agency (1992) AQCS (Analytical Quality Control Services) Intercomparison Runs Reference Materials 1992. Catalog, 88 pp. International Atomic Energy Agency, Laboratory Seibersdorf, P.O. Box 100, A-1400 Vienna, Austria.

Dybczynski, R., and O. Suschny (1979) Final report on the intercomparison run SL-1 for the determination of trace elements in a lake sediment sample. IAEA/RL/64, International Atomic Energy Agency, Laboratory Seibersdorf, P.O. Box 100, A-1400 Vienna, Austria.

SL-2

Lake Sediment

Source:

International Atomic Energy Agency
Analytical Quality Control Service
Laboratory Seibersdorf
P.O. Box 100
A-1400 Vienna
AUSTRIA

Description:

No information available.

Recommended activities (mBq/g):

Radionuclide	Activity	Range
^{40}K	240	211 - 269
^{137}Cs	2.4	2.2 - 2.6

Order information:

SL-1 can be purchased for US$110 per unit (250 g). Price subject to change. The price includes handling, postage (surface mail in Europe, airmail elsewhere), and insurance. Please contact IAEA at the address shown above.

Reference:

International Atomic Energy Agency (1992) AQCS (Analytical Quality Control Services) Intercomparison Runs Reference Materials 1992. Catalog, 88 pp. International Atomic Energy Agency, Laboratory Seibersdorf, P.O. Box 100, A-1400 Vienna, Austria.

SRM 1646

Estuarine Sediment

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

The estuarine sediment sample was dredged from the Chesapeake Bay, USA, and supplied to the NBS by R. Huggett of the Virginia Institute of Marine Science. The material was freeze-dried, radiation-sterilized, sieved through screen openings of 1.00 mm to remove coarse materials, ball-milled to pass through a 150 μm sieve, mixed in a blender, placed in polyethylene bags and bottled. The homogeneity of the bulk material was tested by determining the content of several elements by neutron activation analysis.

Certified concentrations (μg/g dry weight unless noted):

Element	Value	Uncertainty (±)	Element	Value	Uncertainty (±)
Mg (%)	1.09	0.08	Co	10.5	1.3
Al (%)	6.25	0.20	Ni	32	3
P (%)	0.054	0.005	Cu	18	3
Ca (%)	0.83	0.03	Zn	138	6
V	94	1	As	11.6	1.3
Cr	76	3	Cd	0.36	0.07
Mn	375	20	Hg	0.063	0.012
Fe (%)	3.35	0.10	Pb	28.2	1.8

Noncertified concentrations (μg/g dry weight unless noted):

Element	Value	Element	Value
Li	49	Rb	87
Be	1.5	Mo	2.0
Na (%)	2.0	Sb	0.4
Si (%)	31	Te	0.5
K (%)	1.4	Cs	3.7
S (%)	0.96	Ce	80
Ti (%)	0.51	Eu	1.5
Sc	10.8	Tl	0.5
Ge	1.4	Th	10
Se	0.6		

Order information:

SRM 1646 can be purchased for US$167 per unit (75 g). Price subject to change without notice. Please contact NIST at the address shown above.

SRM 1646 (cont.)

Reference:

National Institute of Standards and Technology (1982) SRM 1646. Estuarine sediment. Certificate of analysis (revised). National Institute of Standards and Technology, Gaithersburg, MD, USA.

SRM 1939

Polychlorinated Biphenyls (Congeners) in River Sediment A

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

The sediment material was collected from the Hudson River, New York. It was dried, sieved, homogenized, radiation sterilized using ^{60}Co at 3.2 megarads, and transferred to amber bottles with Teflon-lined screw caps.

Certified concentrations (μg/g dry weight):

Compound	Value	Uncertainty (±)
PCB 26	4.20	0.29
PCB 28	2.21	0.10
PCB 44	1.07	0.12

Noncertified concentrations (μg/g dry weight):

Compound	Value	Compound	Value
PCB 18	3.46	PCB 118	0.51
PCB 31	6.86	PCB 128	0.10
PCB 49	3.78	PCB 138	0.57
PCB 52	4.48	PCB 187	0.18
PCB 66	0.93	PCB 180	0.16
PCB 101	0.82	PCB 170	0.11

Order information:

SRM 1939 can be purchased for US$202 per unit (50 g). Price subject to change without notice. Please contact NIST at the address shown above.

Reference:

National Institute of Standards and Technology (1990) SRM 1939. Polychlorinated biphenyls (congeners) in river sediment. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

SRM 1941

Organics in Marine Sediment

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

SRM 1941 is intended for use in validating analytical methods for the determination of trace levels of selected naturally present PAHs in marine sediments. The marine sediment used to prepare this SRM was collected in the Chesapeake Bay at the mouth of the Baltimore (MD) Harbor near the Francis Scott Key Bridge (39°12.85 N and 76°31.70 W). The sediment was air dried, pulverized, sieved (<150 μm), homogenized in a cone blender, and subsampled into amber glass bottles with Teflon-lined screw caps. The bottled samples were radiation (^{60}Co) sterilized. The collection, preparation, and certification of SRM 1941 were supported in part by the Ocean Assessments Division, National Oceanic and Atmospheric Administration (NOAA); Office of the Chief of Naval Operations, Department of the Navy; and Minerals Management Service, Department of the Interior.

Certified values (μg/g dry weight):

Compound	Value	Uncertainty (±)	Compound	Value	Uncertainty (±)
Phenanthrene	0.577	0.059	Benzo[k]fluoranthene	0.444	0.049
Anthracene	0.202	0.042	Benzo[a]pyrene	0.67	0.13
Pyrene	1.08	0.20	Perylene	0.422	0.033
Fluoranthene	1.22	0.24	Benzo[ghi]perylene	0.516	0.083
Benz[a]anthracene	0.550	0.079	Indeno[1,2,3-cd]=		
Benzo[b]fluoranthene	0.78	0.19	pyrene	0.569	0.040

Noncertified values:

Chlorinated pesticides (ng/g dry weight):

Compound	Value	Uncertainty (±)	Compound	Value	Uncertainty (±)
4,4'-DDE	9.71	0.17	Dieldrin	0.63	0.03
4,4'-DDD	10.3	0.1	Heptachlor epoxide	0.23	0.02
4,4'-DDT	1.11	0.05	*trans*-Nonachlor	0.97	0.03
cis-Chlordane	2.06	0.05			

SRM 1941 (cont.)

PAHs (ng/g dry weight):

Compound	Value	Uncertainty (±)	Compound	Value	Uncertainty (±)
1,3-, 2,10-, 3,9-, and 3,10 Dimethyl= phenanthrene	161	11	2-Methylnaphthalene	406	36
1,6- and 2,9-Dimethyl= phenanthrene	93	6	2-Methylphenanthrene	190	6
1,7-Dimethylphenan= threne	62	4	3-Methylphenanthrene	150	5
1-Methylnaphthalene	229	19	9-Methyl and 4-Methylphenan= threne	145	8
1-Methylphenanthrene	109	6	Acenaphthene	52	2
2,3-Dimethylphenan= threne	36	3	Acenaphthylene	115	10
2,6-Dimethylnaph= thalene	198	23	Benzo[a]fluoranthene	146	4
2,6-Dimethylphenan= threne	68	4	Benzo[e]pyrene	573	-
2,7-Dimethylphenan= threne	52	4	Benzo[j]fluoranthene	351	14
2-Methylanthracene	66	7	Biphenyl	115	15
			Chrysene	449	-
			Fluorene	104	5
			Naphthalene	1322	14
			Triphenylene	192	3

Polychlorinated biphenyls (ng/g dry weight):

Compound	Value	Uncertainty (±)	Compound	Value	Uncertainty (±)
PCB 18	9.90	0.25	PCB 153	22.0	1.4
PCB 28	16.1	0.4	PCB 170	7.29	0.26
PCB 52	10.4	0.4	PCB 180	14.3	0.3
PCB 66	22.4	0.7	PCB 187	12.5	0.6
PCB 101	22.0	0.7	PCB 195	1.51	0.10
PCB 105	5.76	0.23	PCB 206	4.81	0.15
PCB 118	15.2	0.7	PCB 209	8.35	0.21
PCB 138	24.9	1.8			

Elements (µg/g dry weight):

Element	Value	Uncertainty (±)	Element	Value	Uncertainty (±)
B	76	2	Co	27.5	0.1
Na (%)	13	0.3	Zn	1010	40
Al (%)	6.5	0.2	As	75	4
Si (%)	22.2	0.8	Se	10.1	0.2
S (%)	1.64	0.08	Rb	92	1
Cl (%)	1.64	0.04	Ag	1.2	0.5
K (%)	1.58	0.01	Sb	15.2	0.4
Sc	34.4	0.4	Cd	2.3	0.3
Ti (%)	1.72	0.03	Cs	4.8	0.1
V	810	30	La	360	10
Cr	640	10	Ce	272	4
Mn	790	10	Sm	25.7	0.4
Fe (%)	10.6	0.1	Eu	2.19	0.06

SRM 1941 (cont.)

Element	Value	Uncertainty (±)	Element	Value	Uncertainty (±)
Tb	2.2	0.6	Ta	16.4	0.5
Gd	15.2	0.4	Th	25.6	0.3
Hf	22.4	0.3	U	22	1

Order information:

SRM 1941 can be purchased for US$279 per unit (75 g). Price subject to change without notice. Please contact NIST at the address shown above.

Reference:

National Institute of Standards and Technology (1989) SRM 1941. Organics in marine sediment. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

SRM 2704

Buffalo River Sediment

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

The river sediment for this SRM was collected from the Buffalo River, near the Ohio Street Bridge, Buffalo, NY. The U. S. Army Corps of Engineers, under contract to NIST, collected and screened the sediment. The material was shipped under refrigeration in Teflon-lined drums to Technimed Corporation, FL, for freeze drying. The freeze-dried sediment was shipped to a NIST contractor laboratory where it was screened, sieved, radiation sterilized, blended and bottled.

Certified concentrations (μg/g dry weight unless noted):

Element	Value	Uncertainty (±)	Element	Value	Uncertainty (±)
Li	47.5	4.1	Fe (%)	4.11	0.10
C (%)	3.348	0.016	Co	14.0	0.6
Na (%)	0.547	0.014	Ni	44.1	3.0
Mg (%)	1.20	0.02	Cu	98.6	5.0
Al (%)	6.11	0.16	Zn	438	12
Si (%)	29.08	0.13	As	23.4	0.8
P (%)	0.0998	0.0028	Se	1.12	0.05
S (%)	0.397	0.004	Sb	3.79	0.15
K (%)	2.00	0.04	Cd	3.45	0.22
Ca (%)	2.60	0.03	Ba	414	12
Ti (%)	0.457	0.018	Hg	1.47	0.07
V	95	4	Tl	1.06	0.07
Cr	135	5	Pb	161	17
Mn	555	19	U	3.13	0.13

Noncertified concentrations (μg/g dry weight unless noted):

Element	Value	Element	Value	Element	Value
Cl (%)	< 0.01	Sn	9.5	Dy	6
Sc	12	I	2	Yb	2.8
Ga	15	Cs	6	Lu	0.6
Br	7	La	29	Hf	8
Rb	100	Ce	72	Th	9.2
Sr	130	Sm	6.7		
Zr	300	Eu	1.3		

SRM 2704 (cont.)

Order information:

SRM 2704 can be purchased for US$166 per unit (50 g). Price subject to change without notice. Please contact NIST at the address shown above.

Reference:

National Institute of Standards and Technology (1990) SRM 2704. Buffalo river sediment. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

SRM 4350B

River Sediment

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

This SRM is intended for use in tests of environmental radioactivity in matrices similar to that of the SRM. The average particle diameter is 8 μm. Semiquantitative emission spectrometry analysis and the gamma ray spectrum of this SRM are available in the Certificate of Analysis.

Certified values:

Reference time: Sept. 9, 1981

Radionuclide	Activity (Bq/g)	Uncertainty (%)	Half-life (yr)
^{60}Co	4.64×10^{-3}	5.0	5.28
^{137}Cs	2.90×10^{-2}	6.3	30.7
^{152}Eu	3.05×10^{-2}	4.0	13.54
^{154}Eu	3.78×10^{-3}	15	8.48
^{226}Ra	3.58×10^{-2}	10	
^{238}Pu	1.3×10^{-5}	17	
$^{239}Pu + ^{240}Pu$	5.08×10^{-4}	5.8	
^{241}Am	1.5×10^{-4}	21	

Order information:

SRM 4350B can be purchased for US$245 per unit (85 g). Price subject to change without notice. Please contact NIST at the address shown above.

Reference:

National Institute of Standards and Technology (1981) SRM 4350B. River sediment. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

SRM 4354

Gyttja Lake Sediment

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

This SRM is a freshwater lake sediment and is intended for use in tests of environmental radioactivity in matrices similar to that of the SRM. The average particle diameter of this material (gyttja) is 8 μm. Semiquantitative emission spectrometry analysis of this SRM is available in the Certificate of Analysis.

Certified values:

Reference time: Feb. 14, 1986

Radionuclide	Activity (Bq/g)	Uncertainty (%)
^{60}Co	3.20×10^{-1}	13
^{90}Sr	1.09	23
^{137}Cs	5.92×10^{-2}	7
^{228}Th	2.86×10^{-2}	13
^{232}Th	2.68×10^{-2}	10
^{235}U	7.5×10^{-4}	19
^{238}U	1.74×10^{-2}	8
^{238}Pu	2.6×10^{-4}	+14 - 38
$^{239}Pu + ^{240}Pu$	4.00×10^{-3}	+7 -18
^{241}Am	1.1×10^{-3}	+30 - 81

Order information:

SRM 4354 can be purchased for US$181 per unit (25 g). Price subject to change without notice. Please contact NIST at the address shown above.

Reference:

National Bureau of Standards (1986) SRM 4354. Freshwater lake sediment. Certificate of analysis. National Bureau of Standards, Gaithersburg, MD, USA.

STSD-1 - STSD-4

Stream Sediments

Source:

Canada Centre for Mineral and Energy Technology
555 Booth Street
Ottawa K1A 0G1
CANADA

Description:

STSD-1 through STSD-4 are typical stream sediments from various geochemical environments in Canada. The collections were carried out by the Geological Survey of Canada by hand or using shovels. STSD-1 is from Lavant Creek in Ontario; STSD-2, from Hirok Stream and a composite of two samples from British Columbia; STSD-3, from the same locations as STSD-2 with the addition of material from Lavant Creek; and STSD-4, from the same locations as STSD-2 with the addition of material from Ontario. Thirty-five laboratories provided analytical data and provisionally recommended values. These sediment materials are available as a set of four.

Provisional values:

	STSD-1	STSD-2	STSD-3	STSD-4
Oxide (percent)	Value	Value	Value	Value
Na_2O	1.8	1.7	1.5	2.7
MgO	2.2	3.1	2.2	2.1
P_2O_5	0.4	0.3	0.4	0.2
Al_2O_3	9.0	16.1	10.9	12.1
SiO_2	42.5	53.7	48.6	58.9
K_2O	1.2	2.1	1.8	1.6
CaO	3.6	4.0	3.3	4.0
TiO_2	0.8	0.8	0.7	0.8
MnO	0.5	0.1	0.3	0.2
Fe_2O_3	6.5	7.5	6.2	5.7

Total elements (µg/g unless noted)

Element	Value	Value	Value	Value
Li	11	65	23	14
Be	1.6	5.2	2.6	1.7
B	89	42	82	46
C (%)	12.3	1.6	8.4	4.1
F	950	940	850	380
S (%)	0.18	0.06	0.14	0.09
Sc	14	16	13	14
Ti	4600	4870	4400	4530

STSD-1 through STSD-4 (cont.)

Total elements (µg/g unless noted)

Element	Value	Value	Value	Value
V	98	101	134	106
Cr	67	116	80	93
Mn	3950	1060	2730	1520
Fe (%)	4.7	5.2	4.4	4.1
Co	17	19	16	13
Ni	24	53	30	30
Cu	36	47	39	65
Zn	178	246	204	107
As	23	42	28	15
Br	40	4	24	13
Rb	30	104	68	39
Sr	170	400	230	350
Y	42	37	36	24
Zr	218	185	196	190
Nb	5	20	12	9
Mo	<5	13	6	<5
Ag	<0.5	0.5	<0.5	<0.5
Sn	4	5	4	2
Sb	3.3	4.8	4.0	7.3
Cs	1.8	12	5.2	1.9
Ba	630	540	1490	2000
La	30	59	39	24
Ce	51	93	63	44
Nd	28	43	33	21
Sm	6	8	7	5
Eu	1.6	2.0	1.3	1.2
Tb	1.2	1.3	1.1	0.8
Dy	5.6	6.5	5.4	3.8
Yb	4.0	3.7	3.4	2.6
Lu	0.8	0.7	0.8	0.5
Hf	6.1	5.0	5.1	5.5
Ta	0.4	1.6	0.9	0.6
W	<4	7	<4	<4
Au (ng/g)	8	3	7	4
Pb	35	66	40	16
Th	3.7	17.2	8.5	4.3
U	8.0	18.6	10.5	3.0

Elements by extraction using concentrated HNO_3 and HCl (µg/g unless noted):

Element	Value	Value	Value	Value
V	47	58	61	51
Cr	28	50	34	30
Mn	3740	720	2630	1200
Fe (%)	3.5	4.1	3.4	2.6
Co	14	17	14	11
Ni	18	47	25	23
Cu	36	43	38	66
Zn	165	216	192	82

STSD-1 through STSD-4 (cont.)

Elements by extraction using concentrated HNO_3 and HCl (μg/g unless noted):

Element	Value	Value	Value	Value
As	17	32	22	11
Mo	2	13	7	2
Ag	0.3	0.5	0.4	0.3
Cd	0.8	0.8	1.0	0.6
Sb	2.0	2.6	2.4	3.6
Hg (ng/g)	110	46	90	930
Pb	34	66	39	13

Order information:

These sediments are packaged in bottles containing 100 g of each material and can be purchased for Canadian $325 per set. Price subject to change without notice. Please contact CANMET at the address shown above.

Reference:

Bowman, W. S. (1990) Certified reference materials. CCRMP 90-1E. Canada Centre for Mineral and Energy Technology, Ottawa, Canada. 65 pp.

SUD-1

Sudbury Sediment

Source:

National Water Research Institute
Canada Centre for Inland Waters
867 Lakeshore Road, P. O. Box 5050
Burlington, Ontario L7R 4A6
CANADA

Description:

The sediment used for SUD-1 was obtained from Sudbury, North America. The sediment was freeze dried, ground to < 200-mesh particle size, and subsampled into bottles.

Noncertified concentrations (μg/g unless noted):

Element	Value	Uncertainty	Element	Value	Uncertainty
Al (%)	6.22	3.74	Zn	771.0	123.8
V	69.90	26.6	As	(30 - 35)	
Mn	582.5	222	Se	(2.7 - 3.3)	
Fe (%)	3.40	0.68	Cd	2.30	3.40
Co	44.8	23.7	Hg	(0.09 - 0.13)	
Ni	941.0	198	Pb	58.0	51.1
Cu	565.0	194.3			

Order information:

This CRM can be purchased for Canadian $150 per unit (5 g). Foreign purchasers will be charged an additional $50 per sample to cover shipping and handling charges. Price subject to change without notice. Please contact NWRI at the address shown above.

Reference:

National Water Research Institute (1990) Certified reference material SUD-1, trace metals in sediment. Certificate of Analysis (draft), Research and Applications Branch, National Water Research Institute, Burlington, Ontario, Canada.

TH-1

Toronto Harbour Sediment

Source:

National Water Research Institute
Canada Centre for Inland Waters
867 Lakeshore Road, P. O. Box 5050
Burlington, Ontario L7R 4A6
CANADA

Description:

The sediment used for TH-1 was obtained from Toronto Harbour, North America. The sediment was freeze dried, ground to < 200-mesh particle size, and subsampled into bottles.

Noncertified concentrations (μg/g unless noted):

Element	Value	Uncertainty	Element	Value	Uncertainty
Al (%)	6.04	3.56	Cu	105.0	18.3
V	85.50	40.8	Zn	1531	217.5
Mn	586	218	As	9.7	1.0
Fe (%)	3.61	1.42	Se	(0.88 - 1.0)	
Co	15.2	20.6	Cd	5.30	3.28
Ni	44.2	23.7	Pb	254.5	176.3

Order information:

This CRM can be purchased for Canadian $150 per unit (5 g). Foreign purchasers will be charged an additional $50 per sample to cover shipping and handling charges. Price subject to change without notice. Please contact NWRI at the address shown above.

Reference:

National Water Research Institute (1990) Certified reference material TH-1, trace metals in sediment. Certificate of Analysis (draft), Research and Applications Branch, National Water Research Institute, Burlington, Ontario, Canada.

TH-2

Great Lakes Sediment

Source:

National Water Research Institute
Canada Centre for Inland Waters
867 Lakeshore Road, P. O. Box 5050
Burlington, Ontario L7R 4A6
CANADA

Description:

The sediment used for TH-2 was obtained from Great Lakes Basin, North America. The sediment was freeze dried, ground to < 200-mesh particle size, and subsampled into bottles.

Noncertified concentrations (μg/g unless noted):

Element	Value	Uncertainty	Element	Value	Uncertainty
Al (%)	6.33	0.48	Cu	123	4
V	81.8	22	Zn	904	36
Cr	120	12	As	8.83	0.84
Mn	562	47	Se	0.815	0.161
Fe (%)	3.57	0.11	Cd	4.91	0.22
Co	14.4	2.5	Hg	0.593	0.063
Ni	40.1	3.4	Pb	190	16

Order information:

This CRM can be purchased for Canadian $150 per unit (5 g). Foreign purchasers will be charged an additional $50 per sample to cover shipping and handling charges. Price subject to change without notice. Please contact NWRI at the address shown above.

Reference:

National Water Research Institute (1992) Certified reference material TH-2, trace metals in sediment. Certificate of Analysis (draft), Research and Applications Branch, National Water Research Institute, Burlington, Ontario, Canada.

WQB-1 - WQB-2

Lake Ontario Sediment

Source:

National Water Research Institute
Canada Centre for Inland Waters
867 Lakeshore Road, P. O. Box 5050
Burlington, Ontario L7R 4A6
CANADA

Description:

The sediment used for WQB-1 was obtained from Lake Ontario, North America. The sediment was freeze dried, ground to < 200-mesh particle size, and subsampled into bottles. The geochemical composition of WQB-1 can be found in Cheam and Chau (1984). WQB-2 is the same material as WQB-1 and is available in containers of a different size.

Certified concentrations (μg/g unless noted):

Element	Value	Uncertainty
As	23.00	1.84
Se	1.02	0.17
Hg	1.09	0.15

Noncertified concentrations (μg/g unless noted):

Element	Value	Uncertainty	Element	Value	Uncertainty
Al (%)	8.29	4.56	Ni	59.3	25.1
V	125.0	70.3	Cu	80.0	26.1
Mn	2260	540	Cd	2.10	2.46
Fe (%)	4.92	0.98	Zn	279.0	166.1
Co	18.2	26.4	Pb	85.7	77.7

Order information:

WQB-1 can be purchased for Canadian $150 per unit (5 g). Foreign purchasers will be charged an additional $50 per sample to cover shipping and handling charges. Price subject to change without notice. Please contact NWRI at the address shown above.

References:

Cheam, V., and A. S. Y. Chau (1984) Analytical reference materials. Part IV. Development and certification of the first Great Lakes sediment reference material for arsenic, selenium and mercury. Analyst, 109:775-9.

National Water Research Institute (1990) Certified reference material WQB-1, trace metals in sediment. Certificate of Analysis, Research and Applications Branch, National Water Research Institute, Burlington, Ontario, Canada.

WQB-3

Great Lakes Sediments

Source:

National Water Research Institute
Canada Centre for Inland Waters
867 Lakeshore Road, P. O. Box 5050
Burlington, Ontario L7R 4A6
CANADA

Description:

The sediment samples used for WQB-3 were obtained from Hamilton Harbour and Lake Ontario, North America. The sediment samples were freeze dried, and ground to < 200-mesh particle size separately. Then, 160 kg of Lake Ontario sediment and 53 kg of Hamilton Harbour sediment were blended and subsampled into bottles. The geochemical composition of WQB-3 can be found in Cheam *et al.* (1989).

Certified concentrations (μg/g unless noted):

Element	Value	Uncertainty	Element	Value	Uncertainty
Mn	1264	91	Zn	1396	107
Fe (%)	6.0	0.4	As	18.8	1.5
Co	15.3	1.7	Se	1.15	0.19
Ni	52.0	6.1	Hg	2.75	0.28

Noncertified concentrations (μg/g unless noted):

Element	Value	Uncertainty	Element	Value	Uncertainty
Al (%)	5.80	3.42	Cd	3.85	3.18
V	88.85	51.8	Pb	243.0	174.0
Cu	83.4	19.1			

Order information:

This CRM can be purchased for Canadian $150 per unit (5 g). Foreign purchasers will be charged an additional $50 per sample to cover shipping and handling charges. Price subject to change without notice. Please contact NWRI at the address shown above.

References:

Cheam, V., K. I. Aspila, and A. S. Y. Chau (1989) Analytical reference materials VIII. Development and certification of a new Great Lakes sediment reference material for eight trace metals. Sci. Total Environ., 87/88:517-24.

National Water Research Institute (1990) Certified reference material WQB-3, trace metals in sediment. Certificate of Analysis, Research and Applications Branch, National Water Research Institute, Burlington, Ontario, Canada.

CRM 144 and 146

Sewage Sludges

Source:

Community Bureau of Reference
Commission of the European Communities
Directorate General for Science
Research and Development
200 rue de la Loi
B-1049 Brussels
BELGIUM

Description:

CRM 144 is composed of sewage sludge of domestic origin, and CRM 146 of sewage sludge of industrial origin.

Certified values (µg/g):

	CRM 144		CRM 146	
Element	Value	Uncertainty (±)	Value	Uncertainty (±)
Mn	449	13	588	24
Co	9.06	0.6	11.8	0.7
Ni	942	22	280	18
Cu	713	26	934	24
Zn	3143	103	4059	90
Cd	4.82	0.97	77.7	2.6
Hg	1.49	0.22	9.49	0.76
Pb	495	19	1270	28

Noncertified values (µg/g):

Cr	485.4	784
As	6.7	
Se	2.3	1.7

Aqua regia soluble concentrations (µg/g)

Cr	494	769
Mn	436	555
Co	8.6	9.9
Ni	947	269
Cu	694	921
Zn	3090	4002
Cd	3.6	76.5
Pb	-479	-1255

Element	CRM 144 Value	CRM 144 Uncertainty (±)	CRM 146 Value	CRM 146 Uncertainty (±)
Matrix (mg/g)				
SiO_2	136.4		228	
CaO	56.8		142	
MgO	9.2		33	
Al_2O_3	45.8		90	
TiO_2	1.9		29.1	
Fe_2O_3	63.4		26.5	
P_2O5	50.8		59	
Na_2O	4.6		3	
K_2O	7.8		5.8	
Loss at 900°C	0.620		0.377	

Order information:

These CRMs can each be purchased for 2500 BFR per unit (50 g). Price includes handling and normal postage. Price subject to change without notice. Please contact BCR at the address shown above.

Reference:

Community Bureau of Reference (BCR) (1992) Reference Materials. Catalog, Community Bureau of Reference, Commission of the European Communities, Directorate General for Science, Research and Development, 200 rue de la Loi, B-1049 Brussels, Belgium. 75 pp.

CRM 176

Polychlorinated Biphenyls in Sewage Sludge

Source:

Community Bureau of Reference
Commission of the European Communities
Directorate General for Science
Research and Development
200 rue de la Loi
B-1049 Brussels
BELGIUM

Description:

No information available.

Certified concentrations (µg/kg dry weight):

Congener	Value	Uncertainty (±)	Congener	Value	Uncertainty (±)
PCB 28	100	10	PCB 118	97	12
PCB 52	79	9	PCB 153	288	18
PCB 101	134	11	PCB 180	313	24

Noncertified concentration (µg/kg dry):

Congener	Value
PCB 138+163	268

Order information:

CRM 176 can be purchased for BFR5000 per unit (30 g). Price includes handling and normal postage and it is subject to change without notice. Please contact BCR at the address shown above.

Reference:

Community Bureau of Reference (BCR) (1992) Reference Materials. Community Bureau of Reference, Commission of the European Communities, Directorate General for Science, Research and Development, 200 rue de la Loi, B-1049 Brussels, Belgium. 75 pp.

EPA SRS101-100

EPA CRADA API Separator Sludge

Source:

US Environmental Protection Agency
Quality Assurance Research Division
EMSL-Cincinnati
Cincinnati, OH 45268-1525
USA

Available from:

Fisher Scientific
711 Forbes Avenue
Pittsburgh, PA 15219

Description:

This CRADA reference material is designed, produced and verified for purity, homogeneity and stability under a cooperative research and development agreement between Fisher Scientific and the US EPA. This CRM is an oily petroleum waste.

Certified concentrations (µg/g dry weight):

Compound	Value
2-Methylnaphthalene	300
Fluorene	50
Naphthalene	100
Phenanthrene	70
Pyrene	30

Order information:

This CRM can be purchased from US$170 per unit (100 g). They are available from the wholesale distributor, Fisher Scientific, 711 Forbes Ave., Pittsburgh, PA 15219, USA, as well as from other distributors worldwide. Price subject to change without notice.

Reference:

Fisher Scientific (1992) Organic solid waste reference sample, SRS101-100, API separator sludge. Information sheet. Fisher Scientific, 711 Forbes Ave., Pittsburgh, PA 15219, USA.

CRM 141

Trace Elements in a Calcareous Loam Soil

Source:

Community Bureau of Reference
Commission of the European Communities
Directorate General for Science
Research and Development
200 rue de la Loi
B-1049 Brussels
BELGIUM

Description:

This material consists of a homogeneous powder, with particles smaller than 90 μm. Additional information is available on aqua regia soluble concentrations.

Certified concentrations (μg/g dry weight):

Element	Value	Uncertainty (±)	Element	Value	Uncertainty (±)
Cu	32.6	1.4	Hg	0.0568	0.0043
Zn	81.3	3.7	Pb	29.4	2.6
Cd	0.36	0.10			

Information values only (percent dry weight unless noted):

Component	Value	Std. Deviation	Component	Value	Std. Deviation
Na_2O	0.43		TiO_2	0.47	
MgO	1.19		Fe_2O_3	3.74	
Al_2O_3	10.56		Cr (μg/g)	75.0	10.4
P_2O_5	0.16		Mn (μg/g)	547	32
SiO_2	42.58		Co (μg/g)	9.2	1.1
K_2O	1.56		Ni (μg/g)	30.9	3.2
CaO	17.98		Se (μg/g)	0.160	0.025

Order information:

CRM 141 can be purchased for BFR5000 per unit (50 g). Price includes handling and normal postage and it is subject to change without notice. Please contact BCR at the address shown above.

References:

Community Bureau of Reference (BCR) (1983) BCR CRM 141, trace element in calcareous loam soil. Certificate of analysis. Community Bureau of Reference, Commission of the European Communities, Directorate General for Science, Research and Development, 200 rue de la Loi, B-1049 Brussels, Belgium.

Community Bureau of Reference (BCR) (1992) Reference Materials. Community Bureau of Reference, Commission of the European Communities, Directorate General for Science, Research and Development, 200 rue de la Loi, B-1049 Brussels, Belgium. 75 pp.

EPA SRS003-50

EPA CRADA Metals in Soil

Source:

US Environmental Protection Agency
Quality Assurance Research Division
EMSL-Cincinnati
Cincinnati, OH 45268-1525
USA

Available from:

Fisher Scientific
711 Forbes Avenue
Pittsburgh, PA 15219

Description:

This CRADA reference material is designed, produced and verified for purity, homogeneity and stability under a cooperative research and development agreement between Fisher Scientific and the US EPA.

Certified concentrations (µg/g dry weight):

Element	Value
Cr	10
As	25
Cd	2
Ba	550
Hg	5

Order information:

This CRM can be purchased from US$140 per unit (50 g). They are available from the wholesale distributor, Fisher Scientific, 711 Forbes Ave., Pittsburgh, PA 15219, USA, as well as from other distributors worldwide. Price subject to change without notice.

Reference:

Fisher Scientific (1992) Solid waste reference sample, SRS003-50, metals in soil. Information sheet. Fisher Scientific, 711 Forbes Ave., Pittsburgh, PA 15219, USA.

EPA SRS103-100

EPA CRADA PAH Contaminated Soil

Source:

US Environmental Protection Agency
Quality Assurance Research Division
EMSL-Cincinnati
Cincinnati, OH 45268-1525
USA

Available from:

Fisher Scientific
711 Forbes Avenue
Pittsburgh, PA 15219

Description:

This CRADA standard is designed, produced and verified for purity, homogeneity and stability under a cooperative research and development agreement between Fisher Scientific and the US EPA.

Certified concentrations (µg/g dry weight):

Compound	Value	Compound	Value
2-Methylnaphthalene	60	Dibenzofuran	300
Acenaphthylene	20	Fluoranthene	1300
Acenaphthene	600	Fluorene	500
Anthracene	450	Naphthalene	30
Benz[a]anthracene	250	Pentachlorophenol	960
Benzo[b+k]fluoranthene	150	Phenanthrene	1600
Benzo[a]pyrene	100	Pyrene	1000
Chrysene	300		

Order information:

This CRM can be purchased from US$175 per unit (100 g). They are available from the wholesale distributor, Fisher Scientific, 711 Forbes Ave., Pittsburgh, PA 15219, USA, as well as from other distributors worldwide. Price subject to change without notice.

Reference:

Fisher Scientific (1992) Organic solid waste reference sample, SRS103-100, PAH contaminated soil. Information sheet. Fisher Scientific, 711 Forbes Ave., Pittsburgh, PA 15219, USA.

GBW 07401 - 07408

Soils

Source:

National Research Center for CRMs
Office of CRMs
No. 7 District 11
Hepingjie, Chaoyangqu
Beijing, 100013
CHINA

Description:

No information available.

Certified concentrations (μg/g dry weight unless noted):

	GBW 07401	GBW 07402	GBW 07403	GBW 07404	GBW 07405	GBW 07406	GBW 07407	GBW 07408
Component	Value	Value	Value	Value	Value	Value	Value	Value
Li	35.3	22	18.4	55.4	56	36	19.5	35.2
Be	2.5	1.8	1.4	1.85	2.0	4.4	2.8	1.9
B	50	36	23	97	53	57	-	54
Org. C (%)	-	-	0.5	-	-	-	-	0.31
N	1870	630	640	1000	610	740	660	370
F	506	2240	246	540	603	906	321	577
Na_2O (%)	1.66	1.62	2.71	0.11	0.122	0.19	0.074	1.72
MgO (%)	1.81	1.04	0.58	0.49	0.61	0.34	0.26	2.38
Al_2O_3 (%)	14.18	10.31	12.24	23.45	21.58	21.23	29.26	11.92
SiO_2 (%)	62.6	73.35	74.72	50.95	52.57	56.93	32.69	58.61
P	735	446	320	695	390	303	1150	775
S	310	210	120	180	410	260	250	120
Cl	-	-	-	-	-	98	100	-
K_2O (%)	2.59	2.54	3.04	1.03	1.5	1.7	0.20	2.42
CaO (%)	1.72	2.36	1.27	0.26	-	0.22	0.16	8.27
Sc	11.2	10.7	5.0	20.2	17.2	15.5	28	11.7
Ti	0.483	0.271	0.224	1.080	0.629	0.439	2.020	0.380
V	86	62	36.5	247	166	130	245	81.4
Cr	62	47	32	370	118	75	410	68
Mn	1760	510	304	1420	1360	1450	1780	650
F_2O_3 (%)	5.19	3.52	2.0	10.3	12.62	8.09	18.76	4.48
Co	14.2	8.7	5.5	22.3	12.3	7.6	97	12.7
Ni	20.4	19.4	12.2	64.2	40	53	276	31.5
Cu	21	16.3	11.4	40.5	144	390	97	24.3
Zn	680	42.3	31.4	210	494	96.6	142	68
Ga	19.3	12	13.7	30.6	31.7	29.5	39.3	14.8
Ge	1.34	1.2	1.17	1.91	2.6	3.2	1.6	1.27

GBW 07401 - 07408 (cont.)

Component	GBW 07401 Value	GBW 07402 Value	GBW 07403 Value	GBW 07404 Value	GBW 07405 Value	GBW 07406 Value	GBW 07407 Value	GBW 07408 Value
As	33.5	13.7	4.4	58	412	220	4.8	12.7
Se	0.14	0.16	0.094	0.64	1.56	1.34	0.32	0.12
Br	2.9	4.5	4.3	4.0	-	-	5.2	-
Rb	140	88	85	75	117	237	15.8	96
Sr	155	187	380	77	41.5	39	26	236
Y	25	21.7	15	39	21	18.8	26.6	26
Zr	245	219	246	500	272	220	318	229
Nb	16.6	27	9.3	37.6	22.6	26.8	64	15
Mo	1.4	0.98	0.30	2.6	4.6	18	2.9	1.16
Ag	0.35	0.054	0.091	0.070	4.4	0.20	0.057	0.060
Cd	4.3	0.071	0.059	0.35	0.45	0.13	0.080	0.13
In	0.081	0.091	0.031	0.12	4.1	0.84	0.10	-
Sn	6.1	3	2.5	5.7	17.7	72	3.6	2.8
Sb	0.87	1.3	0.45	6.3	35.4	60	0.42	1.04
Te	-	-	0.04	-	-	-	-	0.046
I	1.9	1.8	-	9.4	3.8	19.4	19.3	1.6
Cs	9.0	4.9	3.2	21.4	15.0	10.8	2.7	7.5
Ba	590	930	1210	213	296	118	180	480
La	34	164	21	53	35.7	30	46	35.5
Ce	70	402	39	136	91	66	98	66
Pr	7.5	57	4.8	8.4	7.0	5.8	11	8.3
Nd	28	210	18.4	27.3	24	21	45	32
Sm	5.2	18	3.3	4.4	4.0	3.8	10.3	5.9
Eu	1.0	3.0	0.72	0.85	0.82	0.66	3.4	1.2
Gd	4.6	7.8	2.9	4.7	3.5	3.4	9.6	5.4
Tb	0.75	0.97	0.49	0.94	0.69	0.61	1.3	0.89
Dy	4.6	4.4	2.6	6.6	3.7	3.3	6.6	4.8
Ho	0.87	0.93	0.53	1.46	0.80	0.69	1.1	0.97
Er	2.6	2.1	1.5	4.5	2.4	2.2	2.7	2.8
Tm	0.42	0.42	0.28	0.70	0.41	0.40	0.42	0.46
Yb	2.66	1.97	1.68	4.8	2.8	2.7	2.4	2.8
Lu	0.41	0.32	0.29	0.75	0.42	0.42	0.35	0.43
Hf	6.8	5.8	6.8	14	8.1	7.5	7.7	7.0
Ta	1.4	-	-	3.1	1.8	5.3	3.9	1.05
W	3.1	1.08	0.95	6.2	33.5	89.5	1.23	1.7
Au (ng/g)	-	-	-	-	260	-	-	-
Hg	32	15	60	590	294	72	61	16.6
Tl (ng/g)	1.0	0.62	-	0.94	1.6	2.4	-	0.59
Pb	98	20.2	26	58.5	552	314	13.6	21
Bi	1.17	0.38	0.17	1.04	41	49	0.20	0.30
Th	11.6	16.6	6	27.3	22.7	23	9.1	11.8
U	3.3	1.45	1.26	6.7	6.5	6.7	2.2	2.7

GBW 07401 - 07408 (cont.)

Noncertified concentrations (μg/g dry weight unless noted):

	GBW 07401	GBW 07402	GBW 07403	GBW 07404	GBW 07405	GBW 07406	GBW 07407	GBW 07408
Component	Value	Value	Value	Value	Value	Value	Value	Value
B	-	-	-	-	-	-	10.5	-
Org. C (%)	1.8	0.49	-	0.62	0.32	0.806	0.64	-
Cl	78	63	57	36	78	-	-	68
CaO (%)	-	-	--	-	0.095	-	-	-
Br	-	-	-	-	1.8	7.2	-	2.6
In	-	-	-	-	-	-	-	0.043
Te	0.051	0.035	-	0.15	4.0	0.42	-	-
I	-	-	1.3	-	-	-	-	-
Ta	-	0.8	0.8	-	-	-	-	-
Au (ng/g)	0.55	1.7	-	5.5	-	9.0	0.8	1.4
Tl	-	-	0.48	-	-	-	0.21	-

Order information:

These CRMs are for US$70 per unit (70 g). Price subject to change without notice. Please contact NRCCRM at the address above.

Reference:

National Research Center for CRMs (1992) Catalog of certified reference materials (addendum to catalog 1991). State Bureau of Technical Supervision, National Research Center for CRMs, Office of CRMs, Hepingjie, Chaoyangqu, Beijing, China. 11 pp.

GBW 08302

Tibet Soil

Source:

National Research Center for CRMs
Office of CRMs
No. 7 District 11
Hepingjie, Chaoyangqu
Beijing, 100013
CHINA

Description:

No information available.

Certified concentrations (μg/g dry weight unless noted):

Element	Value	Element	Value
Be	2.96	Cu	24.6
N	0.128	Zn	58.0
Na (%)	1.52	As	3.8
Mg (%)	1.53	Se	0.16
Al (%)	7.11	Rb	135
Si (%)	30.57	Sr	163
P (%)	0.86	Cd	0.081
Ca (%)	2.59	La	41.9
Sc	10.8	Ce	83.6
Ti (%)	0.40	Sm	7.1
V	77.5	Eu	1.4
Cr	60.8	Yb	3.1
Mn	677	Pb	14.2
Fe (%)	3.34	Th	17.6
Co	13.1	U	3.84
Ni	31.1		

Noncertified concentrations (μg/g dry weight unless noted):

Element	Value	Element	Value
Sb	0.4	Dy	5
Br	1.3	Hf	7.3
Cs	7.3	Lu	0.48
Ba	509	Ta	1.1
Tb	0.9	Hg	0.018

Order information:

GBW 08302 is available for US$30 per unit (25 g). Price subject to change without notice. Please contact NRCCRM at the address above.

Reference:

National Research Center for CRMs (1991) Certified reference materials catalog. State Bureau of Technical Supervision, National Research Center for CRMs, Office of CRMs, Hepingjie, Chaoyangqu, Beijing, China. 86 pp.

GBW 08303

Polluted Farmland Soil

Source:

National Research Center for CRMs
Office of CRMs
No. 7 District 11
Hepingjie, Chaoyangqu
Beijing, 100013
CHINA

Description:

No information available.

Certified concentrations (μg/g dry weight unless noted):

Element	Value	Element	Value
Na (%)	1.10	Co	13.0
Mg (%)	1.30	Ni	40
Al (%)	6.86	Cu	120
P (%)	0.160	Zn	260
K (%)	1.57	As	10.6
Ca (%)	4.79	Sr	405
Ti (%)	0.36	Cd	1.20
Cr	112	Hg	2.15
Mn	519	Pb	73
Fe (%)	2.97	Th	11.6

Noncertified concentrations (μg/g dry weight unless noted):

Element	Value		
		Ba	724
Be	2.5	Mo	3.3
Si (%)	25.9	La	40
Sc	10	Rb	68
Se	1.0	U	3.2
Element	Value		

Order information:

GBW 08303 is available for US$40 per unit (40 g). Price subject to change without notice. Please contact NRCCRM at the address above.

Reference:

National Research Center for CRMs (1991) Certified reference materials catalog. State Bureau of Technical Supervision, National Research Center for CRMs, Office of CRMs, Hepingjie, Chaoyangqu, Beijing, China. 86 pp.

GSS-1

Brown Soil

Source:

National Research Center for CRMs
Office of CRMs
No. 7 District 11
Hepingjie, Chaoyangqu
Beijing, 100013
CHINA

Description:

The material used for this CRM was collected at Yichun, Heilongjiang, China. The soil is a dark brown padzolitic soil typical of the mountainous and hilly terrain of northeast China. The underlaying bedrock is granite in a district of Pb-Zn mineralization.

Certified concentrations (μg/g dry weight unless noted):

Component	Value	Uncertainty (±)	Component	Value	Uncertainty (±)
Li	35.3	0.6	Sr	155	3
Be	2.5	0.13	Y	25	1
B	50	2	Zr	245	6
F	506	19	Nb	16.6	0.7
Na_2O (%)	1.66	0.02	Mo	1.4	0.06
MgO (%)	1.81	0.04	Ag	0.35	0.03
Al_2O_3 (%)	14.18	0.08	Cd	4.3	0.2
SiO_2 (%)	62.60	0.09	In	0.081	0.011
P	735	13	Sn	6.1	0.4
S	310	60	Sb	0.87	0.12
K_2O (%)	2.59	0.02	I	1.9	0.2
CaO (%)	1.72	0.03	Cs	9.0	0.4
Sc	11.2	0.3	Ba	590	15
Ti	4830	70	La	34	1
V	86	2	Ce	70	2
Cr	62	1.6	Pr	7.5	0.3
Mn	1760	24	Nd	28	1.4
Fe_2O_3 (%)	5.19	0.04	Sm	5.2	0.2
Co	14.2	0.4	Eu	1.0	0.04
Ni	20.4	0.6	Gd	4.6	0.16
Cu	21	0.6	Tb	0.75	0.04
Zn	680	11	Dy	4.6	0.17
Ga	19.3	0.8	Ho	0.87	0.04
Ge	1.34	0.12	Er	2.6	0.1
As	33.5	1.7	Yb	2.66	0.12
Se	0.14	0.02	Lu	0.41	0.03
Br	2.9	0.3	Hf	6.8	0.5
Pb	140	3	Ta	1.4	0.1
			W	3.1	0.14

GSS-1 (cont.)

Component	Value	Uncertainty (±)	Component	Value	Uncertainty (±)
Hg (ng/g)	32	3	Tm	0.42	0.04
Tl	1.0	0.08	Th	11.6	0.4
Pb	98	3	U	3.3	0.3
Bi	1.17	0.06			

Noncertified concentrations (μg/g dry weight unless noted):

Component	Value
Cl	78
Te	0.051
Au (ng/g)	0.55

Order information:

No price information is available. Please contact NRCCRM at the address above.

Reference:

Institute of Geophysical and Geochemical Exploration (1986) Certificate of geochemical standard reference materials. Institute of Geophysical and Geochemical Exploration, Langfang, Hebei, China.

GSS-2

Chesnut Soil

Source:

National Research Center for CRMs
Office of CRMs
No. 7 District 11
Hepingjie, Chaoyangqu
Beijing, 100013
CHINA

Description:

The material is a composite of soils from several localities in the semi-desert, hilly country of Bainaimiao, Inner Mongolia, in the vicinity of a copper deposit. The bedrocks of the area are sandstone, schist, diorite and granite.

Certified concentrations (μg/g dry weight unless noted):

Component	Value	Uncertainty (±)	Component	Value	Uncertainty (±)
Li	22	0.4	Rb	88	2
Be	1.8	0.1	Sr	187	4
B	36	2	Y	21.7	0.9
F	2240	66	Zr	219	8
Na_2O (%)	1.62	0.02	Nb	27	1
MgO (%)	1.04	0.02	Mo	0.98	0.06
Al_2O_3 (%)	10.31	0.05	Ag	0.054	0.004
SiO_2 (%)	73.35	0.11	Cd	0.071	0.009
P	446	11	In	0.091	0.019
S	210	30	Sn	3.0	0.2
K_2O (%)	2.54	0.02	Sb	1.3	0.1
CaO (%)	2.36	0.02	I	1.8	0.15
Sc	10.7	0.3	Cs	4.9	0.3
Ti	2710	30	Ba	930	24
V	62	2	La	164	5
Cr	47	1.6	Ce	402	10
Mn	510	6	Pr	57	3
Fe_2O_3 (%)	3.52	0.03	Nd	210	10
Co	8.7	0.3	Sm	18	1
Ni	19.4	0.5	Eu	3.0	0.1
Cu	16.3	0.4	Gd	7.8	0.4
Zn	42.3	1.2	Tb	0.97	0.2
Ga	12	0.5	Dy	4.4	0.2
Ge	1.2	0.1	Ho	0.93	0.08
As	1.37	0.6	Er	2.1	0.2
Se	0.16	0.02	Yb	1.97	0.11
Br	4.5	0.4	Lu	0.32	0.03
			Hf	5.8	0.5

GSS-2 (cont.)

Component	Value	Uncertainty (±)	Component	Value	Uncertainty (±)
W	1.08	0.12	Bi	0.38	0.02
Hg (ng/g)	15	2	Tm	0.42	0.07
Tl	0.62	0.13	Th	16.6	0.4
Pb	20.2	1.0	U	1.45	0.18

Noncertified concentrations (μg/g dry weight unless noted):

Component	Value
Cl	63
Te	0.035
Ta	0.8
Au (ng/g)	1.7

Order information:

No price information is available. Please contact NRCCRM at the address above.

Reference:

Institute of Geophysical and Geochemical Exploration (1986) Certificate of geochemical standard reference materials. Institute of Geophysical and Geochemical Exploration, Langfang, Hebei, China.

GSS-3

Yellow-Brown Soil

Source:

National Research Center for CRMs
Office of CRMs
No. 7 District 11
Hepingjie, Chaoyangqu
Beijing, 100013
CHINA

Description:

The material is a a yellow-brown soil from the temperate hilly country of Shandong, China, in the vicinity of a gold mine. The bedrock of the area is gneiss.

Certified concentrations (μg/g dry weight unless noted):

Component	Value	Uncertainty (±)	Component	Value	Uncertainty (±)
Li	18.4	0.5	Y	15	0.6
Be	1.4	0.1	Zr	246	7
B	23	1.6	Nb	9.3	0.7
F	246	15	Mo	0.30	0.04
Na_2O (%)	2.71	0.03	Ag	0.091	0.004
MgO (%)	0.58	0.016	Cd	0.059	0.009
Al_2O_3 (%)	12.24	0.05	In	0.031	0.005
SiO_2 (%)	74.72	0.11	Sn	2.5	0.2
P	320	9	Sb	0.45	0.06
S	120	10	Te	0.040	0.009
K_2O (%)	3.04	0.02	Cs	3.2	0.3
CaO (%)	1.27	0.02	Ba	1210	30
Sc	5.0	0.2	La	21	0.8
Ti	2240	40	Ce	39	2
V	36.5	1.1	Pr	4.8	0.2
Cr	32	1.4	Nd	18.4	1.1
Mn	304	5	Sm	3.3	0.14
Fe_2O_3 (%)	2.00	0.02	Eu	0.72	0.02
Co	5.5	0.2	Gd	2.9	0.2
Ni	12.2	0.4	Tb	0.49	0.04
Cu	11.4	0.4	Dy	2.6	0.1
Zn	31.4	1.1	Ho	0.53	0.04
Ga	13.7	0.6	Er	1.5	0.14
Ge	1.17	0.13	Yb	1.68	0.08
As	4.4	0.3	Lu	0.29	0.015
Se	0.094	0.06	Hf	6.8	0.5
Br	4.3	0.5	W	0.95	0.11
Rb	85	2	Hg (ng/g)	60	3
Sr	380	8	Pb	26	1.3
			Bi	0.17	0.02

GSS-3 (cont.)

Component	Value	Uncertainty (±)	Component	Value	Uncertainty (±)
Tm	0.28	0.03	U	1.26	0.18
Th	6.0	0.3			

Noncertified concentrations (μg/g dry weight unless noted):

Component	Value
Cl	57
I	1.3
Ta	0.8
Tl	0.48

Order information:

No price information is available. Please contact NRCCRM at the address above.

Reference:

Institute of Geophysical and Geochemical Exploration (1986) Certificate of geochemical standard reference materials. Institute of Geophysical and Geochemical Exploration, Langfang, Hebei, China.

GSS-4

Yellow Soil

Source:

National Research Center for CRMs
Office of CRMs
No. 7 District 11
Hepingjie, Chaoyangqu
Beijing, 100013
CHINA

Description:

The material is yellow soil from the subtropical hill country of Yishan, Guangxi, China. The underlaying bedrock is composed of carbonates.

Certified concentrations (μg/g dry weight unless noted):

Component	Value	Uncertainty (±)	Component	Value	Uncertainty (±)
Li	55.4	1.0	Y	39	2
Be	1.85	0.17	Zr	500	21
B	97	6	Nb	37.6	1.4
F	540	15	Mo	2.6	0.1
Na_2O (%)	0.11	0.01	Ag	0.070	0.006
MgO (%)	0.49	0.02	Cd	0.35	0.03
Al_2O_3 (%)	23.45	0.11	In	0.12	0.02
SiO_2 (%)	50.95	0.08	Sn	5.7	0.5
P	695	13	Sb	6.3	0.6
S	180	30	I	9.4	0.7
K_2O (%)	1.03	0.03	Cs	21.4	0.7
CaO (%)	0.26	0.02	Ba	213	10
Sc	20.2	0.10	La	53	2
Ti	10800	140	Ce	136	6
V	247	6	Pr	8.4	1.1
Cr	370	6	Nd	27.3	1.4
Mn	1420	30	Sm	4.4	0.2
Fe_2O_3 (%)	10.30	0.05	Eu	0.85	0.05
Co	22.3	0.6	Gd	4.7	0.3
Ni	64.2	1.7	Tb	0.94	0.06
Cu	40.5	0.10	Dy	6.6	0.3
Zn	210	5	Ho	1.46	0.07
Ga	30.6	2.0	Er	4.5	0.4
Ge	1.91	0.19	Yb	4.8	0.3
As	58	3	Lu	0.75	0.04
Se	0.64	0.10	Hf	14	1
Br	4.0	0.7	Ta	3.1	0.2
Pb	75	2	W	6.2	0.2
Sr	77	3	Hg (ng/g)	590	34
			Tl	0.94	0.16

GSS-4 (cont.)

Component	Value	Uncertainty (±)	Component	Value	Uncertainty (±)
Pb	58.5	2.1	Th	27.3	0.8
Bi	1.04	0.07	U	6.7	0.5
Tm	0.70	0.06			

Noncertified concentrations (μg/g dry weight unless noted):

Component	Value
Cl	36
Te	0.15
Au (ng/g)	5.5

Order information:

No price information is available. Please contact NRCCRM at the address above.

Reference:

Institute of Geophysical and Geochemical Exploration (1986) Certificate of geochemical standard reference materials. Institute of Geophysical and Geochemical Exploration, Langfang, Hebei, China.

GSS-5

Yellow-Red Soil

Source:

National Research Center for CRMs
Office of CRMs
No. 7 District 11
Hepingjie, Chaoyangqu
Beijing, 100013
CHINA

Description:

The material for this CRM was collected in a humid hilly area in the Qibaoshan polymetallic ore field, Hunan, China. The underlying bedrock is granite-porphyry.

Certified concentrations (μg/g dry weight unless noted):

Component	Value	Uncertainty (±)	Component	Value	Uncertainty (±)
Li	56	1	Nb	22.6	1.0
Be	2.0	0.16	Mo	4.6	0.2
B	53	3	Ag	4.4	0.3
F	603	17	Cd	0.45	0.04
Na_2O (%)	0.122	0.009	In	4.1	0.4
MgO (%)	0.61	0.02	Sn	17.7	1.5
Al_2O_3 (%)	21.58	0.09	Sb	35.4	2.4
SiO_2 (%)	52.57	0.1	I	3.8	0.5
P	390	17	Cs	15.0	0.6
S	410	40	Ba	296	12
K_2O (%)	1.50	0.02	La	35.7	1.8
Sc	17.2	0.6	Ce	91	6
Ti	6290	90	Pr	7.0	0.8
V	166	4	Nd	24	1
Cr	118	3	Sm	4.0	0.3
Mn	1360	28	Eu	0.82	0.03
Fe_2O_3 (%)	12.62	0.08	Gd	3.5	0.16
Co	12.3	0.5	Tb	0.69	0.08
Ni	40	1	Dy	3.7	0.3
Cu	144	3	Ho	0.80	0.1
Zn	494	11	Er	2.4	0.2
Ga	31.7	2.1	Yb	2.8	0.2
Ge	2.6	0.2	Lu	0.42	0.03
As	412	8	Hf	8.1	1.0
Se	1.56	0.12	Ta	1.8	0.16
Rb	117	3	W	33.5	1.1
Sr	41.5	1.9	Au (ng/g)	260	4
Y	21	1	Hg (ng/g)	294	19
Zr	272	8	Tl	1.6	0.2
			Pb	552	14

GSS-5 (cont.)

Component	Value	Uncertainty (±)	Component	Value	Uncertainty (±)
Bi	41	2	Th	22.7	0.8
Tm	0.41	0.03	U	6.5	0.5

Noncertified concentrations (μg/g dry weight unless noted):

Component	Value
Cl	78
Br	1.8
Te	4.0

Order information:

No price information is available. Please contact NRCCRM at the address above.

Reference:

Institute of Geophysical and Geochemical Exploration (1986) Certificate of geochemical standard reference materials. Institute of Geophysical and Geochemical Exploration, Langfang, Hebei, China.

GSS-6

Yellow-Red Soil

Source:

National Research Center for CRMs
Office of CRMs
No. 7 District 11
Hepingjie, Chaoyangqu
Beijing, 100013
CHINA

Description:

The material for this CRM is a composite sample from the subtropical low-hill region of Yangchun, Guangdong, China. The rocks in the area are shale, sandstone, granite and granodiorite. Copper, W, Sn, Sb and As mineralization occurs in the area.

Certified concentrations (μg/g dry weight unless noted):

Component	Value	Uncertainty (±)	Component	Value	Uncertainty (±)
Li	36	0.5	Sr	39	2
Be	4.4	0.3	Y	18.8	0.8
B	57	3	Zr	220	7
F	906	27	Nb	26.8	1.0
Na_2O (%)	0.19	0.008	Mo	18	0.8
MgO (%)	0.34	0.02	Ag	0.20	0.01
Al_2O_3 (%)	21.23	0.09	Cd	0.13	0.016
SiO_2 (%)	56.93	0.11	In	0.84	0.12
P	303	15	Sn	72	4
S	260	30	Sb	60	3
Cl	98	11	I	19.4	0.6
K_2O (%)	1.70	0.03	Cs	10.8	0.3
CaO (%)	0.22	0.01	Ba	118	6
Sc	15.5	0.5	La	30	1
Ti	4390	50	Ce	66	3
V	130	3	Pr	5.8	0.4
Cr	75	2	Nd	21	1.4
Mn	1450	32	Sm	3.8	0.3
Fe_2O_3 (%)	8.09	0.06	Eu	0.66	0.03
Co	7.6	0.4	Gd	3.4	0.16
Ni	53	1	Tb	0.61	0.05
Cu	390	6	Dy	3.3	0.14
Zn	96.6	2.4	Ho	0.69	0.04
Ga	29.5	1.8	Er	2.2	0.2
Ge	3.2	0.3	Yb	2.7	0.2
As	220	7	Lu	0.42	0.03
Se	1.34	0.12	Hf	7.5	0.5
Rb	237	4	Ta	5.3	0.4
			W	89.5	3.4

GSS-6 (cont.)

Component	Value	Uncertainty (±)	Component	Value	Uncertainty (±)
Hg (ng/g)	72	5	Tm	0.40	0.04
Tl	2.4	0.3	Th	23	1
Pb	314	6	U	6.7	0.5
Bi	49	3			

Noncertified concentrations (μg/g dry weight unless noted):

Component	Value
Br	7.2
Te	0.42
Au (ng/g)	9.0

Order information:

No price information is available. Please contact NRCCRM at the address above.

Reference:

Institute of Geophysical and Geochemical Exploration (1986) Certificate of geochemical standard reference materials. Institute of Geophysical and Geochemical Exploration, Langfang, Hebei, China.

GSS-7

Laterite

Source:

National Research Center for CRMs
Office of CRMs
No. 7 District 11
Hepingjie, Chaoyangqu
Beijing, 100013
CHINA

Description:

The material for this CRM is a laterite soil from the tropical region of the Leizhou Peninsula, China. The underlying bedrock is basalt.

Certified concentrations (μg/g dry weight unless noted):

Component	Value	Uncertainty (±)	Component	Value	Uncertainty (±)
Li	19.5	0.5	Y	26.6	1.7
Be	2.8	0.3	Zr	318	19
F	321	17	Nb	64	3
Na_2O (%)	0.074	0.009	Mo	2.9	0.14
MgO (%)	0.26	0.02	Ag	0.057	0.006
Al_2O_3 (%)	29.26	0.2	Cd	0.080	0.014
SiO_2 (%)	32.69	0.11	In	0.10	0.02
P	1150	19	Sn	3.6	0.7
S	250	20	Sb	0.42	0.05
Cl	100	8	I	19.3	1.1
K_2O (%)	0.20	0.01	Cs	2.7	0.5
CaO (%)	0.16	0.016	Ba	180	12
Sc	28	1	La	46	3
Ti	20200	230	Ce	98	6
V	245	8	Pr	11	0.5
Cr	410	9	Nd	45	1.6
Mn	1780	44	Sm	10.3	0.2
Fe_2O_3 (%)	18.76	0.16	Eu	3.4	0.1
Co	97	2	Gd	9.6	0.6
Ni	276	6	Tb	1.3	0.1
Cu	97	2	Dy	6.6	0.4
Zn	142	5	Ho	1.1	0.1
Ga	39.3	2.9	Er	2.7	0.3
Ge	1.6	0.2	Yb	2.4	0.2
As	4.8	0.6	Lu	0.35	0.03
Se	0.32	0.05	Hf	7.7	0.2
Br	5.2	0.8	Ta	3.9	0.4
Rb	15.8	1.3	W	1.23	0.13
Sr	26	2	Hg (ng/g)	61	4
			Pb	13.6	1.2

GSS-7 (cont.)

Component	Value	Uncertainty (±)	Component	Value	Uncertainty (±)
Bi	0.20	0.03	Th	9.1	0.4
Tm	0.42	0.03	U	2.2	0.2

Noncertified concentrations (μg/g dry weight unless noted):

Component	Value
B	10.5
Au (ng/g)	0.8
Tl	0.21

Order information:

No price information is available. Please contact NRCCRM at the address above.

Reference:

Institute of Geophysical and Geochemical Exploration (1986) Certificate of geochemical standard reference materials. Institute of Geophysical and Geochemical Exploration, Langfang, Hebei, China.

GSS-8

Loess

Source:

National Research Center for CRMs
Office of CRMs
No. 7 District 11
Hepingjie, Chaoyangqu
Beijing, 100013
CHINA

Description:

The material for this CRM is a loess soil collected from Luochuan, Shaaxi, China.

Certified concentrations (μg/g dry weight unless noted):

Component	Value	Uncertainty (±)	Component	Value	Uncertainty (±)
Li	35.2	0.7	Nb	15	1
Be	1.9	0.1	Mo	1.16	0.05
B	54	2	Ag	0.060	0.006
F	577	14	Cd	0.13	0.02
Na_2O (%)	1.72	0.02	Sn	2.8	0.3
MgO (%)	2.38	0.03	Sb	1.04	0.12
Al_2O_3 (%)	11.92	0.08	Te	0.046	0.008
SiO_2 (%)	58.61	0.08	I	1.6	0.3
P	775	12	Cs	7.5	0.5
S	120	30	Ba	480	11
K_2O (%)	2.42	0.02	La	35.5	1.4
CaO (%)	8.27	0.06	Ce	66	4
Sc	11.7	0.4	Pr	8.3	0.5
Ti	3800	50	Nd	32	1.6
V	81.4	1.8	Sm	5.9	0.3
Cr	68	2	Eu	1.2	0.04
Mn	650	9	Gd	5.4	0.3
Fe_2O_3 (%)	4.48	0.02	Tb	0.89	0.05
Co	12.7	0.4	Dy	4.8	0.2
Ni	31.5	0.7	Ho	0.97	0.05
Cu	24.3	0.5	Er	2.8	0.08
Zn	68	1.6	Yb	2.8	0.1
Ga	14.8	0.7	Lu	0.43	0.03
Ge	1.27	0.13	Hf	7.0	0.5
As	12.7	0.5	Ta	1.05	0.16
Se	0.12	0.02	W	1.7	0.16
Rb	96	2	Hg (ng/g)	16.6	1.7
Sr	236	6	Tl	0.59	0.08
Y	26	1	Pb	21	1
Zr	229	6	Bi	0.30	0.02
			Tm	0.46	0.04

GSS-8 (cont.)

Component	Value	Uncertainty (±)	Component	Value	Uncertainty (±)
Th	11.8	0.4	U	2.7	0.2

Noncertified concentrations (μg/g dry weight unless noted):

Component	Value
Cl	68
Br	2.6
In	0.043
Au (ng/g)	1.4

Order information:

No price information is available. Please contact NRCCRM at the address above.

Reference:

Institute of Geophysical and Geochemical Exploration (1986) Certificate of geochemical standard reference materials. Institute of Geophysical and Geochemical Exploration, Langfang, Hebei, China.

IAEA-312

Soil

Source:

International Atomic Energy Agency
Analytical Quality Control Service
Laboratory Seibersdorf
P. O. Box 100
A-1400 Vienna
AUSTRIA

Description:

The material for this SRM was donated by the Indonesian Atomic Energy Commission.

Concentrations (μg/g) or activities (mBq/g):

Radionuclide	Activity	Range
^{226}Ra	269	250 - 287

Element	Value	Range
Th	91.4	81.3 - 101
U	16.5	15.7 - 17.4

Order information:

IAEA-312 can be purchased for US$60 per unit (50 g). Price subject to change after Summer 1992. The price includes handling, postage (surface mail in Europe, airmail elsewhere), and insurance. Please contact IAEA at the address shown above.

Reference:

International Atomic Energy Agency (1992) AQCS (Analytical Quality Control Services) Intercomparison Runs Reference Materials 1992. Catalog, 88 pp. International Atomic Energy Agency, Laboratory Seibersdorf, P.O. Box 100, A-1400 Vienna, Austria.

SARM 42

Soil

Source:

South Africa Bureau of Standards
Private Bag X191
Pretoria, Transvaal 0001
REPUBLIC OF SOUTH AFRICA

Description:

SARM 42 comes from the Rustenburg area of the Transvaal. As this material Is a fine grained stream sediment, only information from x-ray defractometry is available. The following minerals are present: quartz, ilmenite, magnetite, rutile with small amounts of plagioclase, pyroxenes and clay minerals. Orders of magnitude for As, Ga, Se, W, Au, Br, Cs, Eu, Hf, La, Lu, Sc, Sm, Ta, Tb, Yb and Sb are available from SABS.

Certified concentrations (µg/g dry weight unless noted):

Component	Value	Component	Value
Al_2O_3 (%)	10.03	Fe_2O_3 (%)	4.68
SiO_2 (%)	74.09	Ni	125
K_2O (%)	0.45	Cu	17
CaO (%)	0.89	Zn	44
TiO_2 (%)	0.36	Rb	22
V	94	MgO (%)	1.92
Cr_2O_3 (%)	0.63	Sr	37
MnO (%)	0.10	Y	11
Co	35	Zr	192

Noncertified concentrations (µg/g dry weight unless noted):

Component	Value	Component	Value
Na_2O (%)	0.15	Mo	5
P_2O_5 (%)	0.04	Ba	250
S (%)	0.02	Ce	30
FeO (%)	4.0	Pb	10
Ga	12	Th	5
Nb	8		

Order information:

SARM 42 can be purchased for US$50 per unit (100 g). Price subject to change. Please contact SABS at the address shown above.

SARM 42 (cont.)

Reference:

South African Committee for Certified Reference Materials (1992) Catalogue of certified reference materials. South Africa Bureau of Standards, Private Bag X191, Pretoria, Transvaal 0001, South Africa. 36 pp.

SO-2 - SO-4

Soils

Source:

Canada Centre for Mineral and Energy Technology
555 Booth Street
Ottawa K1A 0G1
CANADA

Description:

SO-2 through SO-4 were selected to represent major kinds of soil materials. The collections were made in different areas of Canada. Material for SO-2 was collected in the Montgomery Forest, north of Quebec, and is of the B horizon of a ferro-humic Podzol developed in sandy till. Its organic matter content is approximately 10%. The material for SO-3 was collected near Guelph, Ontario and is a calcareous till parent material of the Guelph series, a gray brown Luvisol. It has substantial amounts of calcite and dolomite. The material for SO-4 was collected near Saskatoon, Saskatchewan, and is of the A horizon of a black Chernozemic soil developed in silty glacial lacustrine deposits. Forty laboratories provided analytical data and provisionally recommended values. TILL-1, TILL-2, TILL-3 and TILL-4 are currently being certified and will serve as replacements for SO-2, SO-3 and SO-4.

Provisional values (µg/g unless noted):

	SO-2			SO-3			SO-4		
Constituent	Value		Uncertainty	Value		Uncertainty	Value		Uncertainty
Na (%)	1.9	±	0.05	0.74	±	0.04	1.0	±	0.02
Mg (%)	0.54	±	0.03	4.98	±	0.1	0.56	±	0.04
Al (%)	8.07	±	0.18	3.05	±	0.11	5.46	±	0.15
Si (%)	24.99	±	0.23	15.86	±	0.19	31.97	±	0.24
P (%)	0.3	±	0.02	0.048	±	0.005	0.09	±	0.07
K (%)	2.45	±	0.04	1.61	±	0.05	1.73	±	0.03
Ca (%)	1.96	±	0.1	14.63	±	0.4	1.11	±	0.06
Ti (%)	0.86	±	0.02	0.2	±	0.02	0.34	±	0.02
V	64	±	10	38	±	6	90	±	11
Cr	16	±	2	26	±	3	61	±	6
Mn (%)	0.072	±	0.002	0.052	±	0.002	0.06	±	0.002
Fe (%)	5.56	±	0.16	1.51	±	0.06	2.37	±	0.07
Co	9	±	2	8	±	3	11	±	1
Ni	8	±	2	16	±	3	26	±	3
Cu	7	±	1	17	±	1	22	±	1
Zn	124	±	5	52	±	3	94	±	3
Rb	78	±	6	39	±	3	NA		
Sr	340	±	50	217	±	29	170	±	18
Ba	966	±	67	296	±	39	NA		
Hg	0.082	±	0.009	0.017	±	0.007	0.03	±	0.006
Pb	21	±	4	14	±	3	16	±	3

Order information:

These CRMs are packaged in 200-g bottles and can be purchased for Canadian $160 each. Price subject to change without notice. Please contact CANMET at the address shown above.

References:

Bowman, W. S. (1990) Certified reference materials. CCRMP 90-1E. Canada Centre for Mineral and Energy Technology, Ottawa, Canada. 65 pp.

SOIL-6

Soil

Source:

International Atomic Energy Agency
Analytical Quality Control Service
Laboratory Seibersdorf
P. O. Box 100
A-1400 Vienna
AUSTRIA

Description:

Not available.

Recommended activities (Bq/g):

Radionuclide	Activity	Range		
^{90}Sr	30.34	24.2	-	31.67
^{137}Cs	53.65	51.43	-	57.91
^{226}Ra	79.92	69.56	-	93.43
^{239}Pu	1.04	0.962	-	1.11

Order information:

SOIL-6 can be purchased for US$110 per unit (250 g). Price subject to change after Summer 1992. The price includes handling, postage (surface mail in Europe, airmail elsewhere), and insurance. Please contact IAEA at the address shown above.

Reference:

International Atomic Energy Agency (1992) AQCS (Analytical Quality Control Services) Intercomparison Runs Reference Materials 1992. Catalog, 88 pp. International Atomic Energy Agency, Laboratory Seibersdorf, P.O. Box 100, A-1400 Vienna, Austria.

SOIL-7

Soil

Source:

International Atomic Energy Agency
Analytical Quality Control Service
Laboratory Seibersdorf
P. O. Box 100
A-1400 Vienna
AUSTRIA

Description:

Not available.

Recommended concentrations (μg/g):

Element	Value	Range	Element	Value	Range
Sc	8.3	6.9 - 9.0	La	28	27 - 29
V	66	59 - 73	Ce	61	50 - 63
Cr	60	49 - 74	Nd	30	22 - 34
Mn	631	604 - 650	Sm	5.1	4.8 - 5.5
Co	8.9	8.4 - 10.1	Eu	1.0	0.9 - 1.3
Cu	11	9 - 13	Tb	0.6	0.5 - 0.9
Zn	104	101 - 113	Dy	3.9	3.2 - 5.3
As	13.4	12.5 - 14.2	Yb	2.4	1.9 - 2.6
Rb	51	47 - 56	Hf	5.1	4.8 - 5.5
Sr	108	103 - 114	Ta	0.8	0.6 - 1.0
Y	21	15 - 27	Pb	60	55 - 71
Zr	185	180 - 201	Th	8.2	6.5 - 8.7
Sb	1.7	1.4 - 1.8	U	2.6	2.2 - 3.3
Cs	5.4	4.9 - 6.4			

Order information:

SOIL-7 can be purchased for US$110 per unit (25 g). Price subject to change. The price includes handling, postage (surface mail in Europe, airmail elsewhere), and insurance. Please contact IAEA at the address shown above.

Reference:

International Atomic Energy Agency (1992) AQCS (Analytical Quality Control Services) Intercomparison Runs Reference Materials 1992. Catalog, 88 pp. International Atomic Energy Agency, Laboratory Seibersdorf, P.O. Box 100, A-1400 Vienna, Austria.

SRM 2709 - 2711

Soils

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

SRM 2709 is agricultural soil from the San Joaquin Valley, CA; SRM 2710 is a highly contaminated Northern Great Plains soil collected in a flood plain downstream from a major processing plant in Butte, MT. SRM 2711 is a moderately contaminated soil from an undisclosed location in Montana. As of this writing, these SRMs are in the final stages of the certification process and are expected to be available in the Fall 1992.

Draft concentrations (Values in parenthesis are for information only.) (μg/g unless noted):

	SRM 2709	SRM 2710	SRM 2711		SRM 2709	SRM 2710	SRM 2711
Element	Value	Value	Value	Element	Value	Value	Value
Na (%)	1.16	1.14	1.14	Cu	34.5	2950	114
Mg (%)	1.51	0.853	1.048	Zn	105.6	6952	350.4
Al (%)	7.50	6.44	6.53	As	17.7	626	105
Si (%)	29.66	28.97	30.44	Se	1.57	-	1.52
P (%)	0.062	0.106	0.0859	Sr	230.6	-	245
S (%)	0.089	0.24	0.042	Ag	0.41	35.3	4.63
K (%)	2.03	2.11	2.45	Cd	0.38	21.8	41.7
Ca (%)	1.89	1.25	2.88	Sb	7.87	38.4	19.43
Ti (%)	0.34	0.28	0.306	Ba	968	707	726
V	112.2	76.6	81.6	Au	(0.3)	(0.65)	(0.03)
Cr	130	(39)	(47)	Hg	1.40	32.6	6.25
Mn	538	10080	638	Tl	0.704	(1.3)	2.47
Fe (%)	3.50	3.38	2.89	Pb	18.9	5532	1162
Co	13.4	(10)	(10)	Th	10.8	13.5	13.6
Ni	87.7	14.5	20.6				

Order information:

No information available as of this writing. Please contact NIST at the address shown above.

Reference:

J. Kane, National Institute of Standards and Technology, personal communication.

SRM 4353

Rocky Flats Soil Number 1

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

This SRM is soil from the Rocky Flats, Colorado, and is intended for use in tests of environmental radioactivity in matrices similar to that of the SRM. Semiquantitative emission spectrometry analysis and gamma ray spectrum of this SRM are available in the Certificate of Analysis.

Certified values (excluding "hot" particles):

Reference time: Dec. 15, 1980

Radionuclide	Activity (Bq/g)	Uncertainty (%)
^{40}K	7.23×10^{-1}	9.6
^{90}Sr	7.63×10^{-3}	10.2
^{137}Cs	1.76×10^{-2}	4.5
^{226}Ra	4.30×10^{-2}	6.6
^{228}Ac	6.98×10^{-2}	5.1
^{228}Th	7.08×10^{-2}	5.1
^{230}Th	4.43×10^{-4}	5.1
^{232}Th	6.93×10^{-2}	5.1
^{234}U	3.91×10^{-2}	3.6
^{238}U	3.89×10^{-2}	5.1
^{238}Pu	1.66×10^{-4}	11.0
$^{239}Pu + ^{240}Pu$	8.03×10^{-3}	7.5
^{241}Am	1.25×10^{-3}	7.3

Order information:

SRM 4353 can be purchased for US$245 per unit (25 g). Price subject to change without notice. Please contact NIST at the address shown above.

Reference:

National Institute of Standards and Technology (1981) SRM 4353. Rocky Flats soil number 1. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

SRM 4355

Peruvian Soil

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

The material of this SRM has non-measurable radioactivity concentrations for many fallout nuclides and is intended as a blank or very low level standard in tests of environmental radioactivity. The starting material for this SRM is the IAEA Soil-5 which has been the subject of extensive trace element analysis. The elemental composition of the two materials, however, will be similar but not identical.

Certified values:

Reference time: June 1, 1982

Radionuclide	Activity (Bq/g)	Est. Detection Limit (Bq/g)	Uncertainty (%)
^{60}Co	Not detected	1.6×10^{-5}	
^{125}Sb	Not detected	1.4×10^{-4}	
^{137}Cs	3.3×10^{-4}		13
^{152}Eu	Not detected	2.3×10^{-4}	
^{154}Eu	Not detected	2×10^{-4}	
^{155}Eu	Not detected	2×10^{-4}	
^{228}Th	4.22×10^{-2}		5
^{230}Th	3.97×10^{-2}		5
^{232}Th	4.30×10^{-2}		5
$^{239}Pu + ^{240}Pu$	7.6×10^{-6}		28
^{241}Am	4×10^{-6}		36

Order information:

SRM 4355 can be purchased for US$240 per unit (75 g). Price subject to change without notice. Please contact NIST at the address shown above.

Reference:

National Institute of Standards and Technology (1987) SRM 4355. Peruvian soil. Certificate of analysis (revised). National Institute of Standards and Technology, Gaithersburg, MD, USA.

CRM 278

Trace Elements in Mussel Tissue

Source:

Community Bureau of Reference
Commission of the European Communities
Directorate General for Science
Research and Development
200 rue de la Loi
B-1049 Brussels
BELGIUM

Description:

This material consists of freeze dried mussel (*Mytilus edulis*) tissue powder.

Certified concentrations (µg/g dry weight):

Element	Value	Uncertainty (±)	Element	Value	Uncertainty (±)
Cr	0.80	0.08	As	5.9	0.2
Mn	7.3	0.2	Se	1.66	0.04
Fe	133	4	Cd	0.34	0.02
Cu	9.60	0.16	Hg	0.188	0.007
Zn	76	2	Pb	1.91	0.04

Noncertified concentrations (µg/g dry weight unless noted):

Element	Value	Element	Value
Na (mg/g)	20	Ni	1.0
Mg (mg/g)	1.4	Cl (mg/g)	32
Al	70	Br	83
P (mg/g)	7.2	Rb	2.5
K (mg/g)	4.8	Sr	14.5
Ca (mg/g)	1.0	Ba	0.7
Co	0.34		
Ti	2.0		

Order information:

CRM 278 can be purchased for BFR5000 per unit (35 g) respectively. Price includes handling and normal postage and it is subject to change without notice. Please contact BCR at the address shown above.

CRM 278 (cont.)

References:

Community Bureau of Reference (BCR) (1988) BCR CRM 278, trace element in mussel tissue. Certificate of analysis. Community Bureau of Reference, Commission of the European Communities, Directorate General for Science, Research and Development, 200 rue de la Loi, B-1049 Brussels, Belgium.

Community Bureau of Reference (BCR) (1992) Reference Materials. Community Bureau of Reference, Commission of the European Communities, Directorate General for Science, Research and Development, 200 rue de la Loi, B-1049 Brussels, Belgium. 75 pp.

CRM 414

Trace Elements in Plankton

Source:

Community Bureau of Reference
Commission of the European Communities
Directorate General for Science
Research and Development
200 rue de la Loi
B-1049 Brussels
BELGIUM

Description:

This material consists of freeze dried plankton powder in a glass bottle. The bottle contains a small PTFE ball to facilitate homogenisation prior to use.

Certified concentrations (µg/g dry weight):

Element	Value	Uncertainty (±)	Element	Value	Uncertainty (±)
V	8.10	0.18	As	6.82	0.28
Cr	23.8	1.2	Se	1.75	0.10
Mn	299	12	Cd	0.383	0.014
Ni	18.8	0.8	Hg	0.276	0.018
Cu	29.5	1.3	Pb	0.397	0.19
Zn	112	3			

Noncertified concentrations (µg/g dry weight unless noted):

Element	Value	Element	Value
K (mg/g)	7.55	Co	1.43
Sc	0.54	Sr	261
Fe	1.85	Mo	1.35

Order information:

CRM 414 can be purchased for BFR5000 per unit (5 g) respectively. Price includes handling and normal postage and it is subject to change without notice. Please contact BCR at the address shown above.

References:

Community Bureau of Reference (BCR) (1992) BCR CRM 414, trace element in plankton. Certificate of analysis. Community Bureau of Reference, Commission of the European Communities, Directorate General for Science, Research and Development, 200 rue de la Loi, B-1049 Brussels, Belgium.

CRM 414 (cont.)

Community Bureau of Reference (BCR) (1992) Reference Materials. Community Bureau of Reference, Commission of the European Communities, Directorate General for Science, Research and Development, 200 rue de la Loi, B-1049 Brussels, Belgium. 75 pp.

CRM 422

Trace Elements in Cod Muscle

Source:

Community Bureau of Reference
Commission of the European Communities
Directorate General for Science
Research and Development
200 rue de la Loi
B-1049 Brussels
BELGIUM

Description:

This material consists of cod muscle powder in a glass bottle. The bottle contains a small PTFE ball to facilitate homogenisation prior to use.

Certified concentrations (µg/g dry weight):

Element	Value	Uncertainty (±)	Element	Value	Uncertainty (±)
Mn	0.543	0.028	Se	1.63	0.07
Fe	5.46	0.30	Cd	0.017	0.002
Cu	1.05	0.07	I	4.95	0.49
Zn	19.6	0.5	Hg	0.559	0.016
As	21.1	0.5	Pb	0.085	0.015

Noncertified concentrations (µg/g dry weight unless noted):

Element	Value	Element	Value
Na (mg/g)	2200	Co	0.015
Mg (mg/g)	1370	Br	17
S	11500	Sr	0.7
K (mg/g)	21700	Methyl Hg	0.43
Ca (mg/g)	330		

Order information:

CRM 422 can be purchased for BFR5500 per unit (15 g) respectively. Price includes handling and normal postage and it is subject to change without notice. Please contact BCR at the address shown above.

References:

Community Bureau of Reference (BCR) (1992) BCR CRM 422, trace element in cod muscle. Certificate of analysis. Community Bureau of Reference, Commission of the European Communities, Directorate General for Science, Research and Development, 200 rue de la Loi, B-1049 Brussels, Belgium.

CRM 422 (cont.)

Community Bureau of Reference (BCR) (1992) Reference Materials. Community Bureau of Reference, Commission of the European Communities, Directorate General for Science, Research and Development, 200 rue de la Loi, B-1049 Brussels, Belgium. 75 pp.

DOLT-1

Dogfish Liver

Source:

National Research Council of Canada
Marine Analytical Chemistry Standards Program
Institute for Environmental Chemistry
Montreal Road
Ottawa, ON K1A OR9
CANADA

Description:

This CRM contains dogfish (*Squalus acanthias*) liver containing 5 % fat. The livers were cleaned and frozen for storage, thawed, homogenized and extracted with acetone to produce a partially defatted protein powder. This powder was screened through a 24 mesh nylon screen, mixed, bottled, and radiation sterilized. A more complete description of the preparation and analysis of DOLT-1 can be found in the NRCC description sheet (1986).

Certified concentrations (µg/g dry weight unless noted):

Element	Value	Uncertainty (±)	Element	Value	Uncertainty (±)
Na (%)	0.726	0.073	Cu	20.8	1.2
Mg (%)	0.110	0.015	Zn	92.5	2.3
Cl (%)	0.688	0.022	As	10.1	1.4
K (%)	1.01	0.10	Se	7.34	0.42
Cr	0.40	0.07	Cd	4.18	0.28
Mn	8.72	0.53	Hg	0.225	0.037
Fe	712	49	Pb	1.36	0.29
Co	0.157	0.037			
Ni	0.26	0.06	Methyl Hg	0.080	0.011

Order information:

DOLT-1 can be purchased for US$135 per unit (25 g). Price subject to change without notice. Please contact NRCC at the address above.

References:

National Research Council Canada (1986) DORM-1 and DOLT-1. Dogfish muscle and liver reference materials for trace metals. Description sheet. National Research Council Canada, Institute for Environmental Chemistry, Ottawa, Canada.

National Research Council Canada (1988) MACSP Update. Estuarine reference material for trace metals SLEW-1, and MACSP biological tissue reference materials certified for methyl mercury. Information sheet. National Research Council Canada, Institute for Environmental Chemistry, Ottawa, Canada.

DORM-1

Dogfish Muscle

Source:

National Research Council of Canada
Marine Analytical Chemistry Standards Program
Institute for Environmental Chemistry
Montreal Road
Ottawa, ON K1A OR9
CANADA

Description:

This CRM contains dogfish (*Squalus acanthias*) muscle containing 5 % fat. The muscle was frozen for storage, thawed, homogenized, dried and extracted with acetone to produce a partially defatted protein powder. This powder was screened through a 24 mesh nylon screen, mixed, bottled, and radiation sterilized. A more complete description of the preparation and analysis of DOLT-1 can be found in the NRCC description sheet (1986).

Certified concentrations (µg/g dry weight unless noted):

Element	Value	Uncertainty (±)	Element	Value	Uncertainty (±)
Na (%)	0.800	0.060	Cu	5.22	0.33
Mg (%)	0.121	0.013	Zn	21.3	1.0
Cl (%)	1.13	0.03	As	17.7	2.1
K (%)	1.59	0.10	Se	1.62	0.12
Cr	3.60	0.40	Cd	0.086	0.012
Mn	1.32	0.26	Hg	0.798	0.074
Fe	63.6	5.3	Pb	0.40	0.12
Co	0.049	0.014			
Ni	1.20	0.30	Methyl Hg	0.731	0.060

Order information:

DORM-1 can be purchased for US$135 per unit (40 g). Price subject to change without notice. Please contact NRCC at the address above.

References:

National Research Council Canada (1986) DORM-1 and DOLT-1. Dogfish muscle and liver reference materials for trace metals. Description sheet. National Research Council Canada, Institute for Environmental Chemistry, Ottawa, Canada.

National Research Council Canada (1988) MACSP Update. Estuarine reference material for trace metals SLEW-1, and MACSP biological tissue reference materials certified for methyl mercury. Information sheet. National Research Council Canada, Institute for Environmental Chemistry, Ottawa, Canada.

EPA SRS903

EPA CRADA QCS Chlordane in Fish Tissue

Source:

US Environmental Protection Agency
Quality Assurance Research Division
EMSL-Cincinnati
Cincinnati, OH 45268-1525
USA

Available from:

Fisher Scientific
711 Forbes Avenue
Pittsburgh, PA 15219

Description:

This CRADA reference material is designed, produced and verified for purity, homogeneity and stability under a cooperative research and development agreement between Fisher Scientific and the US EPA. It consists of a homogeneous mixture of 1 part fish tissue to 2 parts sodium sulfate.

Certified concentrations (µg/g dry weight of tissue/sodium sulfate homogenate):

Compound	Value	Compound	Value
Total chlordane (sum of the eight isomers)	0.047	b-Chlordene	ND
		g-Chlordene	ND
cis-Chlordane	0.014		
trans-Chlordane	0.011	Total DDT	0.052
cis-Nonachlor	0.007	DDD	0.008
trans-Nonachlor	0.012	DDE	0.044
Oxychlordane	0.002	DDT	ND
a-Chlordene	ND		

ND - Not detected.

Order information:

This CRM can be purchased from US$14 per unit (20 g). They are available from the wholesale distributor, Fisher Scientific, 711 Forbes Ave., Pittsburgh, PA 15219, USA, as well as from other distributors worldwide. Price subject to change without notice.

Reference:

Environmental Protection Agency (1990) Instructions for Chlordane in Fish Tissue quality control sample. US Environmental Protection Agency, Quality Assurance Research Division, EMSL-Cincinnati, Cincinnati, OH 45268-1525. 2 pp.

GBW 08571

Mussel

Source:

National Research Center for CRMs
Office of CRMs
No. 7 District 11
Hepingjie, Chaoyangqu
Beijing, 100013
CHINA

Description:

The mussels for this CRM were collected in the Dalian Sea, China. The tissues were ground in a glass and stainless steel mixer, lyophilised under vacuum, ground in a ball mill, sieved to pass a 80-mesh sieve, mixed and packaged in acid-washed bottles. The bottled tissue material was sterilized in situ using ^{60}Co radiation.

Certified concentrations (μg/g dry weight unless noted):

Element	Value	Uncertainty (±)	Element	Value	Uncertainty (±)
Na (%)	0.582	0.014	Cu	7.7	0.9
Mg (%)	0.197	0.020	Zn	138	9
K (%)	0.424	0.424	As	6.1	1.1
Ca (%)	0.111	0.003	Se	3.65	0.17
Cr	0.57	0.08	Sr	12.8	1.1
Mn	10.2	1.8	Cd	4.5	4.5
Fe	221	14	Pb	1.96	0.09
Co	0.94	0.94	Hg	0.067	0.008
Ni	1.03	1.03			

Noncertified concentrations (μg/g dry weight unless noted):

Element	Value	Element	Value
Li	0.8	Sb	6
B	7	Ba	2
Al	231	La	0.2
P (%)	1.35	Ce	0.3
Sc	0.05	Sm	0.02
Ti	10	Eu	0.08
Cl (%)	0.9	Hf	0.01
Br	90	Au	0.1
Rb	2	Th	0.06
Mo	0.6		

GBW 08571 (cont.)

Order information:

This CRM can be purchased for US$100 per unit (12 g). Price subject to change without notice. Please contact NRCCRM at the address above.

References:

National Research Center for CRMs (1991) Certified reference materials catalog. State Bureau of Technical Supervision, National Research Center for CRMs, Office of CRMs, Hepingjie, Chaoyangqu, Beijing, China. 86 pp.

Second Institute of Oceanography (1989) Certificate of Certified Reference Material. Mussel. Second Institute of Oceanography, National Bureau of Oceanography, Hangzhou, China.

GBW 08572

Prawn

Source:

National Research Center for CRMs
Office of CRMs
No. 7 District 11
Hepingjie, Chaoyangqu
Beijing, 100013
CHINA

Description:

This CRM is composed of tissues of mature prawns cultivated in Tanggu, Tianjin, China. After removing the inedible parts, the tissue was beaten to a pulp, lyophilised under vacuum, ground in a ball mill, sieved to pass a 100-mesh sieve, mixed and packaged in acid-washed bottles. The bottled tissue material was sterilized in situ using ^{60}Co radiation.

Certified concentrations (μg/g dry weight unless noted):

Element	Value	Uncertainty (±)	Element	Value	Uncertainty (±)
N (%)	14.3	0.4	Fe	19.8	0.4
F	5.31	0.39	Cu	4.66	0.23
Na (%)	0.381	0.008	Zn	60.8	1.4
Mg (%)	0.160	0.003	As	1.42	0.06
P (%)	0.845	0.012	Se	1.52	0.04
Al (%)	0.131	0.004	Sr	40.6	3.4
K (%)	0.597	0.012	Cd	0.023	0.004
Ca (%)	0.304	0.006	Ba	4.29	0.72
Cr	0.24	0.06	Pb	0.298	0.019
Mn	1.96	0.13	Hg	0.201	0.004

Noncertified concentrations (μg/g dry weight unless noted):

Element	Value
S (%)	0.85
Ti	1.05
Co	0.29
Br	13.5

Order information:

This CRM can be purchased for US$50 per unit (8 g). Price subject to change without notice. Please contact NRCCRM at the address above.

GBW 08572 (cont.)

References:

Institute of Food Detection (1991) Certificate of Certified Reference Material. Prawn. Institute of Food Detection, Ministry of Commerce, Beijing, China.

National Research Center for CRMs (1991) Certified reference materials catalog. State Bureau of Technical Supervision, National Research Center for CRMs, Office of CRMs, Hepingjie, Chaoyangqu, Beijing, China. 86 pp.

IAEA-307

Sea Plant

Source:

International Atomic Energy Agency
Analytical Quality Control Service
Laboratory Seibersdorf
P. O. Box 100
A-1400 Vienna
AUSTRIA

Description:

The sea plant sample (*Posidonia oceanica*) was collected along the shore of the Principality of Monaco in October 1986. The plants were affected by radioactivity from the Chernobyl Nuclear Power Plant accident. The plants were washed with tap water, dried, ground, sieved and homogenized.

Recommended activities (mBq/g):

Radionuclide	Value	Range	Radionuclide	Value	Range
^{40}K	150	141 - 161	^{226}Ra	3.1	2.1 - 4.4
^{106}Ru	33.5	30.0 - 36.5	^{238}Pu	0.025	0.025 - 0.028
^{110m}Ag	5.1	4.8 - 5.5	$^{239+240}Pu$	0.72	0.72 - 0.79
^{134}Cs	1.6	1.5 - 1.9	^{241}Am	0.036	0.036 - 0.050
^{137}Cs	4.9	4.5 - 5.2			

Information only activities (from Reference Sheet, 1989) (mBq/g):

Radionuclide	Value	Range	Radionuclide	Value	Range
^{90}Sr	0.72	0.28 - 1.6	^{228}Th	3.2	1.5 - 4.2
^{210}Pb	58.5	40 - 91	^{238}U	14	2.5 - 21

Order Information:

IAEA-307 can be purchased for US$60 per unit (90 g). Price subject to change. The price includes handling, postage (surface mail in Europe, airmail elsewhere), and insurance. Please contact IAEA at the address shown above.

References:

International Atomic Energy Agency (1989) IAEA-308 mixture of seaweeds. Reference sheet. International Atomic Energy Agency, 19, av. des Castellans, MC-98000, Monaco.

International Atomic Energy Agency (1992) AQCS (Analytical Quality Control Services) Intercomparison Runs Reference Materials 1992. Catalog, 88 pp. International Atomic Energy Agency, Laboratory Seibersdorf, P.O. Box 100, A-1400 Vienna, Austria.

IAEA-308

Mediterranean Seaweeds

Source:

International Atomic Energy Agency
Analytical Quality Control Service
Laboratory Seibersdorf
P. O. Box 100
A-1400 Vienna
AUSTRIA

Description:

The mixture of seaweeds for IAEA-308 was collected along the shore of the Principality of Monaco in October 1986. The plants were affected by radioactivity from the Chernobyl Nuclear Power Plant accident. The material was roughly cleaned, air dried, ground, sieved and homogenized.

Recommended activities (mBq/g):

Radionuclide	Value	Range	Radionuclide	Value	Range
^{40}K	1381	1320 - 1456	^{210}Pb	73	66 - 75
^{106}Ru	23	22 - 25	^{228}Th	2.5	2.2 - 3.6
^{110m}Ag	2.0	1.2 - 2.7	^{238}Pu	0.017	0.016 - 0.023
^{134}Cs	1.6	1.5 - 1.8	$^{239+240}Pu$	0.50	0.46 - 0.52
^{137}Cs	5.6	5.3 - 6.0	^{241}Am	0.17	0.16 - 0.25

Order Information:

IAEA-308 can be purchased for US$60 per unit (100 g). Price subject to change. The price includes handling, postage (surface mail in Europe, airmail elsewhere), and insurance. Please contact IAEA at the address shown above.

Reference:

International Atomic Energy Agency (1989) IAEA-308 mixture of seaweeds. Reference sheet. International Atomic Energy Agency, 19, av. des Castellans, MC-98000, Monaco.

International Atomic Energy Agency (1992) AQCS (Analytical Quality Control Services) Intercomparison Runs Reference Materials 1992. Catalog, 88 pp. International Atomic Energy Agency, Laboratory Seibersdorf, P.O. Box 100, A-1400 Vienna, Austria.

IAEA-350

Tuna Homogenate

Source:

International Atomic Energy Agency
Analytical Quality Control Service
Laboratory Seibersdorf
P. O. Box 100
A-1400 Vienna
AUSTRIA

Description:

Sixteen tuna, weighing between 17 and 19 kg each were collected from the northern Mediterranean Sea. The fillets were freeze dried under a vacuum of 0.1 Torr, ground, passed through a 250 µm sieve and further homogenized. The material was packaged in glass bottles with teflon-lined screw caps. Teflon tape was wound around the cap to minimize contact of the sample with the atmosphere. This material replaces MA-A-2/TM. It was prepared in cooperation with the Regional Seas Programme of UNEP.

Recommended concentrations (µg/g dry weight):

Element	Values	Range	Element	Values	Range
Cr	0.75	0.55 - 1.01	Se	5.51	4.40 - 5.95
Mn	0.60	0.52 - 0.74	Pb	2.50	2.41 - 3.40
Fe	72.1	66.7 - 77.3	Cd	0.032	0.018 - 0.050
Cu	2.83	2.55 - 3.10	Hg	4.10	3.31 - 4.42
Zn	17.4	16.6 - 18.5			

Information only concentrations (µg/g dry weight):

Element	Values	Range	Element	Values	Range
Ca	100	72 - 191	As	3.73	2.50 - 5.71
Co	0.056	0.032 - 0.229	Sb	0.020	0.003 - 0.080
Ni	0.46	0.32 - 1.13	Pb	0.48	0.20 - 0.86

Order Information:

IAEA-350 can be purchased for US$60 per unit (35 g). Price subject to change. The price includes handling, postage (surface mail in Europe, airmail elsewhere), and insurance. Please contact IAEA at the address shown above.

References:

International Atomic Energy Agency (1990) IAEA-350 Trace elements in tuna fish flesh. Reference sheet. International Atomic Energy Agency, 19, av. des Castellans, MC-98000, Monaco.

IAEA-350 (cont.)

International Atomic Energy Agency (1992) AQCS (Analytical Quality Control Services) Intercomparison Runs Reference Materials 1992. Catalog, 88 pp. International Atomic Energy Agency, Laboratory Seibersdorf, P.O. Box 100, A-1400 Vienna, Austria.

IAEA-351

Tuna Homogenate

Source:

International Atomic Energy Agency
Analytical Quality Control Service
Laboratory Seibersdorf
P. O. Box 100
A-1400 Vienna
AUSTRIA

Description:

Sixteen tuna, weighing between 17 and 19 kg each were collected from the northern Mediterranean Sea. The fillets were freeze dried under a vacuum of 0.1 Torr, ground, passed through a 250 µm sieve and further homogenized. The material was packaged in glass bottles with teflon-lined screw caps. Teflon tape was wound around the cap to minimize contact of the sample with the atmosphere. This material was prepared in cooperation with the Regional Seas Programme of UNEP.

Recommended concentrations (ng/g dry weight):

Compound	Value	Range	Compound	Value	Range
Aldrin	46	0 - 110	PCB 138	110	94 - 126
Aroclor 1254	720	170 - 1270	PCB 153	160	145 - 175
Aroclor 1260	550	230 - 870	PCB 180	88	69 - 107
HCB	0.45	0.11 - 0.79	p,p'-DDD	25	12 - 38
Lindane	1.7	0.5 - 2.9	p,p'-DDE	140	77 - 203
PCB 101	21	15.4 - 26.6	p,p'-DDT	53	22 - 84
PCB 118	38	10 - 66			

Order Information:

IAEA-351 can be purchased for US$60 per unit (35 g). Price subject to change. The price includes handling, postage (surface mail in Europe, airmail elsewhere), and insurance. Please contact IAEA at the address shown above.

References:

International Atomic Energy Agency (1990) IAEA-351 Chlorinated hydrocarbons in tuna homogenate. Reference sheet. International Atomic Energy Agency, 19, av. des Castellans, MC-98000, Monaco.

International Atomic Energy Agency (1992) AQCS (Analytical Quality Control Services) Intercomparison Runs Reference Materials 1992. Catalog, 88 pp. International Atomic Energy Agency, Laboratory Seibersdorf, P.O. Box 100, A-1400 Vienna, Austria.

IAEA-352

Tuna Homogenate

Source:

International Atomic Energy Agency
Analytical Quality Control Service
Laboratory Seibersdorf
P. O. Box 100
A-1400 Vienna
AUSTRIA

Description:

The tuna fish flesh was collected in the western Mediterranean Sea, near Sète, France, in April 1988. Approximately 60 kg was freeze dried, ground, passed through a 1 mm sieve and further homogenized. This material was prepared in cooperation with the Regional Seas Programme of UNEP.

Recommended activities (mBq/g):

Radionuclide	Value	Confidence interval		
^{40}K	3.91	3.79	-	405
^{137}Cs	2.7	2.5	-	2.8
^{210}Pb	0.6	0.36	-	1.0
^{210}Po	2.2	1.7	-	2.7

Information only activity (from Reference Sheet, 1990) (mBq/g):

Radionuclide	Value	Confidence interval		
^{90}Sr	0.2	0.17	-	0.5

Order Information:

IAEA-352 can be purchased for US$60 per unit (100 g). Price subject to change. The price includes handling, postage (surface mail in Europe, airmail elsewhere), and insurance. Please contact IAEA at the address shown above.

References:

International Atomic Energy Agency (1990) IAEA-352 tuna fish flesh. Reference sheet. International Atomic Energy Agency, 19, av. des Castellans, MC-98000, Monaco.

International Atomic Energy Agency (1992) AQCS (Analytical Quality Control Services) Intercomparison Runs Reference Materials 1992. Catalog, 88 pp. International Atomic Energy Agency, Laboratory Seibersdorf, P.O. Box 100, A-1400 Vienna, Austria.

LUTS-1

Non Defatted Lobster Hepatopancreas

Source:

National Research Council of Canada
Marine Analytical Chemistry Standards Program
Institute for Environmental Chemistry
Montreal Road
Ottawa, ON K1A OR9
CANADA

Description:

Freshly frozen "edible grade" lobster tomalley was thawed, homogenized by comminution, and an antioxidant added. The water content was increased and the slurry processed through a high pressure homogenizer. The material was bottled, heat sealed and sterilized. LUTS-1 contains 55 % lipids by weight. A more complete description of the material can be found in Berman and Sturgeon (1988).

Certified concentrations (µg/g unless noted):

Element	As Bottled		Dry Weight	
	Value	Uncertainty (±)	Value	Uncertainty (±)
Mg	89.5	4.1	601	28
K	948	72	6360	480
Ca	203	33	1360	220
Cr	0.079	0.012	0.53	0.08
Mn	1.20	0.13	8.02	0.86
Fe	11.6	0.9	77.8	6.0
Co	0.051	0.006	0.34	0.04
Ni	0.200	0.034	1.34	0.23
Cu	15.9	1.2	107	8
Zn	12.4	0.8	82.9	5.4
As	2.83	0.13	19.0	0.9
Se	0.641	0.054	4.30	0.36
Sr	2.46	0.28	16.5	1.9
Ag	0.580	0.049	3.89	0.33
Cd	2.12	0.15	14.2	1.0
Hg	0.0167	0.0022	0.112	0.015
Pb	0.010	0.002	0.069	0.011
Methyl Hg (as Hg)	0.0094	0.0006	0.063	0.004

Order information:

LUTS-1 can be purchased for US$135 per unit (6 10-g vials). Price subject to change without notice. Please contact NRCC at the address above.

LUTS-1 (cont.)

References:

Berman, S. S., and R. E. Sturgeon (1988) A new approach to the preparation of biological reference materials for trace metals. Fresenius Z. Anal. Chem., 332(6):546-8.

National Research Council Canada (1989) LUTS-1. Non defatted lobster hepatopancreas reference material for trace metals. Description sheet. National Research Council Canada, Institute for Environmental Chemistry, Ottawa, Canada.

MA-A-1/OC

Copepod Homogenate

Source:

International Atomic Energy Agency
Analytical Quality Control Service
Laboratory Seibersdorf
P. O. Box 100
A-1400 Vienna
AUSTRIA

Description:

MA-A-1/OC is composed of homogenized copepods *(Calanus cristatus)* collected in the Norwegian Sea. The material was freeze dried under a vacuum of 0.1 Torr. The lyophilized material was ground, sieved to pass through a 250 µm sieve and homogenized. This material was packaged in glass bottles with aluminum screw caps. Teflon tape was wound around the seal to minimize contact with the outside atmosphere.

Recommended concentrations (ng/g dry weight):

Compound	Value	Range		
Aldrin	14	0	-	33
Aroclor 1242	120	67	-	173
Aroclor 1254	140	70	-	210
alpha-HCH	10	1.6	-	18.4
gamma-HCH	8.2	1.9	-	14.5
p,p'-DDD	5.5	0	-	11
p,p'-DDE	6.1	1.5	-	17.1
p,p'-DDT	8.3	3.4	-	13.2

Order Information:

MA-A-1/OC can be purchased for US$110 per unit (30 g). Price subject to change. The price includes handling, postage (surface mail in Europe, airmail elsewhere), and insurance. Please contact IAEA at the address shown above.

References:

International Atomic Energy Agency (1990) MA-A-1/OC, copepod homogenate for chlorinated hydrocarbons. Reference sheet. International Atomic Energy Agency, 19, av. des Castellans, MC-98000, Monaco.

International Atomic Energy Agency (1992) AQCS (Analytical Quality Control Services) Intercomparison Runs Reference Materials 1992. Catalog, 88 pp. International Atomic Energy Agency, Laboratory Seibersdorf, P.O. Box 100, A-1400 Vienna, Austria.

MA-A-1/TM

Copepod Homogenate

Source:

International Atomic Energy Agency
Analytical Quality Control Service
Laboratory Seibersdorf
P. O. Box 100
A-1400 Vienna
AUSTRIA

Description:

MA-A-1/TM is composed of homogenized copepods *(Calanus cristatus)* collected in the Norwegian Sea. The material was freeze dried under a vacuum of 0.1 Torr. The lyophilized material was ground, sieved to pass through a 250 μm sieve and homogenized. This material was packaged in glass bottles with aluminum screw caps. Teflon tape was wound around the seal to minimize contact with the outside atmosphere.

Recommended concentrations (μg/g dry weight):

Element	Value	Range	Element	Value	Range
Mn	2.80	2.34 - 3.23	Zn	160	147 - 173
Fe	58.0	50.9 - 67.5	As	7.25	4.62 - 8.20
Co	0.14	0.10 - 0.15	Se	3.03	2.43 - 3.39
Ni	1.62	1.39 - 2.59	Cd	0.71	0.61 - 0.90
Cu	7.51	6.80 - 8.38	Hg	0.27	0.24 - 0.32

Information only concentrations (from Reference Sheet, 1990) (μg/g dry weight):

Element	Value	Range	Element	Value	Range
Cr	0.96	0.40 - 1.54	Sb	0.031	0.015 - 0.114
Ag	0.39	0.09 - 0.47	Pb	1.26	0.90 - 2.98

Order Information:

MA-A-1/TM can be purchased for US$110 per unit (30 g). Price subject to change. The price includes handling, postage (surface mail in Europe, airmail elsewhere), and insurance. Please contact IAEA at the address shown above.

References:

International Atomic Energy Agency (1990) MA-A-1/TM, trace elements in copepod homogenate. Reference sheet. International Atomic Energy Agency, 19, av. des Castellans, MC-98000, Monaco.

MA-A-1/TM (cont.)

International Atomic Energy Agency (1992) AQCS (Analytical Quality Control Services) Intercomparison Runs Reference Materials 1992. Catalog, 88 pp. International Atomic Energy Agency, Laboratory Seibersdorf, P.O. Box 100, A-1400 Vienna, Austria.

MA-A-3/OC

Shrimp Homogenate

Source:

International Atomic Energy Agency
Analytical Quality Control Service
Laboratory Seibersdorf
P. O. Box 100
A-1400 Vienna
AUSTRIA

Description:

Deep-frozen shrimps (*Penaeus duorarum*) imported from Senegal were collected from a local supplier. The abdomen of each animal was separated from the cephalothorax which was discarded. The cuticle was then removed and only the muscle retained. The soft tissues were frozen and lyophilized. This material was then ground and sieved, to pass through a 150-µm sieve, and homogenized. The material was packaged in glass bottles with aluminum screw caps.

Recommended concentrations (ng/g dry weight):

Compound	Value	Range	Compound	Value	Range
Aldrin	0.7	0.2 - 1.2	p,p'-DDD	0.81	0.05 - 1.57
Aroclor 1254	33	0 - 67	p,p'-DDE	4.7	1.3 - 8.1
HCB	0.32	0.20 - 0.44	p,p'-DDT	3.2	0 - 6.7
gamma-HCH	3.2	0 - 6.7			

Order Information:

MA-A-3/OC can be purchased for US$60 per unit (35 g). Price subject to change. The price includes handling, postage (surface mail in Europe, airmail elsewhere), and insurance. Please contact IAEA at the address shown above.

References:

International Atomic Energy Agency (1990) MA-A-3/OC, chlorinated hydrocarbons in fish homogenate. Reference sheet. International Atomic Energy Agency, 19, av. des Castellans, MC-98000, Monaco.

International Atomic Energy Agency (1992) AQCS (Analytical Quality Control Services) Intercomparison Runs Reference Materials 1992. Catalog, 88 pp. International Atomic Energy Agency, Laboratory Seibersdorf, P.O. Box 100, A-1400 Vienna, Austria.

MA-B-3/OC

Lyophilised Fish Tissue

Source:

International Atomic Energy Agency
Analytical Quality Control Service
Laboratory Seibersdorf
P. O. Box 100
A-1400 Vienna
AUSTRIA

Description:

Garpike fish (*Belone belone*) were collected in the Baltic Sea and filleted. The fillets were frozen and lyophilized. This material was ground and sieved using a 300-µm screen. The fine material was homogenized and packaged in glass bottles with aluminum screw caps. Teflon tape was wound around the cap to minimize contact of the sample with the atmosphere.

Recommended concentrations (ng/g dry weight):

Compound	Values	Range	Compound	Values	Range
Aldrin	1.8	0.1 - 3.5	alpha-HCH	10	0 - 24
Aroclor 1254	400	170 - 630	gamma-HCH	3.4	0 - 7.2
Aroclor 1260	390	140 - 640	p,p'-DDD	46	13 - 59
HCB	1.5	0.9 - 2.1	p,p'-DDE	160	50 - 270
PCB 101	61	27 - 94	p,p'-DDT	65	16 - 114
PCB 153	120	86 - 154			

Order Information:

MA-B-3/OC can be purchased for US$110 per unit (35 g). Price subject to change. The price includes handling, postage (surface mail in Europe, airmail elsewhere), and insurance. Please contact IAEA at the address shown above.

References:

International Atomic Energy Agency (1990) MA-B-3/OC, chlorinated hydrocarbons in shrimp homogenate. Reference sheet. International Atomic Energy Agency, 19, av. des Castellans, MC-98000, Monaco.

International Atomic Energy Agency (1992) AQCS (Analytical Quality Control Services) Intercomparison Runs Reference Materials 1992. Catalog, 88 pp. International Atomic Energy Agency, Laboratory Seibersdorf, P.O. Box 100, A-1400 Vienna, Austria.

MA-B-3/RN

Lyophilised Fish Tissue

Source:

International Atomic Energy Agency
Analytical Quality Control Service
Laboratory Seibersdorf
P. O. Box 100
A-1400 Vienna
AUSTRIA

Description:

No information available.

Recommended activities (mBq/g):

Radionuclide	Activity	Range
^{40}K	272	252 - 299
^{137}Cs	14.2	13.7 - 15.3

Order Information:

MA-B-3/RN can be purchased for US$60 per unit (50 g). Price subject to change. The price includes handling, postage (surface mail in Europe, airmail elsewhere), and insurance. Please contact IAEA at the address shown above.

References:

International Atomic Energy Agency (1992) AQCS (Analytical Quality Control Services) Intercomparison Runs Reference Materials 1992. Catalog, 88 pp. International Atomic Energy Agency, Laboratory Seibersdorf, P.O. Box 100, A-1400 Vienna, Austria.

MA-B-3/TM

Lyophilised Fish Tissue

Source:

International Atomic Energy Agency
Analytical Quality Control Service
Laboratory Seibersdorf
P. O. Box 100
A-1400 Vienna
AUSTRIA

Description:

Not available.

Recommended concentrations (μg/g):

Element	Value	Range			Element	Value	Range		
Na (mg/g)	2.16	2.00	-	2.31	Zn	109.2	106.4	-	111.9
Mg (mg/g)	1.13	1.04	-	1.20	As	2.11	1.42	-	2.51
P (mg/g)	8.53	7.53	-	9.20	Se	1.46	1.35	-	1.70
Cl (mg/g)	2.54	2.33	-	2.77	Br	12.8	10.8	-	15.0
K (mg/g)	9.32	9.00	-	10.0	Rb	1.49	1.34	-	2.00
Ca (mg/g)	3.49	3.18	-	3.60	Sr	29.9	24.9	-	37.9
Mn	2.62	2.85	-	3.57	Hg	0.51	0.47	-	0.61
Fe	95.4	87.3	-	107.2	Pb	4.62	3.85	-	5.13
Cu	3.08	9	-	13					

Order information:

MA-B-3/TM can be purchased for US$110 per unit (30 g). Price subject to change. The price includes handling, postage (surface mail in Europe, airmail elsewhere), and insurance. Please contact IAEA at the address shown above.

Reference:

International Atomic Energy Agency (1992) AQCS (Analytical Quality Control Services) Intercomparison Runs Reference Materials 1992. Catalog, 88 pp. International Atomic Energy Agency, Laboratory Seibersdorf, P.O. Box 100, A-1400 Vienna, Austria.

MUS-1

Mussel Tissue for Domoic Acid

Source:

National Research Council of Canada
Marine Analytical Chemistry Standards Program
Institute for Marine Biosciences
1411 Oxford Street
Halifax, Nova Scotia B3H 3Z1
CANADA

Description:

MUS-1 is a shelf-stable slurry of mussel (*Mytilus edulis*) tissue containing domoic acid. Batches of contaminated and cleaned pre-cooked mussel tissues were blended to obtain a target level of domoic acid. After addition of an antioxidant (0.02 % ethoxyquin) and adjustment of the moisture content to 87 %, the homogenate was bottled in 15 mL polyethylene containers. The bottles were heat sealed, thermally sterilized and packed in trilaminate pouches.

Certified concentration (µg/g):

126

Order information:

MUS-1 can be purchased for US$400 per unit (4 15-g vials). Price subject to change without notice. Please contact NRCC at the address above.

Reference:

National Research Council Canada (1991) MUS-1. Mussel tissue reference material for domoic acid. Description sheet. National Research Council Canada, Institute for Marine Biosciences, Halifax, Nova Scotia, Canada.

NIES 9

Sargasso Seaweed

Source:

National Institute for Environmental Studies
Yatabe-machi
Tsukuba, Ibaraki, 305
JAPAN

Description:

This CRM was prepared from sargasso (*Sargassum fulvellum*) collected in Shimoda Bay, Shizouka Prefecture, Japan, in 1984. The sargasso was transported to the laboratory, washed in deionized water, and freeze-dried. This material was then ground, sieved to pass through an 80-mesh screen, blended, and bottled in glass bottles.

Certified concentrations (μg/g dry weight unless noted):

Element	Value	Uncertainty (±)	Element	Value	Uncertainty (±)
Na (%)	1.70	0.08	Cu	4.9	0.2
Mg (%)	0.65	0.03	Zn	15.6	1.2
K (%)	6.10	0.20	As	115	9
Ca (%)	1.34	0.05	Rb	24	2
V	1.0	0.1	Sr (%)	0.100	0.003
Mn	21.2	1.0	Ag	0.31	0.02
Fe	187	6	Cd	0.15	0.02
Co	0.12	0.01	Pb	1.35	0.05

Noncertified concentrations (μg/g dry weight unless noted):

Element	Value	Element	Value
P (%)	0.26	Br	270
S (%)	1.2	Sb	0.04
Cl (%)	5.1	I	520
Sc	0.09	Cs	0.04
Ti	9	Hg	0.04
Cr	0.2	U	0.4
Se	0.05		

Order information:

Please contact Dr. M. Morita at the address shown above for information on availability.

References:

National Institute for Environmental Studies (1988) NIES certified reference material, No 9 "Sargasso." Information sheet. National Institute for Environmental Studies, Yatabe-machi,Tsukuba, Ibaraki, 305, Japan.

Okamoto, K. (1988) Preparation and certification of Sargasso seaweed reference material. Mar. Environ. Res., 26:199-207.

NIES 11

Fish Tissue

Source:

National Institute for Environmental Studies
Yatabe-machi
Tsukuba, Ibaraki, 305
JAPAN

Description:

This material was prepared from fish fillets of sea bass (*Leteolabrax japonicus*, Cuvier). The fish used were 50-60 cm in length and were collected in Tokyo Bay, Japan. The fish tissue was homogenized, freeze dried and blended. This material was packaged in polyethylene laminate bags with an oxygen absorber and stored at -20°C.

Certified values (μg/g):

Component	Value	Uncertainty (±)
Total Sn	2.4	0.1
Tributyl Sn	1.3	0.1

Reference value (μg/g):

Component	Value
Triphenyl Sn	6.3

Order information:

Please contact Dr. M. Morita at the address shown above for information on availability.

Reference:

National Institute for Environmental Studies (1990) NIES certified material No. 11 "Fish Tissue." Information sheet. National Institute for Environmental Studies, Yatabe-machi,Tsukuba, Ibaraki, 305, Japan.

SRM 955a

Lead in Blood

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

SRM 1598 is intended primarily for use in calibrating instrumentation and evaluating analytical methods for Pb in blood. Blood was collected from two cows that had been fed gelatin capsules containing lead nitrate. The blood was blended to produce four pools with different Pb contents. The pools were treated with 1.5 mg/mL tripotassium EDTA and dispensed into polyethylene vials. The vials were shipped frozen to NIST. This SRM could be used in studies of marine mammals.

Certified Pb concentrations (μmol/L):

SRM vial	Value	Uncertainty (±)
955a-1	0.242	0.004
955a-2	0.653	0.006
955a-3	1.478	0.015
955a-4	2.627	0.018

Order information:

SRM 955a can be purchased for US$261 per unit (4 2-mL vials). Price subject to change without notice. Please contact NIST at the address shown above.

References:

National Institute of Standards and Technology (1990) SRM 955a. Lead in blood. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

SRM 1566a

Oyster Tissue

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

Oysters were obtained from a commercial source. The oysters had been shucked, frozen, and packaged in sealed plastic bags. The oyster material was ground, freeze-dried, and powdered. At NIST, the material was jet-milled to pass a 355 µm screen, radiation sterilized and bottled.

Certified concentrations (µg/g dry weight unless noted):

Element	Value	Uncertainty (±)	Element	Value	Uncertainty (±)
Na (%)	0.417	0.013	Ni	2.25	0.44
Mg (%)	0.118	0.017	Cu	66.3	4.3
Al	202.5	12.5	Zn	830	57
P (%)	0.623	0.018	As	14.0	1.2
S (%)	0.862	0.019	Se	2.21	0.24
Cl (%)	0.829	0.014	Sr	11.1	1.0
K (%)	0.790	0.047	Ag	1.68	0.15
Ca (%)	0.196	0.019	Cd	4.15	0.38
V	4.68	0.15	I	4.46	0.42
Cr	1.43	0.46	Hg	0.0642	0.0067
Mn	12.3	1.5	Pb	0.371	0.014
Fe	539	15	U	0.132	0.012
Co	0.57	0.11			

Noncertified concentrations (µg/g dry weight unless noted):

Element	Value	Element	Value
N (%)	6.81	Ce	0.4
F	240	Sm	0.06
Sc	0.06	Eu	0.01
Rb	3	Tb	0.007
Sn	3	Hf	0.04
Sb	0.01	Ta	0.003
Cs	0.02	Au	0.01
La	0.3	Th	0.04

Order information:

SRM 1566a can be purchased for US$277 (25 g). Price subject to change without notice. Please contact NIST at the address shown above.

Reference:

National Institute of Standards and Technology (1989) SRM 1566a, oyster tissue. Certificate of analysis, National Institute of Standards and Technology, Gaithersburg, MD.

SRM 1577b

Bovine Liver

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

Although this SRM is not of marine origin, it is one of the "classic" standards that has been used for many years and is included here for reference purposes. The livers for this SRM were obtained in Portland, Oregon, USA. The gross fat, major blood vessels, and "skin" were removed and the liver ground. This ground material was mixed, transferred to polyethylene-lined trays, and lyophilized. After lyophilization, the liver was powdered, packed in moisture-proof bags, and transported to the National Bureau of Standards.

Certified concentrations (μg/g dry weight unless noted):

Element	Value	Uncertainty (±)	Element	Value	Uncertainty (±)
Na (%)	0.2423	0.006	Cu	160	8
Mg	601	28	Zn	127	16
P (%)	1.10	0.03	Se	0.73	0.06
S (%)	0.785	0.006	Rb	13.7	1.1
Cl (%)	0.278	0.006	Sr	0.136	0.001
K (%)	0.994	0.002	Mo	3.5	0.3
Ca	116	4	Ag	0.039	0.007
Mn	10.5	1.7	Cd	0.50	0.03
Fe	184	15	Pb	0.129	0.004

Noncertified concentrations (μg/g dry weight unless noted):

Element	Value	Element	Value
N (%)	10.6	As	0.05
Al	3	Br	9.7
V	0.123	Sb	0.003
Co	0.25	Hg	0.003

Order information:

SRM 1577b can be purchased for US$168 (50 g). Price subject to change without notice. Please contact NIST at the address shown above.

References:

National Institute of Standards and Technology (1991) SRM 1577b, bovine liver. Certificate of analysis, National Institute of Standards and Technology, Gaithersburg, MD.

SRM 1598

Inorganic Constituents in Bovine Serum

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

SRM 1598 is intended primarily for use in calibrating instrumentation and evaluating analytical methods for selected elements in blood serum, plasma and similar body fluids. Blood was collected from four dairy cows, centrifuged and the separated serum was combined, mixed, bottled in acid-cleaned polypropylene vials and freeze dried. Further details of the preparation can be found in Veillon *et al.* (1985). This SRM could be used in studies of marine mammals.

Certified concentrations (ng/g unless noted):

Element	Value	Uncertainty (±)	Element	Value	Uncertainty (±)
Al	3.7	0.9	Cu (µg/g)	0.72	0.04
Mg (µg/g)	20	0.4	Zn (µg/g)	0.89	0.06
K (µg/g)	196	5	Se	42.4	3.5
Cr	0.14	0.08	Rb (µg/g)	0.17	0.02
Mn	3.78	0.32	Mo	11.5	1.1
Fe (µg/g)	2.55	0.10	Cd	0.089	0.016
Co	1.24	0.18			

Noncertified concentrations (ng/g unless noted):

Element	Value	Element	Value
Na (mg/g)	3	Cs	0.1
Ca (mg/g)	0.09	Hg	0.2
V	0.06	Tl	0.4
Ni	0.7	Pb	0.6
As	0.2		

Order information:

SRM 1598 can be purchased for US$319 per unit (2 5-mL ampoules). Price subject to change without notice. Please contact NIST at the address shown above.

References:

National Institute of Standards and Technology (1990) SRM 1598. Inorganic constituents in bovine serum. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

Veillon, C., S. A. Lewis, K. Y. Patterson, W. R. Wolf, J. M. Harnly, J. Versieck, L. Vanballenberghe, R. Cornelius, and T. C. O'Haver (1985) Characterization of a bovine serum reference material for major, minor and trace elements. Anal. Chem., 57:2106-9.

SRM 1974

Organics in Mussel Tissue (*Mytilus edulis*)

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

NIST SRM 1974 is intended primarily for use in validating analytical methods for the determination of selected PAHs in marine bivalve tissue or materials of similar matrix. Development of this SRM was partially funded by the NOAA National Status and Trends Program. Complete preparation and analysis information can be found in the Certificate of Analysis (NIST, 1991) and in Wise *et al.* (1991).

The mussels (*Mytilus edulis*) used for the preparation of this SRM were collected on December 1, 1987 from Dorchester Bar within Boston Harbor, MA (42° 18.25' N, 71° 02.31' W). Approximately 2400 individual mussels were collected by hand at low tide. The samples were transported to the Battelle New England Laboratory (Duxbury, MA) where the mussels were rinsed in a tank supplied with pumped sea water. Rocks and other debris were removed. The samples were placed in insulated, Teflon-lined wooden containers, frozen ant transported to NIST on dry ice. The samples were transferred to Teflon bags and stored in a liquid nitrogen vapor freezer (-120°C) until shucked. The mussel tissue was removed from the shell using the following procedure. The mussels were allowed to warm up to about 0°C. The tissue was removed from the shell using a titanium knife, placed in Teflon bags, and immediately returned to a liquid nitrogen freezer. The frozen mussel tissue was pulverized using a cryogenic procedure. After mixing, the mussel tissue homogenate were aliquoted into pre-cooled glass bottles. The bottles of SRM 1974 have been stored at -80°C since preparation.

Certified concentrations

PAHs (ng/g dry weight):

Compound	Value	Uncertainty (±)	Compound	Value	Uncertainty (±)
Anthracene	6.1	1.7	Fluoranthene	272	47
Benzo[b]fluoranthene	52.3	9.4	Pyrene	276	30
Benzo[ghi]perylene	20.0	2.3	Perylene	8.5	2.4
Benzo[a]pyrene	18.6	3.8	Phenanthrene	45	11
Indeno[1,2,3-cd]= pyrene	14.6	2.7			

SRM 1974 (cont.)

Noncertified concentrations:

PAHs (ng/g dry weight):

Compound	Value	Uncertainty (±)
1-Methylnaphthalene	9	2
1-Methylphenanthrene	19	5
1,3-, 2,10-, 3,9-, and 3,10-Dimethylphenanthrenes	91	17
1,6- and 2,9-Dimethylphenanthrene	47	11
1,7-Dimethylphenanthrene	42	9
2,6-Dimethylphenanthrene	37	7
2,7-Dimethylphenanthrene	35	9
2- and 9-Ethylphenanthrenes and 3,6-dimethylphenanthrene	34	8
2-Methylnaphthalene	17	4
9-Methyl- and 4-methylphenanthrene	22	5
Benzo[a]fluoranthene	4.1	1.2
Benzo[e]pyrene	81	6
Benzo[j]fluoranthene and benzo[k]fluoranthene	35	6
Benzo[k]fluoranthene	24	1
Benz[a]anthracene	37	3
Chrysene/Triphenylene	124	11
Dibenz[a,h]anthracene	2.8	0.1
Flourene	12	2
Indeno[1,2,3-cd]fluoranthene	3.9	0.6

PCBs (ng/g dry weight):

Compound	Value	Uncertainty (±)	Compound	Value	Uncertainty (±)
PCB 18	24	9	PCB 128	15	2
PCB 28	62	3	PCB 138, PCB 163,		
PCB 44	65	23	PCB 164	110	11
PCB 52	98	39	PCB 153	145	8
PCB 66	110	5	PCB 180	13	1
PCB 101, PCB 90	105	11	PCB 187, PCB 182	30	1
PCB 105	45	3			
PCB 118	110	5			

PCBs are listed according to Ballschmitter and Zell (1980). The major PCB congener is listed first, the others listed are minor components.

Chlorinated Pesticides (ng/g dry weight)

Compound	Value	Uncertainty (±)	Compound	Value	Uncertainty (±)
2,4'-DDD	20	7	4,4'-DDT	3	2
2,4'-DDE	5.8	0.6	cis-Chlordane	26	1
2,4'-DDT	4	1	Dieldrin	8	4
4,4'-DDD	68	3	*trans*-Nonachlor	21	5
4,4'-DDE	48	2			

SRM 1974 (cont.)

Element (μg/g dry weight except where noted)

Compound	Value	Uncertainty	Compound	Value	Uncertainty
Na (%)	3.29	0.09	Rb	5.67	0.16
Mg (%)	0.48	0.03	Sr	60	14
Al	503	46	Mo	2.0	0.5
Cl (%)	6.04	0.17	Ag	0.854	0.021
K (%)	1.10	0.33	Cd	1.4	0.4
Sc	0.085	0.009	Sb	0.0262	0.0002
V	1.55	0.29	Cs	0.040	0.003
Cr	2.61	0.21	La	0.35	0.08
Mn	10.2	1.2	Ce	0.53	0.13
Co	0.38	0.01	Sm	0.064	0.014
Fe	500	27	Eu	0.012	0.002
Ni	1.00	0.08	Hf	0.05	0.03
Cu	9.2	1.9	Ta	0.018	0.003
Zn	91.6	3.8	Au	0.0476	0.0010
As	9.72	0.35	Hg	0.194	0.014
Se	2.00	0.06	Pb	9.7	0.6
Br	373	18	Th	0.07	0.02

Order information:

SRM 1974 can be purchased for US$334 (50 g). Price subject to change without notice. Please contact NIST at the address shown above.

References:

Ballschmitter, K., and M. Zell (1980) Analysis of polychlorinated biphenyls (PCB) by glass capillary gas chromatography - composition of technical Aroclor - and Clophen-PCB mixtures. Fresenius Z. Anal. Chem., 302:20-31.

National Institute of Standards and Technology (1991) Certificate of analysis, SRM 1974, Organics in mussel tissue (*Mytilus edulis*). National Institute of Standards and Technology, Gaithersburg, MD.

Wise, S. A., B. A. Benner, R. G. Christensen, B. J. Koster, J. Kurz, M. M. Schantz, and R. Zeisler (1991) Preparation and analysis of a frozen mussel tissue reference material for the determination of trace organic constituents. Env. Sci. Technol. 25(10):1695-1704.

TORT-1

Lobster Hepatopancreas

Source:

National Research Council of Canada
Marine Analytical Chemistry Standards Program
Institute for Environmental Chemistry
Montreal Road
Ottawa, ON K1A OR9
CANADA

Description:

Freshly frozen "edible grade" lobster tomalley from Prince Edward Island, Canada, was purchased from a commercial source. The material was wrapped in plastic, packaged in waxed cardboard boxes, and stored at -30° C to inhibit degradation prior to processing. The tomalley was thawed, homogenized, and spray-dried. The oil was removed by extraction with acetone and vacuum-dried. The material was then mixed in a blender, screened to pass through a 1.4 mm polyethylene sieve, reblended and bottled. The bottled material was radiation-sterilized. A more complete description of the material can be found in NRCC description sheets (1983, 1987).

Certified concentrations (μg/g unless noted):

Element	Value	Uncertainty (±)	Element	Value	Uncertainty (±)
Na (%)	3.67	0.20	Cu	439	22
Mg (%)	0.255	0.025	Zn	177	10
P (%)	0.879	0.021	As	24.6	2.2
S (%)	1.22	0.10	Se	6.88	0.47
Cl (%)	5.58	0.10	Sr	113	5
K (%)	1.041	0.040	Mo	1.5	0.3
Ca (%)	0.895	0.058	Cd	26.3	2.1
V	1.4	0.3	Sn	0.139	0.011
Cr	2.4	0.6	Hg	0.33	0.06
Mn	23.4	1.0	Pb	10.4	2.0
Fe	186	11			
Co	0.42	0.05	Methyl Hg	0.128	0.014
Ni	2.3	0.3			

Order information:

TORT-1 can be purchased for US$135 per unit (35 g). Price subject to change without notice. Please contact NRCC at the address above.

References:

National Research Council Canada (1983) Lobster hepatopancreas, marine reference material for trace metals and other elements, description sheet. National Research Council Canada, Institute for Environmental Chemistry, Ottawa, Canada.

National Research Council Canada (1987) TORT-1. Lobster hepatopancreas marine reference material for trace metals and other elements. Description sheet (rev. 1987). National Research Council Canada, Institute for Environmental Chemistry, Ottawa, Canada.

National Research Council Canada (1988) MACSP Update. Estuarine reference material for trace metals SLEW-1, and MACSP biological tissue reference materials certified for methyl mercury. Information sheet. National Research Council Canada, Institute for Environmental Chemistry, Ottawa, Canada.

CASS-2

Nearshore Seawater

Source:

National Research Council of Canada
Marine Analytical Chemistry Standards Program
Institute for Environmental Chemistry
Montreal Road
Ottawa, ON K1A OR9
CANADA

Description:

Seawater was collected in the outer part of the Halifax Harbor, Canada, at a depth of 5 m in water 25-40 m deep, 400-800 meters offshore, using modified 12-liter Go-Flo bottles coated with Teflon. The salinity was 29.2 ‰ and the total dissolved organic carbon content was 0.5 mg/L. The seawater was immediately filtered through 0.45-µm porosity filters, acidified to pH 1.6 with ultrapure nitric acid and transferred to 50-liter acid-leached polypropylene carboys previously conditioned with ultrapure water acidified to pH 1.6. The seawater was then homogenized in an acid-leached and pH-conditioned 800-liter polyethylene tank in a clean room at the NRCC Division of Chemistry facilities in Ottawa, Canada, and immediately bottled in acid-cleaned 2-liter polyethylene bottles. A more complete description of the preparation and analysis of CASS-2 can be found in the NRCC description sheet (1989). Seawater for CASS-2 was collected in the same location as that used for CASS-1.

Certified concentrations (µg/L):

Element	Value	Uncertainty (±)	Element	Value	Uncertainty (±)
Cr	0.121	0.016	Zn	1.97	0.12
Mn	1.99	0.15	As	1.01	0.07
Fe	1.20	0.12	Mo	9.01	0.28
Co	0.025	0.006	Cd	0.019	0.004
Cu	0.675	0.039	Pb	0.019	0.006
Ni	0.298	0.036			

Order information:

CASS-2 can be purchased for US$120 per unit (2-L bottle). Price subject to change without notice. Please contact NRCC at the address above.

Reference:

National Research Council Canada (1989) CASS-2. Nearshore seawater reference material for trace metals. Description sheet. National Research Council Canada, Institute for Environmental Chemistry, Ottawa, K1A 0R6, Canada.

CRM 403

Trace Elements in Seawater

Source:

Community Bureau of Reference
Commission of the European Communities
Directorate General for Science
Research and Development
200 rue de la Loi
B-1049 Brussels
BELGIUM

Description:

This material consists of seawater filtered through a 0.45 μm filter and acidified to a pH greater than 1.6.

Certified concentrations (nmol/kg):

Element	Value	Uncertainty (±)	Element	Value	Uncertainty (±)
Ni	4.4	0.4	Mo	103	20
Cu	3.9	0.4	Cd	0.175	0.018
Zn	25.7	2.9	Pb	0.117	0.025

Noncertified concentrations (nmol/kg):

Element	Value
Al	17.1
V	22.3
As	19.5

Order information:

CRM 403 can be purchased for BFR9000 per unit (2 L). Price includes handling and normal postage and it is subject to change without notice. Please contact BCR at the address shown above.

References:

Community Bureau of Reference (BCR) (1988) BCR CRM 403, trace element in seawater. Certificate of analysis. Community Bureau of Reference, Commission of the European Communities, Directorate General for Science, Research and Development, 200 rue de la Loi, B-1049 Brussels, Belgium.

Community Bureau of Reference (BCR) (1992) Reference Materials. Community Bureau of Reference, Commission of the European Communities, Directorate General for Science, Research and Development, 200 rue de la Loi, B-1049 Brussels, Belgium. 75 pp.

CSK Nutrient Elements

CSK Nutrients in Seawater

Source:

Sagami Chemical Research Center
Nishi-Ohnuma 4-4-1
Sagamihara-shi 229
JAPAN

Available from:

Wako Chemicals USA
1600 Bellwood Rd.
Richmond, VA 23237
USA

Wako Chemicals GmbH
Nissanstr. 2, 4040 Neuss 1
WEST GERMANY

Wako Pure Chemical Industries Ltd.
1-2, Doshomachi 3-Chome
Chuo-Ku, Osaka
JAPAN

Description:

The standard solutions of nutrient elements, phosphate-P, nitrite-N, nitrate-N, and silicate-Si, for chemical analysis by spectrophotometer were prepared by Wako under the supervision of the Sagami Chemical Research Center of Japan. The solutions have the highest accuracy and stability possible, and the concentrations cover the whole range of values found in seawater. The solutions were sealed in bottles or glass ampoules and sterilized. These standard solutions were used in the Cooperative Study of the Kuroshio and Adjacent Regions (CSK) Program of UNESCO/IOC, 1965-1979, and in other programs.

Concentrations (μg-at/L):

Element	Concentration	
NO_2-N	0.00	Water
	0.50	
	1.00	
	2.00	
NO_3-N	0.0	30.5% NaCl
	5.0	
	10.0	
	20.0	
	30.0	
	40.0	

Element	Concentration	
PO_4-P	0.00	30.5% NaCl
	0.05	
	1.00	
	2.00	
	3.00	
SiO_2-Si	0.0	30.5% NaCl (adjusted to
	5.0	pH 3 with H_2SO_4)
	10.0	
	25.0	
	50.0	
	100	
	150	
	200	

Order information:

The CSK nitrate, nitrite and silicate standard solutions can be purchased for US$50.50 per unit (50 mL) from Wako USA. The silicate solution is packaged in high density polyethylene bottles. Price subject to change without notice. Prices from Wako West Germany and Wako Japan not available.

References:

Ambe, M., J. Kajiwara, T. Yoshihara, and K. Sugawara (1975) Preparation of the standard solutions of nitrate and their application to seawater and freshwater. J. Oceanogr. Soc. Japan, 31:85-92.

Ambe, M. (1978) Note of the experience in the preparation of CSK standard solutions and the ICES-SCOR Intercalibration Experiment, 1969-1970. Mar. Chem., 6:171-8.

Sagami Chemical Research Center (1988?) General guide to the use of CSK standard solutions, No.1. Sagami Chemical Research Center, Sagamihara, Kanagawa Prefecture, Japan.

IAEA-298

Pacific Ocean Water

Source:

International Atomic Energy Agency
Analytical Quality Control Service
Laboratory Seibersdorf
P. O. Box 100
A-1400 Vienna
AUSTRIA

Description:

IAEA-298 is surface water collected outside the Muroroa Atoll.

Recommended activities (Bq/m^3 unless noted):

Radionuclide	Activity	Range		
^{90}Sr	1.32	1.28	-	1.36
^{137}Cs	2.34	2.28	-	2.40
$^{239+240}Pu$ (mBq/m^3)	2.1	1.2	-	3.0

Order information:

IAEA-298 can be purchased for US$110 per unit (3 30-mL). Price subject to change. Cost of shipment to be covered by customer. Please contact IAEA at the address shown above.

Reference:

International Atomic Energy Agency (1992) AQCS (Analytical Quality Control Services) Intercomparison Runs Reference Materials 1992. Catalog, 88 pp. International Atomic Energy Agency, Laboratory Seibersdorf, P.O. Box 100, A-1400 Vienna, Austria.

IAPSO Standard Seawater

Standard Seawater for Conductivity Measurements

Source:

Ocean Scientific International Ltd.
Brook Road, Wormley, Godalming
Surrey GU8 5UB
UNITED KINGDOM

Description:

The seawater for these reference material is collected from the North Atlantic in large quantities. It is transported and stored in polyethylene containers until it is filtered through 0.3-µm filters and transferred into PVC-lined tanks. Further filtration through activated carbon and irradiation with ultraviolet light reduce dissolved organic material and microbial degradation. The seawater is then slowly diluted with distilled water until a salinity of approximately 35 ‰ is achieved. The seawater is then sealed in 280-mL prewashed glass ampoules. Approximately 7,000 ampoules are produced in each batch. The seawater is then calibrated in accordance with the recommendations of the UNESCO, ICES, SCOR, IAPSO Joint Panel in Oceanographic Tables and Standards. The P-series standards are the main single point calibration standards for salinity measurements. The 38H series is used to determine salinometer offset and linearity at higher salinities. The 30L and 10L series are used for a similar purpose at lower salinities. The GPS standard is not suitable for primary calibration and is intended for general applications such as equipment testing and chemical analysis.

Certified values:

Conductivity ratios relative to a defined KCl solution at 15°C are available for each batch of seawater. The conductivity ratios vary from lot to lot and are printed on the label of the ampoules.

Standard	Approx. salinity (‰)	Ampoule (mL)
Normal seawater (P-series)	35	275
High salinity standard seawater (38H series)	38	275
Low salinity standard seawater (30L series)	30	275
Low salinity standard seawater (10L series)	10	275
Atlantic seawater (GPS)	35	5000

Order Information:

The seawater ampoules can be purchased from Ocean Scientific International Ltd., Wormley, for between 64 and 109£ British Sterling, and the GPS seawater for 10£ British Sterling per 5-L bottle. Freight and packaging are additional. Please contact Ocean International at the address shown above.

NASS-4

Open Ocean Seawater

Source:

National Research Council of Canada
Marine Analytical Chemistry Standards Program
Institute for Environmental Chemistry
Montreal Road
Ottawa, ON K1A OR9
CANADA

Description:

NASS-4 is the fourth in a series of open ocean CRMs certified for trace metals.The seawater (31.3 $^{o}/_{oo}$ salinity) was collected in the North Atlantic at a depth of 10 m, 35 km southeast of Halifax, NS, Canada. The water was peristaltically pumped through cleaned polyethylene-lined ethyl vinyl acetate tubing and 0.45 μm acryclic copolymer filters. It was immediately acidified to pH 1.6 with ultrapure nitric acid during the transfer to acid-cleaned 50-liter polypropylene carboys previously conditioned with ultrapure water acidified to pH 1.6. The seawater was then homogenized in two linked 800-liter polyethylene tanks in a clean room at the NRC Institute for Environmental Chemistry in Ottawa, Canada, and immediately bottled in acid-cleaned 2-liter polyethylene bottles. Because the seawater for NASS-4 was collected at an entirely different location of the North Atlantic and at a different depth, the different trace metal profile is different from those of the previous NASS series CRMS. Within the precision of the measurements for 11 trace elements for NASS-1, no significant change in sample composition could be discerned over the 530-day storage period described in Berman *et al.* (1983). The effect of storage on the concentrations of the 11 elements will continue to be monitored until the supply of NASS-1 is exhausted. Further details of the handling, storage, and analytical procedures can be found in Berman *et al.* (1983).

Certified concentrations (μg/L):

Element	Value	Uncertainty (±)	Element	Value	Uncertainty (±)
Cr	0.115	0.010	Zn	0.178	0.025
Mn	0.380	0.023	As	0.115	0.018
Fe	0.105	0.016	Mo	8.84	0.60
Co	0.009	0.001	Cd	0.016	0.003
Ni	0.228	0.009	Pb	0.013	0.005
Cu	0.228	0.011	U	2.68	0.12

Information only concentration (μg/L):

Element	Value
Se (IV)	0.018

NASS-4 (cont.)

Order information:

NASS-4 can be purchased for C$120 per unit (2-L bottle). Price subject to change without notice. Please contact NRCC at the address above.

References:

Berman, S.S., R.E. Sturgeon, J.A.H. Desaulniers, and A.P. Mykytiuk (1983) Preparation of the sea water reference material for trace metals, NASS-1. Mar. Pollut. Bull., 14(2):69-73.

National Research Council Canada (1992) NASS-4. Open ocean seawater reference material for trace metals. Provisional certificate. National Research Council Canada, Institute for Environmental Chemistry, Ottawa, K1A 0R6, Canada.

ORMS-1

Riverine Water

Source:

National Research Council of Canada
Marine Analytical Chemistry Standards Program
Institute for Environmental Chemistry
Montreal Road
Ottawa, ON K1A OR9
CANADA

Description:

Riverine water was collected from the Ottawa River at Cheneaux, Ontario, about 100 km upstream from Ottawa, at the 2-3 meter level. The water was filtered through a 0.45-µm porosity filter during collection and acidified immediately with nitric acid to pH 1.6. The water was later refiltered through 0.2-µm porosity filters, blended and bottled in 2-liter polyethylene bottles.

Certified concentration (µg/L):

Element	Value	Uncertainty (±)
Hg	6.8	1.3

Order Information:

ORMS-1 can be purchased for US$100 per unit (2 2-liter bottles). Price subject to change without notice. Please contact NRCC at the address above.

Reference:

National Research Council Canada (1991) ORMS-1. Riverine water reference material for mercury. Description sheet. National Research Council Canada, Marine Analytical Standards Program, Ottawa, Canada.

SLAP

Water

Source:

International Atomic Energy Agency
Analytical Quality Control Service
Laboratory Seibersdorf
P. O. Box 100
A-1400 Vienna
AUSTRIA

Description:

SLAP has certified values of natural levels of ^{2}H and ^{18}O. No other information available.

Order information:

SLAP can be purchased for US$60 per unit (30 mL). Price subject to change. The price includes handling, postage (surface mail in Europe, airmail elsewhere), and insurance. Please contact IAEA at the address shown above.

Reference:

International Atomic Energy Agency (1992) AQCS (Analytical Quality Control Services) Intercomparison Runs Reference Materials 1992. Catalog, 88 pp. International Atomic Energy Agency, Laboratory Seibersdorf, P.O. Box 100, A-1400 Vienna, Austria.

SLEW-1

Estuarine Water

Source:

National Research Council of Canada
Marine Analytical Chemistry Standards Program
Institute for Environmental Chemistry
Montreal Road
Ottawa, ON K1A OR9
CANADA

Description:

The water for SLEW-1 was collected in the St. Lawrence River estuary at 5 m depth, several kilometers upriver from Ile aux Coudres, and 50 km below the mixing zone. The salinity was 11.6 $^{o}/_{oo}$ and the total dissolved organic carbon content was 1.2 mg/L. The water was peristaltically pumped through cleaned polyethylene-lined ethyl vinyl acetate tubing and 0.45 µm porosity acrylic copolymer filters. It was immediately acidified to pH 1.6 with ultrapure nitric acid during transfer to 50-liter acid leached polypropylene carboys previously conditioned with pH 1.6 ultrapure water. The estuarine water was later refiltered through 0.2 µm porosity acrylic copolymer filters into an 800-liter polyethylene tank in a clean room at the Division of Chemistry in Ottawa. A more complete description of the preparation and analysis of SLEW-1 can be found in the NRCC description sheet (1989).

Certified concentrations (µg/L):

Element	Value	Uncertainty (±)	Element	Value	Uncertainty (±)
Cr	0.139	0.016	Cu	1.76	0.09
Mn	13.1	0.8	Zn	0.86	0.15
Fe	2.08	0.34	As	0.765	0.093
Co	0.046	0.007	Cd	0.018	0.003
Ni	0.743	0.078	Pb	0.028	0.007

Order information:

SLEW-1 can be purchased for US$120 per unit (2-L bottle). Price subject to change without notice. Please contact NRCC at the address above.

References:

National Research Council Canada (1991) SLEW-1. Estuarine water reference material for trace metals. Description sheet. National Research Council Canada, Institute for Environmental Chemistry, Ottawa, K1A 0R6, Canada.

SLRS-2

Riverine Water

Source:

National Research Council of Canada
Marine Analytical Chemistry Standards Program
Institute for Environmental Chemistry
Montreal Road
Ottawa, ON K1A OR9
CANADA

Description:

Riverine water was collected from the Ottawa River at Cheneaux, Ontario, about 100 km upstream from Ottawa, at the 2-3 meter level. The water was filtered through a 0.45-µm porosity filter during collection and acidified immediately with nitric acid to pH 1.6. The water was later refiltered through 0.2-µm porosity filters, blended and bottled in 2-liter polyethylene bottles.

Certified concentrations (µg/L unless noted):

Element	Value	Uncertainty (±)	Element	Value	Uncertainty (±)
Na (mg/L)	1.86	0.11	Cu	2.76	0.17
Mg (mg/L)	1.51	0.13	Zn	3.33	0.15
Al	84.4	3.4	As	0.77	0.09
K (mg/L)	0.69	0.09	Sr	27.3	0.4
Ca (mg/L)	5.70	0.13	Mo	0.16	0.02
V	0.25	0.06	Cd	0.028	0.004
Cr	0.45	0.07	Sb	0.26	0.05
Mn	10.1	0.3	Ba	13.8	0.3
Fe	129	7	Pb	0.129	0.011
Co	0.063	0.012	U	0.049	0.002
Ni	1.03	0.10			

Order Information:

SLRS-2 can be purchased for US$120 per unit (2-liter bottle). Price subject to change without notice. Please contact NRCC at the address above.

Reference:

National Research Council Canada (1990) SLRS-2. Riverine water reference material for trace metals. Description sheet. National Research Council Canada, Marine Analytical Standards Program, Ottawa, Canada.

SRM 2694a

Simulated Rainwater

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

This SRM was prepared by dissolution of high-purity salts and acids in high-purity distilled deionized water. Two pH levels are provided.

Certified values/concentrations (mg/L unless noted):

Elements/Parameters	SRM 2694a-I Value	SRM 2694a-I Uncertainty (±)	SRM 2694a-II Value	SRM 2694a-II Uncertainty (±)
pH at 25°C	4.30	0.03	3.60	0.03
Specific conductance (S/cm at 25°C)	23.4	1.2	119.9	1.3
Acidity (meq/L)	0.0544	0.0006	0.283	0.003
Flouride	0.057	0.005	0.108	0.004
Nitrate			7.19	0.16
Sulfate	2.69	0.03	10.6	0.1
Sodium	0.208	0.002	0.423	0.012
Potassium	0.056	0.002	0.108	0.003
Calcium	0.0126	0.0014	0.0364	0.0006
Magnesium	0.0242	0.0002	0.0484	0.0010

Noncertified values/concentrations (mg/L):

Elements/Parameters	SRM 2694a-I Value	SRM 2694a-II Value
Chloride	0.23	0.94
Nitrate	0.53	
Ammonium	0.12	1.06

Order information:

SRM 2694a can be purchased for US$271 per unit (set of 4 5-ml vials). Price subject to change without notice. Please contact NIST at the address shown above.

Reference:

National Institute of Standards and Technology (1991) SRM 2694a. Simulated rainwater. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

VSMOW

Water

Source:

International Atomic Energy Agency
Analytical Quality Control Service
Laboratory Seibersdorf
P. O. Box 100
A-1400 Vienna
AUSTRIA

Description:

VSMOW has certified values of natural levels of ^{2}H and ^{18}O. No other information available.

Order information:

VSMOW can be purchased for US$60 per unit (30 mL). Price subject to change. The price includes handling, postage (surface mail in Europe, airmail elsewhere), and insurance. Please contact IAEA at the address shown above.

Reference:

International Atomic Energy Agency (1992) AQCS (Analytical Quality Control Services) Intercomparison Runs Reference Materials 1992. Catalog, 88 pp. International Atomic Energy Agency, Laboratory Seibersdorf, P.O. Box 100, A-1400 Vienna, Austria.

Appendix I

Symbol, atomic number and Chemical Abstracts Service registry numbers of elements

Actinium	Ac	89	7440-34-8
Aluminum	Al	13	7429-90-5
Americium	Am	95	7440-35-9
Antimony	Sb	51	7440-36-0
Argon	Ar	18	7440-37-1
Arsenic	As	33	7440-38-2
Astatine	At	85	7440-76-1
Barium	Ba	56	7440-39-3
Berkelium	Bk	97	7440-40-6
Beryllium	Be	4	7440-41-7
Bismuth	Bi	83	7440-69-9
Boron	B	5	7440-42-8
Cadmium	Cd	48	7440-43-9
Calcium	Ca	20	7440-70-2
Californium	Cf	98	7440-71-3
Carbon	C	6	7440-44-0
Cerium	Ce	58	7440-45-1
Cesium	Cs	55	7440-46-2
Chlorine	Cl	17	7782-50-5
Chromium	Cr	24	7440-47-3
Cobalt	Co	27	7440-48-8
Curium	Cm	96	7440-51-9
Dysprosium	Dy	66	7429-91-6
Einsteinium	Es	99	7429-92-7
Erbium	Er	68	7440-52-0
Europium	Eu	63	7440-53-1
Fluorine	F	9	7782-41-4
Francium	Fr	87	7440-73-5
Gadolinium	Gd	64	7440-54-2
Gallium	Ga	31	7440-55-3
Germanium	Ge	32	7440-56-4
Gold	Au	79	7440-57-5
Hafnium	Hf	72	7440-58-6
Helium	He	2	7440-59-7
Holmium	Ho	67	7440-60-0
Hydrogen	H	1	1333-74-0
Indium	In	49	7440-74-6
Iodine	I	53	7553-56-2
Krypton	Kr	36	7439-90-9
Lanthanum	La	57	7439-91-0
Lead	Pb	82	7439-92-1
Lithium	Li	3	7439-93-2
Lutetium	Lu	71	7439-94-3
Magnesium	Mg	12	7439-95-4
Manganese	Mn	25	7439-96-55
Mercury	Hg	80	7439-97-6
Molybdenum	Mo	42	7439-98-7
Neodymium	Nd	60	7440-00-8
Neon	Ne	10	7440-01-9
Neptunium	Np	93	7439-99-8
Nickel	Ni	28	7440-02-0
Niobium	Nb	41	7440-03-1
Nitrogen	N	7	7727-37-9
Osmium	Os	76	7440-04-02
Oxygen	O	8	7782-44-7
Palladium	Pd	46	7440-05-3
Phosphorus	P	15	7723-14-0
Platinum	Pt	78	7440-06-4
Plutonium	Pu	94	7440-07-5
Polonium	Po	84	7440-08-6
Potassium	K	19	7440-09-7
Praseodymium	Pr	59	7440-10-0
Promethium	Pm	61	7440-12-2
Protactinium	Pa	91	7440-13-3
Radium	Ra	88	7440-14-4
Radon	Rn	86	10043-92-2
Rhenium	Re	75	7440-15-5
Rhodium	Rh	45	7440-16-6
Rubidium	Rb	37	7440-17-7
Ruthenium	Ru	44	7440-18-8
Samarium	Sm	62	7440-19-9
Scandium	Sc	21	7440-20-2
Selenium	Se	34	7782-49-2
Silicon	Si	14	7440-21-3
Silver	Ag	47	7440-22-4
Sodium	Na	11	7440-23-5
Strontium	Sr	38	7440-24-66
Sulfur	S	16	7704-34-9
Tantalum	Ta	73	7440-25-7
Technetium	Tc	43	7440-26-8
Tellurium	Te	52	13494-80-9
Terbium	Tb	65	7440-27-9
Thallium	Tl	81	7440-28-0
Thorium	Th	90	7440-29-1
Thulium	Tm	69	7440-30-4
Tin	Sn	50	7440-31-5
Titanium	Ti	22	7440-32-6
Tungsten	W	74	7440-33-7
Uranium	U	92	7440-61-1
Vanadium	V	23	7440-62-2
Xenon	Xe	54	7440-63-3
Ytterbium	Yb	70	7440-64-4
Yttrium	Y	39	7440-65-5
Zinc	Zn	30	7440-66-6
Zirconium	Zr	40	7440-67-7

Appendix II

Alternate names and Chemical Abstracts Service registry numbers of organic compounds

1,1,1,2-Tetrachloroethane	630-20-6	---
1,1,1-Trichloroacetone	918-00-3	---
1,1,1-Trichloroethane	71-55-6	Methylchloroform
1,1,2,2-Tetrachloroethane	79-34-5	---
1,1,2-Trichloroethane	---	---
1,1-Dichloro-1-propene	563-58-6	---
1,1-Dichloroethane	75-34-3	Ethylidene chloride
1,1-Dichloroethylene	75-35-4	Vinylidene chloride
1,1-Dichloropropylene	---	---
1,2,3,4-Diepoxybutane	298-18-0	(±)-1,3-Butadiene diepoxide
1,2,3,4-Tetrachlorobenzene	634-66-2	---
1,2,3-Trichlorobenzene	87-61-6	---
1,2,3-Trichloropropane	96-18-4	Allyl trichloride
1,2,4,5-Tetrachlorobenzene	95-94-3	Benzene tetrachloride
1,2,4-Trichlorobenzene	120-82-1	---
1,2,4-Trimethylbenzene	95-63-6	Pseudocumene
1,2-Dibromo-3-chloropropane	---	---
1,2-Dibromoethane	106-93-4	Ethylene dibromide
1,2-Dichlorobenzene	95-50-1	---
1,2-Dichlorobenzene-d4	---	Deuterated dichlorobenzene
1,2-Dichloroethane	107-06-2	Ethylene chloride
1,2-Dichloropropane	78-87-5	Propylene dichloride
1,2-Epoxybutane	106-88-7	1-Butylene oxide
1,2-Epoxypropane	75-56-9	---
1,2-Propanediol	57-55-6	Propylene glycol
1,2:3,4:5,6:7,8-Tetrabenzonaphthalene	---	Dibenzo[g,p]chrysene
1,3,5-Trichlorobenzene	108-70-3	---
1,3,5-Trimethylbenzene	108-67-8	Mesitylene
1,3-Butadiene	106-99-0	---
1,3-Dichloro-2-propanol	96-23-1	---
1,3-Dichlorobenzene	541-73-1	---
1,3-Dichloroporpylene (cis and trans)	542-75-6	---
1,3-Dichloropropane	142-28-9	---

1,3-Dimethylphenanthrene	16664-45-2	---
1,3-Dinitrobenzene	99-65-0	---
1,3-Dinitropyrene	75321-20-9	---
1,3-Propane sultone	1120-71-4	3-Hydroxy-1-propanesulfonic acid
1,4-Dichlorobenzene	106-46-7	---
1,4-Dichlorobenzene-d4	---	---
1,4-Dichlorobutane-d8	83547-96-0	Deuterated 1,4-dichloro-butane
1,4-Diphenylenediamine	106-50-3	---
1,4-Naphthoquinone	130-15-4	---
1,6-Dimethylphenanthrene	20291-74-1	---
1,6-Dinitropyrene	42397-64-8	---
1,7-Dimethylphenanthrene	483-87-4	---
1,8-Dinitropyrene	42397-65-9	---
1-(o-Chlorophenyl)-2-thiourea	5344-82-1	---
1-Acetyl-2-thiourea	591-08-2	---
1-Fluoronaphthalene	321-38-0	---
1-Hydroxychlordene	24009-05-0	---
1-Methylbenz[a]anthracene	43178-22-9	---
1-Methylchrysene	3351-28-8	---
1-Methylnaphthalene	90-12-0	---
1-Methylphenanthrene	832-69-9	---
1-Naphthol	90-15-3	---
1-Naphthylamine	134-32-7	1-Aminonaphthalene
1-Nicotine	---	see Nicotine
1-Nitronaphthalene	86-57-7	---
1-Nitropyrene	5522-43-0	---
1-Nitrosopiperidine	100-75-4	---
1-Propanamine	107-10-8	---
10-Azobenzo[a]pyrene	189-92-4	Phenaleno[1,9-gh]quinoline
2',3,3',4,5-Pentachlorobiphenyl	---	see PCB 122
2',3,4,4',5-Pentachlorobiphenyl	---	see PCB 123
2',3,4,5,5'-Pentachlorobiphenyl	---	see PCB 124
2',3,4,5,6'-Pentachlorobiphenyl	---	see PCB 125
2',3,4,5-Tetrachlorobiphenyl	---	see PCB 76
2',3,4-Trichlorobiphenyl	---	see PCB 33
2',3,5-Trichlorobiphenyl	---	see PCB 34
2,10-Dimethylphenanthrene	2497-54-3	---
2,2',3',4,5-Pentachlorobiphenyl	---	see PCB 97
2,2',3',4,6-Pentachlorobiphenyl	---	see PCB 98

2,2',3,3',4',5,5',6-Octachlorobiphenyl	---	see PCB 201
2,2',3,3',4',5,6-Heptachlorobiphenyl	---	see PCB 177
2,2',3,3',4,4',5',6-Octachlorobiphenyl	---	see PCB 196
2,2',3,3',4,4',5,5',6,6'-Decachlorobiphenyl	---	see PCB 209
2,2',3,3',4,4',5,5',6-Nonachlorobiphenyl	---	see PCB 206
2,2',3,3',4,4',5,5'-Octachlorobiphenyl	---	see PCB 194
2,2',3,3',4,4',5,6,6'-Nonachlorobiphenyl	---	see PCB 207
2,2',3,3',4,4',5,6-Octachlorobiphenyl	---	see PCB 195
2,2',3,3',4,4',5-Heptachlorobiphenyl	---	see PCB 170
2,2',3,3',4,4',6,6'-Octachlorobiphenyl	---	see PCB 197
2,2',3,3',4,4',6-Heptachlorobiphenyl	---	see PCB 171
2,2',3,3',4,4'-Hexachlorobiphenyl	---	see PCB 128
2,2',3,3',4,5',6,6'-Octachlorobiphenyl	---	see PCB 200
2,2',3,3',4,5',6-Heptachlorobiphenyl	---	see PCB 175
2,2',3,3',4,5'-Hexachlorobiphenyl	---	see PCB 130
2,2',3,3',4,5,5',6,6'-Nonachlorobiphenyl	---	see PCB 208
2,2',3,3',4,5,5',6-Octachlorobiphenyl	---	see PCB 198
2,2',3,3',4,5,5'-Heptachlorobiphenyl	---	see PCB 172
2,2',3,3',4,5,6'-Heptachlorobiphenyl	---	see PCB 174
2,2',3,3',4,5,6,6'-Octachlorobiphenyl	---	see PCB 199
2,2',3,3',4,5,6-Heptachlorobiphenyl	---	see PCB 173
2,2',3,3',4,5-Hexachlorobiphenyl	---	see PCB 129
2,2',3,3',4,6'-Hexachlorobiphenyl	---	see PCB 132
2,2',3,3',4,6,6'-Heptachlorobiphenyl	---	see PCB 176
2,2',3,3',4,6-Hexachlorobiphenyl	---	see PCB 131
2,2',3,3',4-Pentachlorobiphenyl	---	see PCB 82
2,2',3,3',5,5',6,6'-Octachlorobiphenyl	---	see PCB 202
2,2',3,3',5,5',6-Heptachlorobiphenyl	---	see PCB 178
2,2',3,3',5,5'-Hexachlorobiphenyl	---	see PCB 133
2,2',3,3',5,6'-Hexachlorobiphenyl	---	see PCB 135
2,2',3,3',5,6,6'-Heptachlorobiphenyl	---	see PCB 179
2,2',3,3',5,6-Hexachlorobiphenyl	---	see PCB 134
2,2',3,3',5-Pentachlorobiphenyl	---	see PCB 83
2,2',3,3',6,6'-Hexachlorobiphenyl	---	see PCB 136
2,2',3,3',6-Pentachlorobiphenyl	---	see PCB 84
2,2',3,3'-Tetrachlorobiphenyl	---	see PCB 40
2,2',3,4',5',6-Hexachlorobiphenyl	---	see PCB 149
2,2',3,4',5,5',6-Heptachlorobiphenyl	---	see PCB 187
2,2',3,4',5,5'-Hexachlorobiphenyl	---	see PCB 146

2,2',3,4',5,6'-Hexachlorobiphenyl	---	see PCB 148
2,2',3,4',5,6,6'-Heptachlorobiphenyl	---	see PCB 188
2,2',3,4',5,6-Hexachlorobiphenyl	---	see PCB 147
2,2',3,4',5-Pentachlorobiphenyl	---	see PCB 90
2,2',3,4',6,6'-Hexachlorobiphenyl	---	see PCB 150
2,2',3,4',6-Pentachlorobiphenyl	---	see PCB 91
2,2',3,4'-Tetrachlorobiphenyl	---	see PCB 42
2,2',3,4,4',5',6-Heptachlorobiphenyl	---	see PCB 183
2,2',3,4,4',5'-Hexachlorobiphenyl	---	see PCB 138
2,2',3,4,4',5,5',6-Octachlorobiphenyl	---	see PCB 203
2,2',3,4,4',5,5'-Heptachlorobiphenyl	---	see PCB 180
2,2',3,4,4',5,6'-Heptachlorobiphenyl	---	see PCB 182
2,2',3,4,4',5,6,6'-Octachlorobiphenyl	---	see PCB 204
2,2',3,4,4',5,6-Heptachlorobiphenyl	---	see PCB 181
2,2',3,4,4',5-Hexachlorobiphenyl	---	see PCB 137
2,2',3,4,4',6'-Hexachlorobiphenyl	---	see PCB 140
2,2',3,4,4',6,6'-Heptachlorobiphenyl	---	see PCB 184
2,2',3,4,4',6-Hexachlorobiphenyl	---	see PCB 139
2,2',3,4,4'-Pentachlorobiphenyl	---	see PCB 85
2,2',3,4,5',6-Hexachlorobiphenyl	---	see PCB 144
2,2',3,4,5'-Pentachlorobiphenyl	---	see PCB 87
2,2',3,4,5,5',6-Heptachlorobiphenyl	---	see PCB 185
2,2',3,4,5,5'-Hexachlorobiphenyl	---	see PCB 141
2,2',3,4,5,6'-Hexachlorobiphenyl	---	see PCB 143
2,2',3,4,5,6,6'-Heptachlorobiphenyl	---	see PCB 186
2,2',3,4,5,6-Hexachlorobiphenyl	---	see PCB 142
2,2',3,4,5-Pentachlorobiphenyl	---	see PCB 86
2,2',3,4,6,6'-Hexachlorobiphenyl	---	see PCB 145
2,2',3,4,6-Pentachlorobiphenyl	---	see PCB 88
2,2',3,4-Tetrachlorobiphenyl	---	see PCB 41
2,2',3,5',6-Pentachlorobiphenyl	---	see PCB 95
2,2',3,5'-Tetrachlorobiphenyl	---	see PCB 44
2,2',3,5,5',6-Hexachlorobiphenyl	---	see PCB 151
2,2',3,5,5'-Pentachlorobiphenyl	---	see PCB 92
2,2',3,5,6'-Pentachlorobiphenyl	---	see PCB 94
2,2',3,5,6,6'-Hexachlorobiphenyl	---	see PCB 152
2,2',3,5,6-Pentachlorobiphenyl	---	see PCB 93
2,2',3,5-Tetrachlorobiphenyl	---	see PCB 43
2,2',3,6'-Tetrachlorobiphenyl	---	see PCB 46

2,2',3,6,6'-Pentachlorobiphenyl	---	see PCB 96
2,2',3,6-Tetrachlorobiphenyl	---	see PCB 45
2,2',3-Trichlorobiphenyl	---	see PCB 16
2,2',4,4',5,5'-Hexachlorobiphenyl	---	see PCB 153
2,2',4,4',5,6-Hexachlorobiphenyl	---	see PCB 154
2,2',4,4',5-Pentachlorobiphenyl	---	see PCB 99
2,2',4,4',6,6'-Hexachlorobiphenyl	---	see PCB 155
2,2',4,4',6-Pentachlorobiphenyl	---	see PCB 100
2,2',4,4'-Tetrachlorobiphenyl	---	see PCB 47
2,2',4,5',6-Pentachlorobiphenyl	---	see PCB 103
2,2',4,5'-Tetrachlorobiphenyl	---	see PCB 49
2,2',4,5,5'-Pentachlorobiphenyl	---	see PCB 101
2,2',4,5,6'-Pentachlorobiphenyl	---	see PCB 102
2,2',4,5-Tetrachlorobiphenyl	---	see PCB 48
2,2',4,6'-Tetrachlorobiphenyl	---	see PCB 51
2,2',4,6,6'-Pentachlorobiphenyl	---	see PCB 104
2,2',4,6-Tetrachlorobiphenyl	---	see PCB 50
2,2',4-Trichlorobiphenyl	---	see PCB 17
2,2',5,5'-Tetrachlorobiphenyl	---	see PCB 52
2,2',5,6'-Tetrachlorobiphenyl	---	see PCB 53
2,2',5-Trichlorobiphenyl	---	see PCB 18
2,2',6,6'-Tetrachlorobiphenyl	---	see PCB 54
2,2',6-Trichlorobiphenyl	---	see PCB 19
2,2'-Bipyridyl	366-18-7	2,2'-Dipyridyl
2,2'-Dichlorobiphenyl	---	see PCB 4
2,2-Dichloropropane	594-20-7	---
2,3',4',5-Tetrachlorobiphenyl	---	see PCB 70
2,3',4',6-Tetrachlorobiphenyl	---	see PCB 71
2,3',4,4',5',6-Hexachlorobiphenyl	---	see PCB 168
2,3',4,4',5,5'-Hexachlorobiphenyl	---	see PCB 167
2,3',4,4',5-Pentachlorobiphenyl	---	see PCB 118
2,3',4,4',6-Pentachlorobiphenyl	---	see PCB 119
2,3',4,4'-Tetrachlorobiphenyl	---	see PCB 66
2,3',4,5',6-Pentachlorobiphenyl	---	see PCB 121
2,3',4,5'-Tetrachlorobiphenyl	---	see PCB 68
2,3',4,5,5'-Pentachlorobiphenyl	---	see PCB 120
2,3',4,5-Tetrachlorobiphenyl	---	see PCB 67
2,3',4,6-Tetrachlorobiphenyl	---	see PCB 69
2,3',4-Trichlorobiphenyl	---	see PCB 25

2,3',5',6'-Tetrachlorobiphenyl	---	see PCB 73
2,3',5,5'-Tetrachlorobiphenyl	---	see PCB 72
2,3',5-Trichlorobiphenyl	---	see PCB 26
2,3',6-Trichlorobiphenyl	---	see PCB 27
2,3'-Dichlorobiphenyl	---	see PCB 6
2,3,3',4',5,5',6-Heptachlorobiphenyl	---	see PCB 193
2,3,3',4',5,5'-Hexachlorobiphenyl	---	see PCB 162
2,3,3',4',5,6-Hexachlorobiphenyl	---	see PCB 163
2,3,3',4',5-Pentachlorobiphenyl	---	see PCB 107
2,3,3',4',6-Pentachlorobiphenyl	---	see PCB 110
2,3,3',4'-Tetrachlorobiphenyl	---	see PCB 56
2,3,3',4,4',5',6-Heptachlorobiphenyl	---	see PCB 191
2,3,3',4,4',5'-Hexachlorobiphenyl	---	see PCB 157
2,3,3',4,4',5,5',6-Octachlorobiphenyl	---	see PCB 205
2,3,3',4,4',5,5'-Heptachlorobiphenyl	---	see PCB 189
2,3,3',4,4',5,6-Heptachlorobiphenyl	---	see PCB 190
2,3,3',4,4',5-Hexachlorobiphenyl	---	see PCB 156
2,3,3',4,4',6-Hexachlorobiphenyl	---	see PCB 158
2,3,3',4,4'-Pentachlorobiphenyl	---	see PCB 105
2,3,3',4,5',6-Hexachlorobiphenyl	---	see PCB 161
2,3,3',4,5'-Pentachlorobiphenyl	---	see PCB 108
2,3,3',4,5,5',6-Heptachlorobiphenyl	---	see PCB 192
2,3,3',4,5,5'-Hexachlorobiphenyl	---	see PCB 159
2,3,3',4,5,6-Hexachlorobiphenyl	---	see PCB 160
2,3,3',4,5-Pentachlorobiphenyl	---	see PCB 106
2,3,3',4,6-Pentachlorobiphenyl	---	see PCB 109
2,3,3',4-Tetrachlorobiphenyl	---	see PCB 55
2,3,3',5',6-Pentachlorobiphenyl	---	see PCB 113
2,3,3',5'-Tetrachlorobiphenyl	---	see PCB 58
2,3,3',5,5',6-Hexachlorobiphenyl	---	see PCB 165
2,3,3',5,5'-Pentachlorobiphenyl	---	see PCB 111
2,3,3',5,6-Pentachlorobiphenyl	---	see PCB 112
2,3,3',5-Tetrachlorobiphenyl	---	see PCB 57
2,3,3',6-Tetrachlorobiphenyl	---	see PCB 59
2,3,3'-Trichlorobiphenyl	---	see PCB 20
2,3,4',5,6-Pentachlorobiphenyl	---	see PCB 117
2,3,4',5-Tetrachlorobiphenyl	---	see PCB 63
2,3,4',6-Tetrachlorobiphenyl	---	see PCB 64
2,3,4'-Trichlorobiphenyl	---	see PCB 22

2,3,4,4',5,6-Hexachlorobiphenyl	---	see PCB 166
2,3,4,4',5-Pentachlorobiphenyl	---	see PCB 114
2,3,4,4',6-Pentachlorobiphenyl	---	see PCB 115
2,3,4,4'-Tetrachlorobiphenyl	---	see PCB 60
2,3,4,5,6-Pentachlorobiphenyl	---	see PCB 116
2,3,4,5-Tetrachlorobiphenyl	---	see PCB 61
2,3,4,6-Tetrachlorobiphenyl	---	see PCB 62
2,3,4-Trichlorobiphenyl	---	see PCB 21
2,3,5,6-Tetrachlorobiphenyl	---	see PCB 65
2,3,5-Trichlorobiphenyl	---	see PCB 23
2,3,5-Trichlorophenol	933-78-8	Pyrenoline
2,3,5-Trimethylnaphthalene	2245-38-7	---
2,3,6-Trichlorobiphenyl	---	see PCB 24
2,3,6-Trichlorophenol	933-75-5	---
2,3,7,8-TCDD	1746-01-6	2,3,7,8-Tetrachloro-dibenzo[b,e][1,4]dioxin
2,3,7,8-TCDD-13C12	76523-40-5	Labeled 2,3,7,8-Tetrachloro-dibenzo[b,e][1,4]dioxin
2,3-Dichloro-1-propene	78-88-6	---
2,3-Dichlorobiphenyl	---	see PCB 5
2,4',5-Trichlorobiphenyl	---	see PCB 31
2,4',6-Trichlorobiphenyl	---	see PCB 32
2,4'-DDD	53-19-0	o,p'-TDE
2,4'-DDE	3424-82-6	---
2,4'-DDT	789-29-3	---
2,4'-Dichlorobiphenyl	---	see PCB 8
2,4,4',5-Tetrachlorobiphenyl	---	see PCB 74
2,4,4',6-Tetrachlorobiphenyl	---	see PCB 75
2,4,4'-Trichlorobiphenyl	---	see PCB 28
2,4,5-T	• 93-76-5	(2,4,5-Trichlorophenoxy) acetic acid
2,4,5-T (acid)	---	see 2,4,5-T
2,4,5-T (methyl ester)	---	---
2,4,5-T Butoxyethanol ester ether	2545-59-7	---
2,4,5-T Butyl ester	---	---
2,4,5-T Isooctyl ester	25168-15-4	---
2,4,5-T Propylene glycol butyl ester ether	1928-48-9	---
2,4,5-TB	93-80-1	---
2,4,5-TP	• 93-72-1	2-(2,4,5-Trichlorophenoxy)propionic acid
2,4,5-Trichlorobiphenyl	---	see PCB 29
2,4,5-Trichlorophenol	95-95-4	---
2,4,5-Trichlorophenoxyacetic acid	---	see 2,4,5-T

2,4,6-TBA (acid)		---	2,4,6-Trichlorobenzoic acid
2,4,6-Trichlorobiphenyl		---	see PCB 30
2,4,6-Trichlorophenol		88-06-2	---
2,4-D		94-75-7	---
2,4-D (acid)	•	---	see 2,4-D
2,4-D (methyl ester)		---	---
2,4-D Butoxyethanol ester ether		1929-73-3	---
2,4-D, 2-Ethylhexyl ester		1928-43-4	---
2,4-D, Butyl esters, mixed		94-80-4	---
2,4-D, Diethanolamine salt, formulation		53404-34-5	---
2,4-D, Dimethylamine salt, formulation		2008-39-1	---
2,4-D, Isobutyl ester, mixed		1713-15-1	---
2,4-D, Isopropyl ester		94-11 -1	---
2,4-D, mixed Isooctyl ester		---	---
2,4-D, Propylene glycol butyl ester ether		53466-78-7	---
2,4-D, Sodium salt		2702-72-9	---
2,4-DB	•	94-28-6	4-(2,4-Dichlorophenoxy)butyric acid
2,4-DB		94-82-6	---
2,4-DB, Butyl ester		6753-24-8	---
2,4-DB, Isobutyl ester		51550-64-2	---
2,4-Diaminotoluene		95-80-7	2,4-Diamino-1-methylbenzene
2,4-Dichlorobenzoic acid		50-84-0	---
2,4-Dichlorobiphenyl		---	see PCB 7
2,4-Dichlorophenol		120-83-2	---
2,4-Dichlorophenol-d3		---	Deuterated 2,4-dichlorophenol
2,4-Dichlorophenoxy acetic acid		94-57-7	---
2,4-Dichlorophenoxy acetic acid		---	see 2,4-D
2,4-Dichlorotoluene		95-73-8	1,3-Dichloro-4-methylbenzene
2,4-Dimethylphenol		105-67-9	m-Xylenol
2,4-Dimethylphenol-3,5,6-d3		---	Deuterated 2,4-dimethylphenol
2,4-Dinitrophenol		51-28-5	---
2,4-Dinitrotoluene		121-14-2	---
2,5-Dichlorobiphenyl		---	see PCB 9
2,6-Dichlorobiphenyl		---	see PCB 10
2,6-Dichlorophenol		87-65-0	---
2,6-Dimethylnaphathalene		581-42-0	---
2,6-Dimethylphenanthrene		17980-16-4	---
2,6-Dinitrotoluene		606-20-2	---
2,7-Dimethylphenanthrene		1576-69-8	---

2,9-Dimethylphenanthrene	17980-09-5	---
2-Aminobenzimidazole	934-32-7	---
2-Chlorobiphenyl	---	see PCB 1
2-Chloroethanol	---	---
2-Chloroethyl vinyl ether	110-75-8	(2-Chloroethoxy)ethene
2-Chloronaphthalene	91-58-7	---
2-Chlorophenol	95-57-8	o-Chlorophenol
2-Chlorophenol-d4	---	Deuterated 2-chlorophenol
2-Chlorotoluene	95-49-8	---
2-Ethylphenanthrene	3674-74-6	---
2-Fluoroacetamide	640-19-7	Fluoroacetamide
2-Fluorobiphenyl	321-60-8	2-Fluoro-1,11-biphenyl
2-Fluorophenol	367-12-4	---
2-Hexanone	591-78-6	---
2-Methyl-1-propanol	78-83-1	Isobutyl alcohol
2-Methylchrysene	3351-32-4	---
2-Methylnaphthalene	91-57-6	---
2-Naphthylamine	91-59-8	2-Aminonaphthalene
2-Nitro-7-methoxynaphtho[2,1-b]furan	92882-94-5	---
2-Nitrofluoranthene	13177-29-2	---
2-Nitrofluorene	607-57-8	2-Nitro-9H-fluorene
2-Nitronaphthalene	581-89-5	---
2-Nitrophenol	88-75-5	o-Nitrophenol
2-Nitrophenol-d4	---	Deuterated 2-nitrophenol
2-Phenylphenol	90-43-7	2-Hydroxybiphenyl
2-Picoline	109-06-8	2-Methylpyridine
3,10-Dimethylphenanthrene	66291-33-6	---
3,3',4,4',5,5'-Hexachlorobiphenyl	---	see PCB 169
3,3',4,4',5-Pentachlorobiphenyl	---	see PCB 126
3,3',4,4'-Tetrachlorobiphenyl	---	see PCB 77
3,3',4,5'-Tetrachlorobiphenyl	---	see PCB 79
3,3',4,5,5'-Pentachlorobiphenyl	---	see PCB 127
3,3',4,5-Tetrachlorobiphenyl	---	see PCB 78
3,3',4-Trichlorobiphenyl	---	see PCB 35
3,3',5,5'-Tetrachlorobiphenyl	---	see PCB 80
3,3',5-Trichlorobiphenyl	---	see PCB 36
3,3'-Dichlorobenzidine	91-94-1	3,3'-Dichloro-[1,1'-biphenyl]-4,4'-diamine
3,3'-Dichlorobiphenyl	---	see PCB 11
3,3-Dichlorobenzidine (as dihydrochloride)	612-83-9	---

3,4',5-Trichlorobiphenyl	---	see PCB 39
3,4'-Dichlorobiphenyl	---	see PCB 13
3,4,4',5-Tetrachlorobiphenyl	---	see PCB 81
3,4,4'-Trichlorobiphenyl	---	see PCB 37
3,4,5-Trichlorobiphenyl	---	see PCB 38
3,4-Dichlorobiphenyl	---	see PCB 12
3,5-Dichlorobiphenyl	---	see PCB 14
3,6-Dimethylphenanthrene	1576-67-6	---
3,9-Dimethylphenanthrene	66291-32-5	---
3-Chlorobiphenyl	---	see PCB 2
3-Chlorophenol	108-43-0	m-Chlorophenol
3-Chloropropionitrile	542-76-7	3-Chloropropanenitrile
3-Chlorotoluene	108-41-8	---
3-Hydroxybenzo[a]pyrene	13345-21-6	---
3-Hydroxycarbofuran	---	---
3-Hydroxycarbofuran	16655-82-6	---
3-Ketocarbofuran phenol	11781 -16-7	---
3-Methylchrysene	3351-31-3	---
3-Nitrofluoranthene	892-21-7	---
3-Nitrophenol	554-84-7	m-Nitrophenol
4,4'-Bipyridyl	553-26-4	4,4'-Dipyridyl
4,4'-DDD •	72-54-8	2,2-bis(p-Chlorophenyl)-1,1-dichloroethane
4,4'-DDE •	72-55-9	1,1'-(Dichloroethenylidene)-bis(4-chlorobenzene)
4,4'-DDT •	50-29-3	1,1'-(2,2,2-Trichloroethylidene)bis[4-chlorobenzene]
4,4'-Dichlorobiphenyl	---	see PCB 15
4,4'-Methylene bis(o-chloroaniline)	---	---
4,4-Dibromooctafluorobiphenyl	10386-84-2	---
4,6-Dinitro-2-methylphenol	---	see 4,6-Dinitro-o-cresol
4,6-Dinitro-o-cresol	534-52-1	3,5-Dinitro-2-hydroxytoluene
4-Amino-5-chloropyridaz-6-one	6339-19-6	---
4-Aminobiphenyl	92-67-1	---
4-Aminopyridine	504-24-5	4-Pyridinamine
4-Bromo-2,5-dichlorophenol	1940-42-7	---
4-Bromofluorobenzene	460-00-4	p-Bromofluorobenzene
4-Bromophenyl phenyl ether	101-55-3	p-Phenoxybromobenzene
4-Chloro-3-methyl phenol	59-50-7	Chlorocresol
4-Chloro-m-cresol	---	see 4-Chloro-3-methylphenol
4-Chloroaniline	106-47-8	4-Chlorobenzeneanine
4-Chlorobiphenyl	---	see PCB 3

4-Chlorophenol		106-48-9	p-Chlorophenol
4-Chlorophenyl phenyl ether		7005-72-3	p-Chlorodiphenyl oxide
4-Chlorotoluene		106-43-4	---
4-CPA		122-88-3	2-(4-Chlorophenoxy)propanamine
4-Dimethylaminoazobenzene		60-11-7	Methyl Yellow
4-Isopropyltoluene		99-87-6	p-Cymene
4-Methyl-2-pentanone		109-10-1	---
4-Methylchrysene		3351-30-2	---
4-Methylphenanthrene		832-64-4	---
4-Nitrophenol		100-02-7	p-Nitrophenol
4H-Cyclopenta[def]phenanthrene-4-one		---	---
5-Methylchrysene		3697-24-3	---
5-Nitro-o-toluidine		99-55-8	---
6-Methylchrysene		1705-85-7	---
6-Nitrobenzo[a]pyrene		63041-90-7	---
6-Nitrochrysene		7496-02-8	---
7,12-Dimethylbenz[a]anthracene		57-97-6	---
7-Nitrobenz[a]anthracene		20268-51-3	---
7H-Dibenzo[c,g]carbazole		194-59-2	---
9-Ethylphenanthrene		3674-75-7	---
9-Fluorenone		486-25-9	---
9-Methylphenanthrene		883-83-7	---
9-Nitroanthracene		602-60-8	5-Nitroanthracene
a-Chlordene		---	see alpha-Chlordene
Acenaphthene	•	83-32-9	1,2-Dihydroacenaphthylene
Acenaphthenes		---	(not specified)
Acenaphthylene	•	208-96-8	---
Acephate		30560-19-1	---
Acetanilide		103-84-4	---
Acetone		67-64-1	---
Acetonitrile		75-08-5	---
Acetophenone		98-86-2	1-Phenyl-ethanone
Acrolein		107-02-8	Acryl aldehyde
Acrylamine		79-06-1	Propenamide
Acrylonitrile		107-13-1	2-Propenenitrile
Alachlor	•	15972-60-8	2-Chloro-N-(2,6-diethylphenyl)-N-(methoxymethyl)-acetamide
Aldicarb	•	116-06-3	2-Methyl-2-(methylthio)propanal O-[(methylamino) carbonyl]oxime
Aldicarb sulfone	•	1646-88-4	2-Methyl-2-(methylsulfonyl)propanal o-[(methylamino)carbonyl)]oxime
Aldicarb sulfoxide	•	1646-87-3	2-Methyl-2-(methylsulfinyl)propanal o-[(methylamino)carbonyl]oxime

Aldrin	•	309-00-2	1,2,3,4,10,10-Hexachloro-1,4,4a,5,8,8a-hexahydro-1,4:5,8-dimethanonaphthalene
Alkylbenzenes		---	(not specified)
Allethrin	•	584-79-2	---
Allyl alcohol		107-18-6	2-Propen-1-ol
Allyl chloride		107-05-1	3-Chloro-1-propene
alpha,alpha-Dimethylphenethylamine		122-09-8	---
alpha-BHC		319-84-6	alpha-Lindane
alpha-Chlordane		---	see cis-Chlordane
alpha-Chlordene		56534-02-2	---
alpha-Endosulfan		---	see Endosulfan I
alpha-HCH		---	see alpha-BHC
alpha-Tocopherol		59-02-9	---
Amdro		67485-29-4	---
Ametryne		834-12-8	2-(Ethylamino)-4-(isopropylamino)-6-(methylthio)-s-triazine
Aminocarb		2032-59-9	---
Amitraz		33089-61 -1	N,N-bis(2,4-xylyliminomethyl)methylamine
Amitrole		61-82-5	3-Amino-s-triazole
Amobam		3566-10-7	---
Ancymidol		12771 -68-5	---
Aniline		62-53-3	Benzenamine
Anisic acid		---	(unspecified form)
Anthanthrene	•	191-26-4	Dibenzo(def,mno)chrysene
Anthracene	•	120-12-7	Paranaphthalene
Anthraquinone		84-65-1	---
ANTU		86-88-4	1-Naphthalenylthiourea
Aroclor 1016		12674-11-2	(mixture)
Aroclor 1221		11104-28-2	(mixture)
Aroclor 1232		11141-16-5	(mixture)
Aroclor 1242		53469-21-9	(mixture)
Aroclor 1248		12672-29-6	(mixture)
Aroclor 1254		11097-69-1	(mixture)
Aroclor 1260		11096-82-5	(mixture)
Aroclor 1262		37324-23-5	(mixture)
Aroclor 1268		11100-14-4	(mixture)
Aspon		3244-90-4	---
Asulam	•	3337-71-1	Methyl sulphanilylcarbamate
Atraton		1610-17-9	---
Atrazine	•	1912-24-9	6-Chloro-N-ethyl-N'-(1-methylethyl)-1,3,5-triazine-2,4-diamine

Azinphosethyl	2642-71-9	---
Azinphosmethyl	86-50-0	Guthion
Azobenzene	103-33-3	---
b-Chlordene	---	---
Barban	101-27-9	---
Bendiocarb	22781-23-3	2,3-Isopropylidenedioxyphenyl methylcarbamate
Benefin	1861-40-1	---
Benomyl	17804-35-2	Methyl [1-[(butylamino)carbonyl]-1H-benzimidazol-2-yl]carbamate
Bensulide	741-58-2	O,O-bis(1-Methylethyl) S-[2-(phenylsulfonyl)amino]ethyl] phosphorodithioate
Bentazon	25057-89-0	3-(1-Methylethyl)-1H-2,1,3-benzothiadiazin-4(3H)-one 2,2-dioxide
Bentranil	1022-46-4	2-Phenyl-4-oxo-3,1-benzoxazine
Benzadox	5251-93-4	---
Benzal chloride	98-87-3	---
Benzene	71-43-2	---
Benzene-d6	1076-43-3	Deuterated benzene
Benzidine (as dihydrochloride)	531-85-1	---
Benzoic acid	65-85-0	---
Benzonitrile	100-47-0	---
Benzophenone	119-61-9	Diphenyl ketone
Benzotrichloride	98-07-7	---
Benzoylprop ethyl	22212-55-1	---
Benzo[a]fluoranthene	203-33-8	1,2-Benzofluoranthene
Benzo[a]fluorenone	479-79-8	---
Benzo[a]pyrene •	50-32-8	3,4-Benzpyrene
Benzo[a]pyrene-d12	---	Deuterated benzo[a]pyrene
Benzo[b+k]fluoranthene	---	---
Benzo[b]chrysene •	214-17-5	1,2:6,7-Dibenzophenanthrene
Benzo[b]fluoranthene •	205-99-2	Benz[e]acephenanthrylene
Benzo[b]naphtho[1,2-d]thiophene	205-43-6	---
Benzo[b]naphtho[2,1-d]thiophene	239-35-0	---
Benzo[b]naphtho[2,3-d]thiophene	243-46-9	---
Benzo[b]naphto[1,2-d]furan	205-39-0	---
Benzo[b]naphto[2,1-d]furan •	239-30-5	Naphtho[1,2-b]benzofuran
Benzo[c,d]pyren-6-one	3074-00-8	---
Benzo[c]chrysene •	194-69-4	1,2:5,6-Dibenzophenanthrene
Benzo[c]phenanthrene •	195-19-7	3,4-Benzophenanthrene
Benzo[e]pyrene •	192-97-2	4,5-Benzopyrene
Benzo[f]quinoline •	85-02-9	5,6-Benzoquinoline

Benzo[ghi]fluoranthene	•	203-12-3	Benzo[mno]fluoranthene
Benzo[ghi]perylene	•	191-24-2	1,12-Benzoperylene
Benzo[ghi]perylene-13C		---	Labeled 1,12-Benzoperylene
Benzo[j]fluoranthene	•	205-82-3	10,11-Benzofluoranthene
Benzo[k]fluoranthene	•	207-08-9	11,12-Benzofluoranthene
Benzyl alcohol		100-47-0	
Benzyl alcohol		100-51-6	---
Benzyl benzoate		120-51-4	---
Benzyl chloride		100-44-7	alpha-Chlorotoluene
Benz[a]acridine		225-11-6	---
Benz[a]anthracene	•	56-55-3	1,2-Benzanthracene
Benz[c]acridine		225-51-4	---
beta-BHC		319-85-7	beta-Lindane
beta-Endosulfan		---	see Endosulfan II
BHC mixed		608-73-1	---
Bifenox		42576-02-3	Methyl 5-(2,4-dichlorophenoxy)-2-nitrobenzoate
Bioallethrin		22431 -63-6	d-trans Allethrin
Biphenyl	•	92-52-4	---
bis(2-Chloroethoxy)methane		111-91-1	Bis(2-chloroethyl) formal
bis(2-Chloroethyl)ether		111-44-4	1,1'-Oxybis(2-chloroethane)
bis(2-Chloroisopropyl)ether		108-60-1	---
bis(2-Ethylhexyl)adipate		103-23-1	---
bis(2-Ethylhexyl)phthalate		---	see Di-n-octyl phthalate
bis(2-Ethylhexyl)phthalate-d4		---	Deuterated dioctyl phthalate
Blazer, acid		62476-59-9	Acifluorfen, acid
Bomyl		122-10-1	---
BPMC		3766-81 -2	2-(1-Methylpropyl)phenyl methylcarbamate
Bromacil		314-40-9	5-Bromo-6-methyl-3-(1-methylpropyl)-2,4(1H,3H)-pyrimidinedione
Bromadilone	•	28772-56-7	Talon
Bromobenzene		108-86-1	---
Bromochloroacetonitrile		83463-62-1	---
Bromochloromethane		74-97-5	---
Bromodichloromethane		75-27-4	---
Bromoform		75-25-2	Tribromomethane
Bromomethane		74-83-9	---
Bromophos		2104-96-3	---
Bromophos ethyl		4824-78-6	---
Bromopropylate		18181-80-1	---
Bromoxynil	•	1089-84-5	3,5-Dibromo-4-hydroxybenzonitrile

Bromoxynil octanoate		1689-99-2	2,6-Dibromo-4-cyanophenyl octanoic acid ester
Brucine		357-57-3	---
Bunema		51026-28-9	---
Bupirimate	•	41483-43-6	5-Butyl-2-ethylamino-6-methylpyrimidin-4-yl-dimethylsulphamate
Butachlor		23184-66-9	N-(Butoxymethyl)-2-chloro-2',6'-diethylacetanilide
Buthidazole		55511-98-3	---
Butralin		33629-47-9	N-sec-Butyl-4-tert-butyl-2,6-dinitroaniline
Butyl benzyl phthalate		85-68-7	1,2-Benzenedicarboxylic acid butyl phenylmethyl ester
Butylate		2008-41 -5	---
Cacodylic acid		75-60-5	---
Captafol	•	2425-06-1	N-[(1,1,2,2-Tetrachloroethyl)thio]-4-cyclohexene-1,2-dicarboximide
Captan		133-06-2	N-[(Trichloromethyl)thio]-4-cyclohexene-1,2-dicarboximide
Carbaryl	•	63-25-2	1-Naphthyl methylcarbamate
Carbazole	•	86-74-8	Dibenzopyrrole
Carbendazim		10605-21 -7	Methyl 2-benzimidazolecarbamate
Carbetamide		16118-49-3	(R)-N-Ethyl-2-[[(phenylamino)carbonyl]oxy]propanamide
Carbofuran	•	1563-66-2	2,3-Dihydro-2,2-dimethyl-7-benzofuranyl methylcarbamate
Carbofuran phenol		1563-38-8	---
Carbon disulfide		75-15-0	---
Carbon tetrachloride		56-23-5	Tetrachloromethane
Carbon tetrachloride-13C		---	Labeled carbon tetrachloride
Carbophenothion		786-19-6	Trithion
Carboxin		5234-68-4	5,6-Dihydro-2-methyl-1,4-oxathiin-3-carboxalinide
CDAA		93-71-0	2-Chloro-N,N-di-2-propenylacetamide
Chloral hydrate		75-87-6	Trichloroacetaldehyde
Chloramben		133-90-4	3-Amino-2,5-dichlorobenzoic acid
Chlorambucil	•	305-03-3	4-[bis(2-Chloroethyl)amino]benzebebutanoic acid
Chloranil		118-75-2	---
Chlorbenside	•	103-17-3	4-Chlorobenzyl 4-chlorophenyl sulfide
Chlordane	•	57-74-9	1,2,4,5,6,7,8,8-Octachloro-2,3,3a,4,7,7a-hexahydro-4,7-methano-1H-indene
Chlordecone		143-50-0	Kepone
Chlordene		3734-48-3	---
Chlordimeform		6164-98-3	---
Chlorfenvinphos		470-90-6	2-Chloro-1-(2,4-dichlorophenyl)ethenyl diethyl phosphate
Chlormephos		24934-91-6	---
Chlorobenzene		108-90-7	---
Chlorobenzene-d5		3114-55-4	Deuterated chlorobenzene
Chlorobenzilate	•	510-15-6	Ethyl 4-chloro-alpha-(4-chlorophenyl)-alpha-hydroxybenzeneacetate

Chlorobromuron	•	13360-45-7	3-(4-Bromo-3-chlorophenyl)-1-methoxy-1-methyl urea
Chlorodibromomethane		124-48-1	---
Chloroethane		75-00-3	---
Chloroform		67-66-3	---
Chloromethane		74-87-3	---
Chloroneb		2675-77-6	1,4-Dichloro-2,5-dimethoxybenzene
Chlorophacinone	•	3691-35-8	2-[(p-Chlorophenyl)phenylacetyl]-1,3-indandione
Chloropicrin		76-06-2	Tetrachloronitromethane
Chlorothalonil		1897-45-6	2,4,5,6-Tetrachloro-1,3-benzenedicarbonitrile
Chlorotoluron	•	15545-48-9	3-(3-Chloro-p-tolyl)-1,1-dimethylurea
Chlorpropham		101-21-3	Isopropyl m-chlorcarbanilate
Chlorpyriphos		2921-88-2	O,O-Diethyl O-3,5,6-trichloro-2-pyridyl phosphorothioate
Chlorpyriphos methyl		5598-13-0	---
Chrysene	•	218-01-9	1,2-Benzphenanthrene
cis-1,2-Dichloroethylene		156-59-2	---
cis-1,3-Dichloro-1-propene		---	---
cis-1,3-Dichloropropylene		10061-01-5	Z-1,3-Dichloropropene
cis-Chlordane		5103-71-9	alpha-Chlordane
cis-Nonachlor		---	---
cis-Permethrin		---	---
Clofentezine		---	3,6-bis(2-Chlorophenyl)-1,2,4,5-tetrazine
Coronene	•	191-07-1	---
Coumafuryl		117-52-2	---
Coumaphos		56-72-4	O-(3-Chloro-4-methyl-2-oxo-2H-1-benzopyran-7-yl
CPMC		3942-54-9	---
Crotonaldehyde		123-73-9	---
Crotoxyphos		7700-17-6	---
Crufomate		299-86-5	---
Cryolite		13775-53-6	---
Cyanazine	•	21725-46-2	2-(4-Chloro-6-ethylamino-1,3,5-triazin-2-ylamino)-2-methylpropionitrile
Cyanophos		2636-26-2	Cyanox
Cycloate		1134-23-3	S-Ethyl cyclohexylethylcarbamothioate
Cyclohexanone		108-94-1	---
Cycloheximide		66-81-9	---
Cyclopenta[c,d]pyrene		27208-37-3	---
Cypermethrin	•	52315-07-8	---
Cyprazine		22936-86-3	---
Cystine		---	(unspecified form)
Cythioate		115-93-5	---

	Dalapon	75-99-0	2,2-Dichloropropanoic acid
	Daminozide	1596-84-5	Succinic acid mono(2,2-dimethylhydrazine)
	DCPA	1861-32-1	---
	DDD	---	(not specified)
	DDE	---	(not specified)
	DDT	---	(not specified)
	DEET	134-62-3	N,N-Diethyl-3-methylbenzamide
	DEF	50-29-3	---
	DEF	50-29-3	
	delta-BHC	319-86-8	delta-Lindane
	Deltamethrin	52918-63-5	---
	Demeton, mixed isomers	298-03-3	---
	Desmedipham	13684-56-5	Ethyl [3-[[(phenylamineo)carbonyl]0xy]phenyl]carbamate
•	Desmetryn	1014-69-3	2-(Isopropylamino)-4-(methylamino)-6-(methylthio)-s-triazine
	Di-n-butyl phthalate	84-74-2	---
	Di-n-octyl phthalate	117-81-7	---
	Diallate	2303-16-4	S-2,3-Dichloro allyl-N,N-di-isopropylthiocarbamate
	Diaphene	87-10-5	---
	Diazinon	333-41 -5	O,O-Diethyl O-(2-isopropyl-6-methyl-4-pyrimidinyl) phosphorothioate
•	Dibenzofuran	132-64-9	2,2'-Biphenylene
•	Dibenzothiophene	132-65-0	Diphenylene sulfide
	Dibenzothiophenes	---	(not specified)
	Dibenzo[a,e]fluoranthene	5385-75-1	Dibenz[a,e]acenthrylene
•	Dibenzo[a,e]pyrene	192-65-4	Naphtho(1,2,3,4-def)chrysene
•	Dibenzo[a,h]anthracene	---	see Dibenz[a,h]anthracene
•	Dibenzo[a,h]pyrene	189-64-0	---
•	Dibenzo[a,i]pyrene	189-55-9	Benzo[rst]pantaphene
•	Dibenzo[a,l]pyrene	191-30-0	Dibenzo[def,p]chrysene
	Dibenzo[b,d]furan	---	see Dibenzofuran
•	Dibenz[a,c]acridine	215-62-3	Phenanthracridine
•	Dibenz[a,c]anthracene	215-58-7	Benzo[b]triphenylene
•	Dibenz[a,h]acridine	226-36-8	---
	Dibenz[a,h]anthracene	414-29-9	1,2:5,6-Dibenzanthracene
•	Dibenz[a,i]acridine	226-92-6	---
•	Dibenz[a,j]acridine	224-42-0	---
•	Dibenz[a,j]anthracene	224-41-9	1,2:7,8-Dibenzanthracene
	Dibenz[c,h]acridine	224-53-3	---
	Dibromochloropropane	96-12-8	---
	Dibromofluoromethane	75-61-6	---

Dibromomethane		74-95-3	---
Dibutyl chlorendate		1770-80-5	---
Dibutyl ether		142-96-1	2,2'-Oxy(bis)(2-methylpropane)
Dibutyl phthalate		---	see Di-n-butyl phthalate
Dicamba		1918-00-9	---
Dichlobenil	•	1194-65-6	2,6-Dichlorobenzonitrile
Dichlofenthion		97-17-6	---
Dichlofop methyl		51338-27-3	---
Dichlone	•	117-65-6	2,3-Dichloro-1,4-naphthoquinone
Dichloran		99-30-9	2,6-Dichloro-4-nitroaniline
Dichloroacetonitrile		3018-12-0	---
Dichlorobromomethane		---	see Bromodichloromethane
Dichlorodifluoromethane		75-71-8	---
Dichloromethane		75-09-2	---
Dichlorosalicylic acid		320-72-9	---
Dichlorprop	•	120-36-5	2-(2,4-Dichlorophenoxy) propionic acid
Dichlorprop (2-ethylhexyl ester)	•	---	---
Dichlorvos		62-73-7	---
Dicofol		115-32-2	4,4'-Dichloro-alpha-(trichloromethyl)benzhydrol
Dicyclohexyl phthalate		84-61-7	---
Dieldrin	•	60-57-1	3,4,5,6,9,9-Hexachloro-1a,2,2a,3,6,6a,7,7a-octahydro-2,7:3,6-dimethanonaphth-[2,3-b]-oxirene
Diethyl ether		60-29-7	1,11-Oxy(bis)ethane
Diethyl phosphate		598-02-7	---
Diethyl phthalate	•	84-66-2	o-Benzenedicarboxylic acid diethyl ether
Diethylamine		109-89-7	---
Diethylstilbestrol	•	56-53-1	---
Difenoxuron		14214-32-5	3[p-(p-Methoxyphenoxy)phenyl]-1,1-dimethylurea
Difenzoquat		43222-48-6	1,2-Dimethyl-3,5-diphenylpyrazolium
Diflubenzuron		35367-38-5	1-(4-Chlorophenyl)-3-(2,6-difluorobenzoyl)urea
Dimethirimol	•	5221-53-4	5-Butyl-2(dimethylamino)-6-methyl-4(1H)-pyrimidinone
Dimethoate	•	60-51-5	o,o-Dimethyl S-[2-(methylamino)-2-oxoethyl) phosphorodithioate
Dimethyl phosphate		813-78-5	---
Dimethyl phthalate		131-11-3	1,2-Benzenedicarboxylic acid, dimethyl ester
Dinaphthenebenzene		---	(not specified)
Dinex		131-89-5	2-Cyclohexyl-4,6-dinitrophenol
Dinitramine		29091-05-2	---
Dinobuton	•	973-21-7	1-Methylethyl 2-(1-methylpropyl)-4,6-dinitrophenyl carbonate
Dinocap		131-72-9	(E)-2-(1-Methylheptl)-4,6-dinitrophenyl 2-butenoate

Dinoseb	•	88-85-7	2-(1-Methylpropyl)-4,6-dinitrophenol
Dinoseb acetate		2813-95-8	---
Dinoterb	•	1420-07-1	2-(1,1-Dimethylethyl)-4,6-dinitrophenol acetate ester
Dinoterb acetate		3204-27-1	---
Diothyl		5221 -49-8	---
Diphacinone		82-66-6	2-(Diphenylacetyl)-1,3-indandione
Diphenamid		957-51-7	N,N-Dimethyl-2,2-diphenylacetamide
Diphenyl sulphone		127-63-9	Phenyl sulfone
Diphenylamine		122-39-4	Phenyl ether
Dipropetryne		4147-51-7	6-(Ethylthio)-N,N'-bis(1-methylethyl)-1,3,5-triazine-2,4-diamine
Diquat dibromide	•	85-00-7	6,7-Dihydropyrido[1,2-a:2',1'-c]pyrazinedium bromide
Disulfoton	•	298-04-4	o,o-Diethyl S-[2-(ethylthio)ethyl]phosphorodithioate
Ditalimphos		5131-24-8	---
Dithianon		3347-22-6	2,3-Dicyano-1,4-dithia-anthraquinone
Diuron	•	330-54-1	3-(3,4-Dichlorophenyl)-1,1-dimethylurea
DNOC		---	see 4,6-Dinitro-o-cresol
Dodine		2439-10-3	1-Dodecylguanidinium acetate
Domoic acid	•	14277-97-5	---
Drazoxolon		51450-97-6	3-methyl-4,5-isoxazoledione 4-[(o-chlorophenyl)hydrazone]
DSMA		144-21-8	Disodium methylarsonate
Edifenphos		17109-49-8	O-Ethyl S,S-diphenyl phosphorodithioate
Endosulfan I		959-98-8	---
Endosulfan II		33213-65-9	---
Endosulfan mixed isomers		115-29-7	---
Endosulfan sulfate		1031-07-8	---
Endothall		145-73-3	3,6-Epoxycyclohexane-1,2-dicarboxylic acid
Endothall, acid		129-67-9	---
Endrin	•	72-20-8	3,4,5,6,9,9-Hexachloro-1a,2,2a,3,6,6a,7,7a-octahydro-2,7:3,6-dimethanonaphth[2,3-6]oxirene
Endrin aldehyde		7421-93-4	---
Endrin ketone		53494-70-5	(E)-4,4'-(1,2-Diethyl-1,2-ethenediyl)bis phenol
Epichlorohydrin		106-89-8	1-Chloro-2,3-epoxy propane
EPN		2104-64-5	O-Ethyl O-(4-nitrophenyl) phenylphosphomothioate
EPTC		759-94-4	S-Ethyl dipropylcarbamothioate
Ethazol		2593-15-9	---
Ethephon		16672-87-0	(2-Chloroethyl)phosphonic acid
Ethiolate		2941-55-1	---
Ethion		563-12-2	S,S'-Methylene O,O,O',O'-tetraethyl di(phosphorodithioate)
Ethirimol	•	23947-60-6	5-Butyl-2-ethylamino-6-methyl-4(1H)-pyrimidinone

Ethofumesate		26225-79-6	(±)-2-Ethoxy-2,3-dihydro-3,3-dimethylbenzofuran-5-yl methanesulfonate
Ethoprop		13194-48-4	O-Ethyl S,S-dipropyl phosphorodithioate
Ethyl acrylate		140-88-5	---
Ethyl methacrylate		97-63-2	2-Methyl-2-propanoic acid ethyl ester
Ethyl methanesulfonate		62-50-0	Methanesulfonic acid ethyl ester
Ethyl parathion		56-38-2	Parathion
Ethylan		72-56-0	---
Ethylbenzene		100-41-4	---
Ethylene thiourea		96-45-7	2-Imidazolidinethione
Ethylenediamine		107-15-3	1,2-Ethanediamine
Ethylhexanediol		94-96-4	---
Etrimfos		38260-54-7	O-(6-Ethoxy-2-ethyl-4-pyrimidinyl) O,O-dimethyl phosphorothioate
EXD		502-55-6	Diethyl thioperoxydicarbonate
Famphur		52-85-7	O-[4-[(Dimethylamino)sulfonyl]phenyl] O,O-dimethyl phosphorothioate
Fenac		85-34-7	---
Fenaminosulf		140-56-7	---
Fenamiphos		22224-92-6	Ethyl 4-(methylthio)-m-tolyl isopropylphosphoramidate
Fenbutatin-oxide		13356-08-6	---
Fenoprop		---	see 2,4,5-TP
Fensulfothion		115-90-2	O,O-Diethyl O-[p-(methylsulfinyl)phenyl] phosphorothioate
Fenthion		55-38-9	O,O-Dimethyl O-[4-(methylthio)-m-tolyl] phosphorothioate
Fentin acetate		900-95-8	Triphenyltin acetate
Fentin chloride		639-58-7	Triphenyltin chloride
Fentin hydroxide		76-87-9	Triphenyltin hydroxide
Fenvalerate		51630-58-1	Cyano(3-phenoxyphenyl)methyl 4-chloro-alpha-(1-methylethyl)benzene= acetate
Ferbam		14484-64-1	Tris(dimethyldithiocarbamato)iron
Fluchloralin		33245-39-5	N-(2-Chloroethyl)-2,6-dinitro-N-propyl-4-(trifluoromethyl)benzenamine
Fluometuron		2164-17-2	1,1-Dimethyl-3-(alpha,alpha,alpha-trifluoro-m-tolyl)urea
Fluoranthene	•	206-44-0	1,2-(1,8-Naphthylene)-benzene
Fluorene	•	86-73-7	o-Biphenylenemethane
Fluorenes		---	(not specified)
Fluoridamid		47000-92-0	---
Fluorobenzene		462-06-6	---
Fluorotrichloromethane		---	see Trichlorofluoromethane
Flurecol, n-butyl ester		2314-9-2	---
Folpet		133-07-3	N-(Trichloromethanesulphenyl)phthalimide
Fonofos	•	944-22-9	(±)-O-Ethyl S-phenyl ethylphosphonodithioate
Formetanate-HCl		23422-53-9	---

Formothion		2540-82-1	2-Dimethoxyphosphinothioylthio-N-formyl-N-methylacetamide
Fosamine ammonium		69975-80-0	---
Furan		110-00-9	---
g-Chlordene		---	---
gamma-BHC	•	58-89-9	Lindane, Hexachlorocyclohexane
gamma-Chlordane		5103-74-2	---
gamma-Chlordene		56641-38-4	---
gamma-HCH		---	see gamma-BHC
Gibberellic acid		77-06-5	---
Glyoxime		557-30-2	---
Glyphosine		2439-99-8	---
Glyphosphate		1071-83-6	N-(Phosphonomethyl)glycine
Halowax 1000		58718-66-4	(mixture)
Halowax 1001		58718-67-5	(mixture)
Halowax 1001		58718-67-5	(mixture)
Halowax 1013		12616-35-2	(mixture)
Halowax 1014		12616-36-3	(mixture)
Halowax 1051		2234-13-1	(mixture)
Halowax 1099		39450-05-0	(mixture)
Heptachlor	•	76-44-8	1,4,5,6,7,8,8-Hepta-chloro-3a,4,7,7a-tetra-hydro-4,7-methano-1H-indene
Heptachlor epoxide	•	1024-57-3	1,4,5,6,7,8,8-Hepta-chloro-2,3-epoxy-3a,4,7,7a-tetrahydro-4,7-methanoindan
Heptenophos		23560-59-0	7-Chlorobicyclo[3.2.0]hepta-2,6-dien-6-yl dimethyl phosphate
Hexachlorobenzene		118-74-1	---
Hexachlorobutadiene		87-68-3	Perchloro-1,3-butadiene
Hexachlorocyclopentadiene		77-47-4	Hexachloro-1,3-cyclo-pentadiene
Hexachloroethane		67-72-1	---
Hexachlorophene		70-30-4	2,2'-Methylenebis[2,4,6-trichlorophenol]
Hexachlorophene		70-30-4	2,2'-Methylenebis[2,4,6-trichlorophenol]
Hexachloropropene		70-30-4	---
Hexachloropropene		70-30-4	---
Hexazinone		51235-04-2	3-Cyclohexyl-6-(dimethylamino)-1-methyl-1,3,5-triazine-2,4(1H,3H)-dione
IBP		26087-47-8	O,O-bis(1-Methylethyl) S-(phenylmethyl) phosphorothioate
Indeno[1,2,3-cd]fluoranthene	•	193-43-1	---
Indeno[1,2,3-cd]perylene	•	101686-49-1	---
Indeno[1,2,3-cd]pyrene	•	193-39-5	2,3,-o-Phenylenepyrene
Indomethacin		53-86-1	---
Iodofenphos		18181-70-9	---

Ioxynil		1689-83-4	4-Hydroxy-3,5-diiodobenzonitrile
Ioxynil octanoate		3861-47-0	4-Cyano-2,6-diiodophenyl octanoate
Isodrin		465-73-6	1,2,3,4,10,10-Hexachloro-1,4,4a,5,8,8a-hexahydro-endo,endo-1,4:5,8-dimethanonaphthalene
Isofenphos		25311-71-1	1-methyl 2-[[ethoxy[(1-methylethyl)amino]phosphinothioyl]oxy]benzoate
Isophorone	•	78-59-1	3,5,5-Trimethyl-2-cyclohexen-1-one
Isoprocarb		2631-40-5	2-Isopropylphenyl methylcarbamate
Isopropalin		33820-53-0	2,6-Dinitro-N,N-dipropylcumidine
Isoproturon		34123-59-6	N,N-Dimethyl-N'-[4-(1-methylethyl)phenyl]urea
Isosafrole	•	120-58-1	5-(1-Propenyl)-1,3-benzodioxole
Karbutilate		4849-32-5	3-[[(Dimethylamino)carbonyl]amino]phenyl (1,1-dimethylethyl)carbamate
Kepone	•	143-50-0	1,1a,3,3a,4,5,5,5a,5b,6-Decachlorooctahydro-1,3,4-metheno-2H-cuclobuta[cd]pentalen-2-one
Lamprecide		654-66-0	---
Lenacil		2164-08-1	3-Cyclohexyl-6,7-dihydro-1H-cyclopentapyrimidine-2,4(3H,5H)-dione
Leptophos		21609-90-5	---
Leptophos oxygen analog		25006-32-0	---
Lethane 384		112-56-1	---
Lindane		---	see gamma-HCH
Linuron	•	330-55-2	N'-(3,4-Dichlorophenyl)-N-methoxy-N-methylurea
m-Chlorobenzoic acid		535-80-8	PCBA
m-Cresol		108-39-4	3-Methylphenol
m-Dichlorobenzene		---	see 1,3-Dichlorobenzene
m-Nitroaniline		99-09-2	3-Nitrobenzeneamine
m-Xylene		108-38-3	1,3-Dimethylbenzene
Malathion	•	121-75-5	Diethyl((diethoxyphosphinothioyl)thio) butanedioate
Malononitrile		109-77-3	Propane dinitrile
Maneb		12427-38-2	[1,2-Ethanediylbis[carbamodithioato](2-)manganese
MCPA		---	see MCPA (acid)
MCPA (2-butoxyethyl ester)	•	---	---
MCPA (2-ethylhexyl ester)	•	---	---
MCPA (acid)	•	94-74-6	2-Methyl-4-chlorophenoxyacetic acid
MCPA, Isooctyl ester		26544-20-7	---
MCPB		---	see MCPB (acid)
MCPB (acid)		94-81-5	4-(4-Chloro-o-tolyloxy) butyric acid
MCPP		7085-19-0	---
MCPP, Isooctyl ester		28473-03-2	---
Mecarbam		2595-54-2	Ethyl[((diethoxyphosphinothioyl)thio)acetyl]methyl carbamate
Mecoprop	•	7085-19-0	2-[(4-Chloro-o-tolyl)oxy] propionic acid

Mecoprop (2-butoxyethyl ester)	•	---	---
Mefluidide		53780-34-0	5'-(1,1,1-Trifluoromethanesulfonamido)acet-2',4'-xylidide
Melphalan		148-82-3	---
Mephosfolan	•	950-10-7	Diethyl (4-methyl-1,3-dithiolan-2-ylidene)phosphoramidate
Merphos		150-50-5	---
Methacrylonitrile		126-98-7	2-Methyl-2-propenenitrile
Methacrylonitrile		135-23-9	---
Metham		6734-80-1	Methylcarbamodithioic acid
Methamidophos		10265-92-6	O,S-Dimethyl phosphoramidothioate
Methane		74-82-8	---
Methanearsonic acid		124-58-3	---
Methazole		20354-26-1	2-(2,4-Dichlorophenyl)-4-methyl-1,2,4-oxadiazolidine-3,5-dione
Methidathion	•	950-37-8	S-2,3-Dihydro-5-methoxy-2-oxo-1,3,4-thiadiazol-3-ylmethyl o,o-dimethyl phosphorodithioate
Methiocarb		2032-65-7	4-Methylthio-3,5-xylyl methylcarbamate
Methomyl		16752-77-5	Methyl N-[[(methylamino)carbonyl]oxy]ethanimidothioate
Methoprene		40596-69-8	(E,E)-1-Methylethyl 11-methoxy-3,7,11-trimethyl-2,4-dodecadienoate
Methyl ethyl ketone		78-93-3	2-Butanone
Methyl methacrylate		80-62-6	Methyl 2-methyl-2-propenoate
Methyl methanesulfonate		66-27-3	Methanesulfonic acid methyl ester
Methyl parathion		298-00-0	Dimethyl parathion
Methyl stearate		112-61-8	Octadecanoic acid methyl ester
Methyl thiouracil		56-04-2	2,3-Dihydro-6-methyl-2-thioxo-4(1H)-pyrimidinone
Metobromuron		3060-89-7	3-(4-Bromophenyl)-1-methoxy-1-methylurea
Metolachlor		51218-45-2	2-Chloro-N-(2-ethyl-6-methylphenyl)-N-(2-methoxy-1-methylethyl)acetamide
Metoxuron		19937-59-8	N'-(3-Chloro-4-methoxyphenyl)-N,N-dimethylurea
Metribuzin		21087-64-9	4-Amino-6-(1,1-dimethylethyl)-3-(methylthio)-1,2,4-triazin-5(4H)-one
Mevinphos		7786-34-7	Methyl 3-[(dimethoxyphosphinyl)oxy]-2-butenoate
Mexacarbate		315-18-4	---
MH		123-33-1	---
Mirex	•	2385-85-5	1,1a,2,2,3,3a,4,5,5,5a,5b,6-Dodecachlorooctahydro-1,3,4-metheno-2H-cyclobuta-[c,d]pentalene
Molinate		2212-67-1	S-Ethyl hexahydro-1H-azepine-1-carbothioate
Monalide		7287-36-7	4'-Chloro-alpha,alpha-dimethylvaleranilide
Monocrotophos		6923-22-4	(E)-Dimethyl 1-methyl-3-(methylamino)-3-oxo-1-propenyl phosphate
Monolinuron	•	1746-81-2	3-(p-Chlorophenyl)-1-methoxy-1-methylurea
Monuron	•	150-68-5	3-(4-Chlorophenyl)-1,1-dimethylurea
Monuron TCA		140-41-0	---

MSMA	2163-80-6	---
N,N-Dimethylformamide	68-12-2	---
n-Butyl acetate	123-86-42	---
n-Butylbenzene	104-51-8	Butylbenzene
N-Nitro-N-methyl ethylamine	---	---
N-Nitrosodi-n-propylamine	621-64-7	---
N-Nitrosodibutylamine	924-16-3	---
N-Nitrosodiethylamine	55-18-5	Diethylnitrosamine
N-Nitrosodimethylamine	62-75-9	Dimethylnitrosamine
N-Nitrosodiphenylamine	156-10-5	4-Nitrosodiphenylamine
N-Nitrosomorpholine	59-89-2	4-Nitrosomorpholine
N-Nitrosopyrrolidine	930-55-2	1-Nitrosopyrrolidine
n-Propylbenzene	103-65-1	Propylbenzene
Naled	300-76-5	1,2-Bromo-2,2-dichloroethyl dimethyl phosphate
Naphthabenzothiophenes	---	(not specified)
Naphthalene •	91-20-3	---
Naphthalene acetamide	86-86-2	---
Naphthalene acetic acid	86-87-3	---
Naphthalene-d8	1146-65-2	Deuterated naphthalene
Naphthalenes	---	(not specified)
Naphthenebenzenes	---	(not specified)
Napropamide	15299-99-7	N,N-Diethyl-2-(1-naphthalenyloxy)propanamide
Naptalam sodium salt	132-67-2	---
Neburon •	555-37-3	1-Butyl-3-(3,4-dichlorophenyl)-1-methylurea
Niclosamide	50-65-7	2',5-Dichloro-4'-nitrosalicylanilide
Nicotine	54-11-5	(S)-3-(1-Methyl-2-pyrrolidinyl)pyridine
Nicotinic acid	59-67-6	Niacin
Nitrapyrin	1929-82-4	2-Chloro-6-(trichloromethyl)pyridine
Nitrobenzene	98-95-3	---
Nitrobenzene-d5	4165-60-0	Deuterated nitrobenzene
Nitrofen	1836-75-5	---
Nitrolin	4726-14-1	---
Nitrosodipropylamine	---	see N-Nitrosodi-n-propylamine
o,p'-DDE	---	---
o,p'-DDT	---	---
o,p'-TDE	---	---
o-Bromobenzoic acid	88-65-3	2-Bromobenzoic acid
o-Cresol	95-48-7	2-Methylphenol
o-Dichlorobenzene	---	see 1,2-Dichlorobenzene

o-Dichlorobenzene		106-46-7	1,3-Dichlorobenzene
o-Nitroaniline		88-74-4	2-Nitroaniline
o-Phenylphenol		---	see 2-Phenylphenol
o-Toluidine hydrochlorine		636-21-5	---
o-Xylene		95-47-6	1,2-Dimethylbenzene
Octachlorostyrene		---	---
Oryzalin		19044-88-3	4-(Dipropylamino)-3,5-dinitrobenzenesulfonamide
Oryzalin, dimethyl		19044-94-1	---
Oxadiazon	•	19666-30-9	5-tert-Butyl-3-(2,4-dichloro-5-isopropoxyphenyl)-1,3,4-oxadiazol-2(3H)-one
Oxamino methomyl		13749-94-5	---
Oxamino oxamyl		30558-43-1	---
Oxamyl		23135-22-0	Methyl 2-(dimethylamino)-N-[[(methylamino)carbonyl]oxy]-2-oxoethanimidothioate
Oxychlordane		---	---
Oxychlordane		26880-48-8	---
Oxydemeton methyl		301 -12-2	S-[2-(Ethylsulfinyl)ethyl)] O,O-dimethyl phosphorothioate
Oxyfluorfen	•	42874-03-3	2-Chloro-1-(3-ethoxy-4-nitrophenoxy)-4-(trifluoromethyl) benzene
Oxythioquinox		2439-01-2	---
p,p'-DDA		83-05-6	---
p,p'-DDD		---	see 4,4'-DDD
p,p'-DDD olefin		1022-22-6	---
p,p'-DDE		---	see 4,4'-DDE
p,p'-DDT		---	see 4,4'-DDT
p,p'-Methoxychlor	•	72-43-5	2,2-bis(p-Methoxyphenyl)1,1,1-trichloroethane
p,p'-TDE		---	see p,p'-DDD
p,p'-TDE (olefin)	•	---	---
p-Cresol		106-44-5	4-Methylphenol
p-Dichlorobenzene		---	see 1,4-Dichlorobenzene
p-Difluorobenzene		540-36-3	---
p-Dioxane		123-91-1	1,4-Dioxane
p-Fluorobenzoic acid		456-22-4	4-Fluorobenzoic acid
p-Nitroaniline		100-01-6	1-Amino-4-nitrobenzene
p-Xylene		106-42-3	1,4-Dimethylbenzene
Paraquat dichloride	•	1910-42-5	1,1'-Dimethyl-4,4'-bipyridinium dichloride
Parathion-ethyl		---	see Ethyl parathion
PCB 1		2051-60-7	2-Chlorobiphenyl
PCB 10		33146-45-1	2,6-Dichlorobiphenyl
PCB 100		39485-83-1	2,2',4,4',6-Pentachlorobiphenyl

PCB 101	37680-73-2	2,2',4,5,5'-Pentachlorobiphenyl
PCB 1016	---	see Alochlor 1016
PCB 102	68194-06-9	2,2',4,5,6'-Pentachlorobiphenyl
PCB 103	60145-21-3	2,2',4,5',6-Pentachlorobiphenyl
PCB 104	56558-16-8	2,2',4,6,6'-Pentachlorobiphenyl
PCB 105	32598-14-4	2,3,3',4,4'-Pentachlorobiphenyl
PCB 106	70424-69-0	2,3,3',4,5-Pentachlorobiphenyl
PCB 108	70362-41-3	2,3,3',4,5'-Pentachlorobiphenyl
PCB 109	74472-35-8	2,3,3',4,6-Pentachlorobiphenyl
PCB 11	2050-67-1	3,3'-Dichlorobiphenyl
PCB 110	38380-03-9	2,3,3',4',6-Pentachlorobiphenyl
PCB 111	39635-32-0	2,3,3',5,5'-Pentachlorobiphenyl
PCB 112	74472-36-9	2,3,3',5,6-Pentachlorobiphenyl
PCB 113	68194-10-5	2,3,3',5',6-Pentachlorobiphenyl
PCB 114	74472-42-0	2,3,4,4',5-Pentachlorobiphenyl
PCB 115	74472-38-1	2,3,4,4',6-Pentachlorobiphenyl
PCB 116	18259-05-7	2,3,4,5,6-Pentachlorobiphenyl
PCB 117	68194-11-6	2,3,4',5,6-Pentachlorobiphenyl
PCB 118	31508-00-6	2,3',4,4',5-Pentachlorobiphenyl
PCB 119	56558-17-9	2,3',4,4',6-Pentachlorobiphenyl
PCB 12	2974-92-7	3,4-Dichlorobiphenyl
PCB 120	68194-12-7	2,3',4,5,5'-Pentachlorobiphenyl
PCB 121	56558-18-0	2,3',4,5',6-Pentachlorobiphenyl
PCB 122	---	2',3,3',4,5-Pentachlorobiphenyl
PCB 1221	---	see Alochlor 1221
PCB 123	---	2',3,4,4',5-Pentachlorobiphenyl
PCB 1232	---	see Alochlor 1232
PCB 124	---	2',3,4,5,5'-Pentachlorobiphenyl
PCB 1242	---	see Alochlor 1242
PCB 1248	---	see Alochlor 1248
PCB 125	---	2',3,4,5,6'-Pentachlorobiphenyl
PCB 1254	---	see Alochlor 1254
PCB 126	57465-28-8	3,3',4,4',5-Pentachlorobiphenyl
PCB 1260	---	see Alochlor 1260
PCB 1262	---	see Alochlor 1262
PCB 1268	---	see Alochlor 1268
PCB 127	39635-33-1	3,3',4,5,5'-Pentachlorobiphenyl
PCB 128	38380-07-3	2,2',3,3',4,4'-Hexachlorobiphenyl
PCB 129	55215-18-4	2,2',3,3',4,5-Hexachlorobiphenyl

PCB 13	2974-90-5	3,4'-Dichlorobiphenyl
PCB 130	52663-66-8	2,2',3,3',4,5'-Hexachlorobiphenyl
PCB 131	61798-70-7	2,2',3,3',4,6-Hexachlorobiphenyl
PCB 132	38380-05-1	2,2',3,3',4,6'-Hexachlorobiphenyl
PCB 133	35694-04-3	2,2',3,3',5,5'-Hexachlorobiphenyl
PCB 134	52704-70-8	2,2',3,3',5,6-Hexachlorobiphenyl
PCB 135	52744-13-5	2,2',3,3',5,6'-Hexachlorobiphenyl
PCB 136	38411-22-2	2,2',3,3',6,6'-Hexachlorobiphenyl
PCB 137	35694-06-5	2,2',3,4,4',5-Hexachlorobiphenyl
PCB 138	35065-28-2	2,2',3,4,4',5'-Hexachlorobiphenyl
PCB 139	56030-56-9	2,2',3,4,4',6-Hexachlorobiphenyl
PCB 14	34883-41-5	3,5-Dichlorobiphenyl
PCB 140	59291-64-4	2,2',3,4,4',6'-Hexachlorobiphenyl
PCB 141	52712-04-6	2,2',3,4,5,5'-Hexachlorobiphenyl
PCB 142	41411-61-4	2,2',3,4,5,6-Hexachlorobiphenyl
PCB 143	68194-15-0	2,2',3,4,5,6'-Hexachlorobiphenyl
PCB 144	68194-14-9	2,2',3,4,5',6-Hexachlorobiphenyl
PCB 145	74472-40-5	2,2',3,4,6,6'-Hexachlorobiphenyl
PCB 146	51908-16-8	2,2',3,4',5,5'-Hexachlorobiphenyl
PCB 147	68194-13-8	2,2',3,4',5,6-Hexachlorobiphenyl
PCB 148	74472-41-6	2,2',3,4',5,6'-Hexachlorobiphenyl
PCB 149	38380-04-0	2,2',3,4',5',6-Hexachlorobiphenyl
PCB 15	2050-68-2	4,4'-Dichlorobiphenyl
PCB 150	68194-08-1	2,2',3,4',6,6'-Hexachlorobiphenyl
PCB 151	52663-63-5	2,2',3,5,5',6-Hexachlorobiphenyl
PCB 152	68194-09-2	2,2',3,5,6,6'-Hexachlorobiphenyl
PCB 153	35065-27-1	2,2',4,4',5,5'-Hexachlorobiphenyl
PCB 154	60145-22-4	2,2',4,4',5,6-Hexachlorobiphenyl
PCB 155	33979-03-2	2,2',4,4',6,6'-Hexachlorobiphenyl
PCB 156	38380-08-4	2,3,3',4,4',5-Hexachlorobiphenyl
PCB 157	69782-90-7	2,3,3',4,4',5'-Hexachlorobiphenyl
PCB 158	74472-42-7	2,3,3',4,4',6-Hexachlorobiphenyl
PCB 159	39635-35-3	2,3,3',4,5,5'-Hexachlorobiphenyl
PCB 16	38444-78-9	2,2',3-Trichlorobiphenyl
PCB 160	41411-62-5	2,3,3',4,5,6-Hexachlorobiphenyl
PCB 161	74472-43-8	2,3,3',4,5',6-Hexachlorobiphenyl
PCB 162	39635-34-2	2,3,3',4',5,5'-Hexachlorobiphenyl
PCB 163	74472-44-9	2,3,3',4',5,6-Hexachlorobiphenyl
PCB 165	74472-46-1	2,3,3',5,5',6-Hexachlorobiphenyl

PCB 166	41411-63-6	2,3,4,4',5,6-Hexachlorobiphenyl
PCB 167	52663-72-6	2,3',4,4',5,5'-Hexachlorobiphenyl
PCB 168	59291-65-5	2,3',4,4',5',6-Hexachlorobiphenyl
PCB 169	32774-16-6	3,3',4,4',5,5'-Hexachlorobiphenyl
PCB 17	37680-66-3	2,2',4-Trichlorobiphenyl
PCB 170	35065-30-6	2,2',3,3',4,4',5-Heptachlorobiphenyl
PCB 171	52663-71-5	2,2',3,3',4,4',6-Heptachlorobiphenyl
PCB 172	52663-74-8	2,2',3,3',4,5,5'-Heptachlorobiphenyl
PCB 173	68194-16-1	2,2',3,3',4,5,6-Heptachlorobiphenyl
PCB 174	38411-25-5	2,2',3,3',4,5,6'-Heptachlorobiphenyl
PCB 175	40186-70-7	2,2',3,3',4,5',6-Heptachlorobiphenyl
PCB 176	52663-65-7	2,2',3,3',4,6,6'-Heptachlorobiphenyl
PCB 177	---	2,2',3,3',4',5,6-Heptachlorobiphenyl
PCB 178	52663-67-9	2,2',3,3',5,5',6-Heptachlorobiphenyl
PCB 179	52663-64-6	2,2',3,3',5,6,6'-Heptachlorobiphenyl
PCB 18	37680-65-2	2,2',5-Trichlorobiphenyl
PCB 180	35065-29-3	2,2',3,4,4',5,5'-Heptachlorobiphenyl
PCB 181	74472-47-2	2,2',3,4,4',5,6-Heptachlorobiphenyl
PCB 182	60145-23-5	2,2',3,4,4',5,6'-Heptachlorobiphenyl
PCB 183	52663-69-1	2,2',3,4,4',5',6-Heptachlorobiphenyl
PCB 184	74472-48-3	2,2',3,4,4',6,6'-Heptachlorobiphenyl
PCB 185	52712-05-7	2,2',3,4,5,5',6-Heptachlorobiphenyl
PCB 186	74472-49-4	2,2',3,4,5,6,6'-Heptachlorobiphenyl
PCB 187	52663-68-0	2,2',3,4',5,5',6-Heptachlorobiphenyl
PCB 188	74487-85-7	2,2',3,4',5,6,6'-Heptachlorobiphenyl
PCB 189	39635-31-9	2,3,3',4,4',5,5'-Heptachlorobiphenyl
PCB 19	38444-73-4	2,2',6-Trichlorobiphenyl
PCB 190	41411-64-7	2,3,3',4,4',5,6-Heptachlorobiphenyl
PCB 191	74472-50-7	2,3,3',4,4',5',6-Heptachlorobiphenyl
PCB 192	74472-51-8	2,3,3',4,5,5',6-Heptachlorobiphenyl
PCB 193	69782-91-8	2,3,3',4',5,5',6-Heptachlorobiphenyl
PCB 194	35694-08-7	2,2',3,3',4,4',5,5'-Octachlorobiphenyl
PCB 195	52663-78-2	2,2',3,3',4,4',5,6-Octachlorobiphenyl
PCB 196	---	2,2',3,3',4,4',5',6-Octachlorobiphenyl
PCB 197	33091-17-7	2,2',3,3',4,4',6,6'-Octachlorobiphenyl
PCB 198	68194-17-2	2,2',3,3',4,5,5',6-Octachlorobiphenyl
PCB 199	52663-73-7	2,2',3,3',4,5,6,6'-Octachlorobiphenyl
PCB 2	2051-61-8	3-Chlorobiphenyl
PCB 20	38444-84-7	2,3,3'-Trichlorobiphenyl

PCB 200	40186-71-8	2,2',3,3',4,5',6,6'-Octachlorobiphenyl
PCB 201	---	2,2',3,3',4',5,5',6-Octachlorobiphenyl
PCB 202	2136-99-4	2,2',3,3',5,5',6,6'-Octachlorobiphenyl
PCB 203	52663-76-0	2,2',3,4,4',5,5',6-Octachlorobiphenyl
PCB 204	74472-52-9	2,2',3,4,4',5,6,6'-Octachlorobiphenyl
PCB 205	74472-53-0	2,3,3',4,4',5,5',6-Octachlorobiphenyl
PCB 206	40186-72-9	2,2',3,3',4,4',5,5',6-Nonachlorobiphenyl
PCB 207	52663-79-3	2,2',3,3',4,4',5,6,6'-Nonachlorobiphenyl
PCB 208	52663-77-1	2,2',3,3',4,5,5',6,6'-Nonachlorobiphenyl
PCB 209	2051-24-3	2,2',3,3',4,4',5,5',6,6'-Decachlorobiphenyl
PCB 21	55702-46-0	2,3,4-Trichlorobiphenyl
PCB 22	38444-85-8	2,3,4'-Trichlorobiphenyl
PCB 23	55720-44-0	2,3,5-Trichlorobiphenyl
PCB 24	55702-45-9	2,3,6-Trichlorobiphenyl
PCB 25	55712-37-3	2,3',4-Trichlorobiphenyl
PCB 26	38444-81-4	2,3',5-Trichlorobiphenyl
PCB 27	38444-76-7	2,3',6-Trichlorobiphenyl
PCB 28	7012-37-5	2,4,4'-Trichlorobiphenyl
PCB 29	15862-07-4	2,4,5-Trichlorobiphenyl
PCB 3	2051-62-9	4-Chlorobiphenyl
PCB 30	35693-92-6	2,4,6-Trichlorobiphenyl
PCB 31	16606-02-3	2,4',5-Trichlorobiphenyl
PCB 32	38444-77-8	2,4',6-Trichlorobiphenyl
PCB 33	38444-86-9	2',3,4-Trichlorobiphenyl
PCB 34	37680-69-6	2',3,5-Trichlorobiphenyl
PCB 35	38444-87-0	3,3',4-Trichlorobiphenyl
PCB 36	38444-90-5	3,3',5-Trichlorobiphenyl
PCB 37	53555-66-1	3,4,4'-Trichlorobiphenyl
PCB 37	53555-66-1	3,4,4'-Trichlorobiphenyl
PCB 38	53555-66-1	3,4,5-Trichlorobiphenyl
PCB 38	53555-66-1	3,4,5-Trichlorobiphenyl
PCB 39	38444-88-1	3,4',5-Trichlorobiphenyl
PCB 4	13029-08-8	2,2'-Dichlorobiphenyl
PCB 40	38444-93-8	2,2',3,3'-Tetrachlorobiphenyl
PCB 41	52663-59-9	2,2',3,4-Tetrachlorobiphenyl
PCB 42	36559-22-5	2,2',3,4'-Tetrachlorobiphenyl
PCB 43	70362-46-8	2,2',3,5-Tetrachlorobiphenyl
PCB 44	41464-39-5	2,2',3,5'-Tetrachlorobiphenyl
PCB 45	70362-45-7	2,2',3,6-Tetrachlorobiphenyl

PCB 46	41464-47-5	2,2',3,6'-Tetrachlorobiphenyl
PCB 47	2437-79-8	2,2',4,4'-Tetrachlorobiphenyl
PCB 48	70362-47-9	2,2',4,5-Tetrachlorobiphenyl
PCB 49	41464-40-8	2,2',4,5'-Tetrachlorobiphenyl
PCB 5	16605-91-7	2,3-Dichlorobiphenyl
PCB 50	62796-65-0	2,2',4,6-Tetrachlorobiphenyl
PCB 51	68194-04-7	2,2',4,6'-Tetrachlorobiphenyl
PCB 52	35693-99-3	2,2',5,5'-Tetrachlorobiphenyl
PCB 53	41464-41-9	2,2',5,6'-Tetrachlorobiphenyl
PCB 54	15968-05-5	2,2',6,6'-Tetrachlorobiphenyl
PCB 55	74338-24-2	2,3,3',4-Tetrachlorobiphenyl
PCB 56	41464-43-1	2,3,3',4'-Tetrachlorobiphenyl
PCB 57	70424-67-8	2,3,3',5-Tetrachlorobiphenyl
PCB 58	41464-49-7	2,3,3',5'-Tetrachlorobiphenyl
PCB 59	74472-33-6	2,3,3',6-Tetrachlorobiphenyl
PCB 6	25569-80-6	2,3'-Dichlorobiphenyl
PCB 60	33025-41-1	2,3,4,4'-Tetrachlorobiphenyl
PCB 61	33284-53-6	2,3,4,5-Tetrachlorobiphenyl
PCB 62	54230-22-7	2,3,4,6-Tetrachlorobiphenyl
PCB 63	74475-34-7	2,3,4',5-Tetrachlorobiphenyl
PCB 64	52663-58-8	2,3,4',6-Tetrachlorobiphenyl
PCB 65	33284-54-7	2,3,5,6-Tetrachlorobiphenyl
PCB 66	32598-10-0	2,3',4,4'-Tetrachlorobiphenyl
PCB 67	73575-53-8	2,3',4,5-Tetrachlorobiphenyl
PCB 68	73575-52-7	2,3',4,5'-Tetrachlorobiphenyl
PCB 69	60233-24-1	2,3',4,6-Tetrachlorobiphenyl
PCB 7	33284-50-3	2,4-Dichlorobiphenyl
PCB 70	32598-11-1	2,3',4',5-Tetrachlorobiphenyl
PCB 71	41464-46-4	2,3',4',6-Tetrachlorobiphenyl
PCB 72	41464-42-0	2,3',5,5'-Tetrachlorobiphenyl
PCB 73	74338-23-1	2,3',5',6'-Tetrachlorobiphenyl
PCB 74	32690-93-0	2,4,4',5-Tetrachlorobiphenyl
PCB 75	32598-12-2	2,4,4',6-Tetrachlorobiphenyl
PCB 76	70362-48-0	2',3,4,5-Tetrachlorobiphenyl
PCB 77	32598-13-3	3,3',4,4'-Tetrachlorobiphenyl
PCB 78	70362-49-1	3,3',4,5-Tetrachlorobiphenyl
PCB 79	41464-48-6	3,3',4,5'-Tetrachlorobiphenyl
PCB 8	34883-43-7	2,4'-Dichlorobiphenyl
PCB 80	33284-52-5	3,3',5,5'-Tetrachlorobiphenyl

PCB 81	70362-50-4	3,4,4',5-Tetrachlorobiphenyl
PCB 82	52663-62-4	2,2',3,3',4-Pentachlorobiphenyl
PCB 83	60145-20-2	2,2',3,3',5-Pentachlorobiphenyl
PCB 84	52663-60-2	2,2',3,3',6-Pentachlorobiphenyl
PCB 85	65510-45-4	2,2',3,4,4'-Pentachlorobiphenyl
PCB 86	55312-69-1	2,2',3,4,5-Pentachlorobiphenyl
PCB 87	38380-02-8	2,2',3,4,5'-Pentachlorobiphenyl
PCB 88	55215-17-3	2,2',3,4,6-Pentachlorobiphenyl
PCB 89	---	same as PCB 88
PCB 9	34883-39-1	2,5-Dichlorobiphenyl
PCB 90	68194-07-0	2,2',3,4',5-Pentachlorobiphenyl
PCB 91	68194-05-8	2,2',3,4',6-Pentachlorobiphenyl
PCB 92	52663-61-3	2,2',3,5,5'-Pentachlorobiphenyl
PCB 93	73575-56-1	2,2',3,5,6-Pentachlorobiphenyl
PCB 94	73575-55-0	2,2',3,5,6'-Pentachlorobiphenyl
PCB 95	38379-99-6	2,2',3,5',6-Pentachlorobiphenyl
PCB 96	73575-54-9	2,2',3,6,6'-Pentachlorobiphenyl
PCB 97	41464-51-1	2,2',3',4,5-Pentachlorobiphenyl
PCB 99	38380-01-7	2,2',4,4',5-Pentachlorobiphenyl
PCBs	---	(mixture)
PCNB	---	see Pentachloronitrobenzene
PCP	---	see Pentachlorophenol
Pebulate	1114-71 -2	S-Propyl butylethylcarbamothioate
Pendimethalin	40487-42-1	N-(1-Ethylpropyl)-3,4-dimethyl-2,6-dinitrobenzenamine
Pentachlorobenzene	608-93-5	---
Pentachloroethane	76-01-7	---
Pentachloronitrobenzene	82-68-8	---
Pentachlorophenol	87-86-5	---
Pentachlorophenol-13C	---	Labeled Pentachlorophenol
Perfluidone	37924-13-3	---
Permethrin	• 52645-53-1	(3-Phenoxyphenyl)methyl 3-(2,2-dichloroethenyl)-2,2-dimethylcyclopropane carboxylic acid ester
Phenacetin	• 62-44-2	p-Acetophenetidide
Phenanthrene	---	(not specified)
Phenanthrene	• 85-01-8	---
Phenanthrene-d10	1517-22-2	Deuterated phenanthrene
Phenanthridine	• 229-87-8	---
Phenanthro[3,4-c]phenanthrene	187-83-7	---
Phenmedipham	13684-63-4	3-[(methoxycarbonyl)amino]phenyl (3-methylphenyl)carbamate

Phenol		108-95-2	Carbolic acid
Phenol-d5		---	Deuterated phenol
Phenothiazine		92-84-1	---
Phorate	•	298-02-0	O,O-Diethyl S-[(ethylthio)methyl] phosphorodithioate
Phorate sulfoxide		2588-05-8	---
Phosalone	•	2310-17-0	S-[(6-Chloro-2-oxo-3(2H)benzoxazolyl)methyl] O,O-diethyl phosphorodithionate
Phosfolan		947-02-4	P,P-Diethyl cyclic ethylene phosphonodithioimidocarbonate
Phosmet	•	732-11-6	S-[(1,3-Dohydro-1,3-dioxo-2H-isoindol-2-yl)methyl] O,O-dimethyl phosphorodithioate
Phosmet oxygen analog		3785-33-9	---
Phosphamidon		13171 -21 -6	2-Chloro-3-(diethylamino)-1-methyl-3-oxo-1-propenyl dimethyl phosphate
Phthalic acid, dimethyl-d6 ester		---	---
Phthalic anhydride		85-44-9	---
Phytane		---	---
Picloram	•	1918-02-1	4-Amino-3,5,6-trichloro-2-pyridine carboxylic acid
Piperalin		3478-94-2	---
Piperonyl butoxide	•	51-03-6	5[(2-(2'-Butoxyethoxy)ethoxy)methyl)-6-propyl-1,3-benzodioxide
Pirimicarb	•	23103-98-2	2-(Dimethylamino)-5,6-dimethyl-4-pyridimidyl dimethylcarbamate
Pirimphos-ethyl		23505-41-1	O-[2-(Diethylamino)-6-methyl-4-pyrimidinyl] O,O-diethyl phosphorothioate
Pirimphos-methyl		29232-93-7	O-[2-(Diethylamino)-6-methyl-4-pyrimidinyl] O,O-dimethyl phosphorothioate
Plantvax		5259-88-1	---
Procyazine		32889-48-8	---
Profenophos		41198-08-7	O-(4-Bromo-2-chlorophenyl) O-ethyl S-propyl phosphorothioate
Profluralin		26399-36-0	N-(Cyclopropylmethyl)-2,6-dinitro-N-propyl-4-(trifluoromethyl)benzenamine
Promecarb		2631-37-0	3-methyl-5-(1-methylethyl)phenyl methylcarbamate
Prometon		1610-18-0	6-Methoxy-N,N'-bis(1-methyl)-1,3,5-triazine-2,4-diamine
Prometryn	•	7287-19-6	2,4-bis(Isopropylamino)-6-(methylthio)-s-triazine
Pronamide		23950-58-5	---
Propane		74-98-6	---
Propanil		709-98-8	N-(3,4-Dichlorophenyl)propanamide
Propargite		2312-35-8	2-(p-tert-Butylphenoxy)cyclohexyl 2-propynyl sulfite
Propargyl alcohol		107-19-7	2-Propyn-1-ol
Propazine		139-40-2	2-Chloro-4,6-bis(isopropylamino)-s-triazine
Propetamphos		31218-83-4	(E)-1-Methylethyl 3-[[(ethylamino)methoxyphosphinothioyl]oxy]-2-butenoate

Propham		122-42-9	1-Methylethyl phenylcarbamate
Propionic acid		79-09-4	Propanoic acid
Propionitrile		107-12-0	Propanenitrile
Propoxur	•	114-26-1	2-(1-Methylethoxy)phenyl methylcarbamate
Protect		81-84-5	---
Pyracarbolid		24691-76-7	---
Pyrazon		1698-60-8	---
Pyrazophos		13457-18-6	Ethyl 2-[(diethoxyphosphinothioyl)oxy]-5-methylpyrazolo[1,5-a]pyrimidine-6-carboxylate
Pyrene	•	129-00-0	Benzo[def]phenanthrene
Pyrenes		---	(not specified)
Pyrethrins, mixed		8003-34-7	---
Pyridine		110-86-1	---
Quinalphos		13593-03-8	O,O-Diethyl O-2-quinoxalinyl phosphorothioate
Quinoline		91-22-6	---
Quintozene		---	see Pentachloronitrobenzene
Release		6814-58-0	---
Reserpine		50-55-5	---
Resmethrin	•	10453-86-8	(5-benzyl-3-furyl)methyl 2,2-dimethyl-3-(2-methylpropenyl)cyclopropane=carboxylate
Resorcinol		108-46-3	1,3-Dihydroxybenzene
Ronnel		299-84-3	---
Rotenone	•	83-79-4	1,2,12,12a(alpha)-Tetrahydro-2a-isopropenyl-8,9-dimethoxy[1]benzopyranol[3,4-b]furo[2,3-h][1]benzopyran-6(6aH-one
S-Bioallethrin		28434-00-6	---
Safrole		94-59-7	4-Allyl-1,2-(methylenedioxy)benzene
Salithion		3811-49-2	---
sec-Butylbenzene		135-98-8	(1-Methylpropyl)benzene
Sethoxydim	•	74051-80-2	(±)-2-[1-Ethoxyimino)butyl]-5-[2-(ethylthio)propyl]-3-hydroxy-2-cyclohexen-1-one
Siduron		1982-49-6	N-(2-Methylcyclohexyl)-N'-phenylurea
Silvex		---	see 2,4,5-TP
Silvex, Propylene glycol butyl ester ether		25537-26-2	---
Simazine	•	122-34-9	2,4-diamine-6-Chloro-N,N'-diethyl-1,3,5-triazine
Sodium o-phenylphenate		132-27-4	---
Sodium pentachlorophenate		131-52-2	---
Strobane		8001-50-1	---
Strychnine		57-24-9	---
Styrene		100-42-5	---

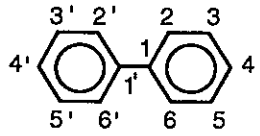
Sulprophos		35400-43-2	O-Ethyl O-[4-(methylthio)phenyl] S-propyl phosphorodithioate
Tecnazene		117-18-0	1,2,4,5-Tetrachloro-3-nitrobenzene
Temephos		3383-96-8	O,O'-Thiodi-n-phenylene O,O,O'O'-tetra
Terbacil		5902-51-2	5-Chloro-3-(1,1-dimethyl)-6-methyl-2,4(1H,3H0-pyrimidinedione
Terbufos		13071 -79-9	S-(tert-butylthio)methyl O,O-diethyl phosphorodithioate
Terbutryn	•	886-50-0	N-(1,1-Dimethylethyl)-N')ethyl-6-(methylthio)-1,3,5-triazine-2,4-diamine
Terbutylazine		5915-41-3	---
tert-Butylbenzene		98-06-6	1,1-Dimethylethylbenzene
Tetrachloroethylene		127-18-4	Perchloroethylene
Tetrachlorvinphos	•	2248-79-9	---
Tetradifon		116-29-0	p-Chlorophenyl 2,4,5-trichlorophenyl sulfone
Tetrahydrofuran		109-99-9	---
Tetramethrin		7696-12-0	---
Tetramethylthiuram disulfude		137-26-8	---
Tetrasul		2227-13-6	---
Thanite		115-31 -1	---
Thiabendazole	•	148-79-8	2-(4-Thiazolyl)benzimidazole
Thidiazuron		51707-55-2	N-Phenyl-N'-1,2,3-thiadiazol-5-ylurea
Thioacetamide		62-55-5	---
Thiobencarb		28249-77-6	S-(p-Chlorobenzyl) diethylthiocarbamate
Thiofanox	•	39196-18-4	3,3-Dimethyl-1-(methylthio)-2-butanone O-[(methylamino)carbonyl]oxime
Thiometon		640-15-3	S-[2-Ethylthio)ethyl] O,O-dimethyl phosphorodithioate
Thiophanate		23564-06-9	---
Thiophanate methyl		23564-05-8	Dimethyl [1,2-phenylenebis(iminocarbonothioyl)]bis[carbamate]
Thiosemicarbazole		79-19-6	---
Thiourea		62-56-6	---
Thiram	•	137-26-8	Tetramethylthiuram disulfide
Toluene		108-88-3	Methylbenzene
Toluene-d8		---	Deuterated toluene
Tolylfluanid		731-27-1	N-[(Dichlorofluoromethyl)thio]-N,N'-dimethyl-N-p-tolysulfamide
Toxaphene		8001-35-2	---
trans-1,2-Dichloroethylene		156-60-5	trans-1,2-Dichloroethene
trans-1,3-Dichloro-1-propene		---	---
trans-1,3-Dichloropropylene		10061-02-6	(E)-1,3-Dichloro-1-propene
trans-Chlordane		---	see gamma-Chlordane
trans-Nonachlor	•	39765-80-5	---
trans-Permethrin		---	---
Triallate	•	2303-17-5	S-(2,3,3-Trichloroallyl) diisopropylthiocarbamate
Triazophos		24017-47-8	O,O-Diethyl O-(1-phenyl-1H-1,2,4-triazol-3-yl) phosphorothioate

Trichlorfon	52-68-6	Dimethyl (2,2,2-trichloro-1-hydroxyethyl)phosphonate
Trichloro-p-dioxin-13C	---	(not specified)
Trichlorodibenzo-p-dioxin	---	(not specified)
Trichlorodibenzo-p-dioxin - 13C	---	(not specified)
Trichloroethylene	79-00-5	---
Trichlorofluoromethane	75-69-4	FREON 11
Triclopyr	55336-06-3	(3,5,6-Trichloro-2-pyridyloxy)acetic acid
Tridemorph	24602-86-6	(mixture)
Trietazine	1912-26-1	6-Chloro-N,N,N'-triethyl-1,3,5-triazine-2,4-amine
Triethylamine	121-44-8	---
Trifluralin	1582-09-8	2,6-Dinitro-N,N-dipropyl-4-(trifluoromethyl)benzenamine
Triforine	26644-46-2	N,N'-[1,4-Piperazinediylbis(2,2,2-trichloroethylidene)]bis{formamide)
Triphenylene	• 217-59-4	9,10-Benzphenanthrene
Urea	57-13-6	---
Urethane	51-79-6	Ethyl carbamate
Vernolate	1929-77-7	S-Propylcarbamothioate
Vinyl acetate	108-05-4	Ethylenethanoate
Vinyl chloride	75-01-4	Chloroethene
Warfarin	• 81-81-2	4-Hydroxy-3-(3-oxo-1-phenylbutyl)-2H-1-benzopyran-2-one
Zineb	12122-67-7	[Ethylenebis(dithiocarbamato)]zinc
Ziram	137-30-4	bis(Dimethyldithiocarbamato)zinc

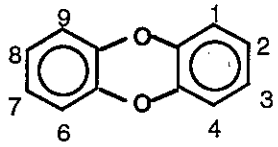
Appendix III

Selected organic compound structures

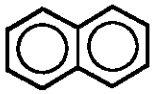
PCB parent structure



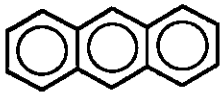
Dioxin parent structure



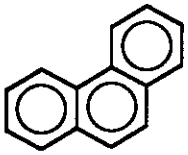
Polynuclear aromatic hydrocarbons



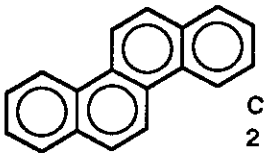
Naphthalene
91-20-3



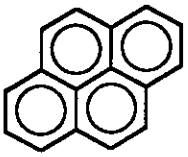
Anthracene
120-12-7



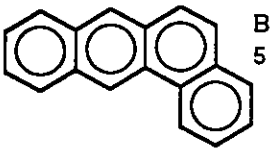
Phenanthrene
85-01-8



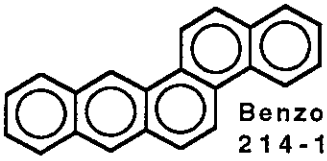
Chrysene
218-01-9



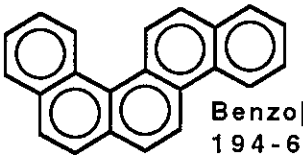
Pyrene
129-00-0



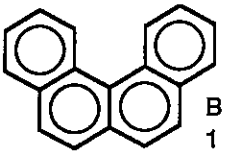
Benz[a]anthracene
56-55-3



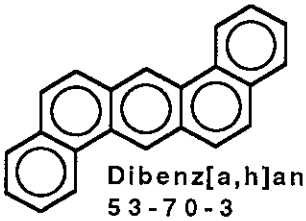
Benzo[b]chrysene
214-17-5



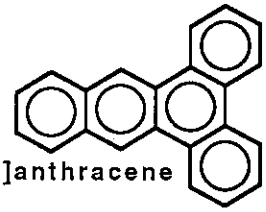
Benzo[c]chrysene
194-69-4



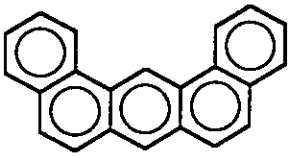
Benzo[c]phenanthrene
195-19-7



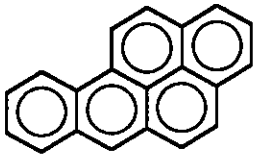
Dibenz[a,h]anthracene
53-70-3



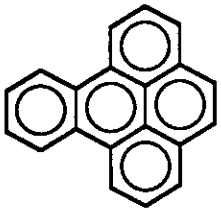
Dibenz[a,c]anthracene
215-58-7



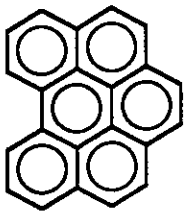
Dibenz[a,j]anthracene
224-41-9



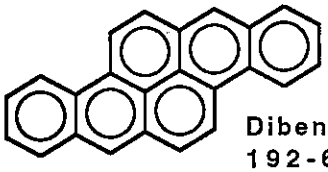
Benzo[a]pyrene
50-32-8



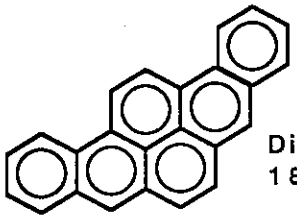
Benzo[e]pyrene
192-97-2



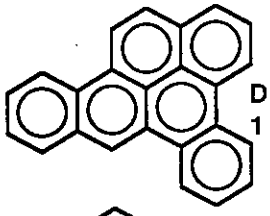
Benzo[ghi]perylene
191-24-2



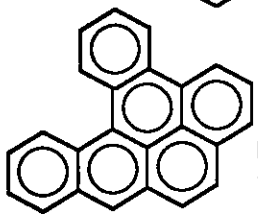
Dibenzo[a,h]pyrene
192-65-4



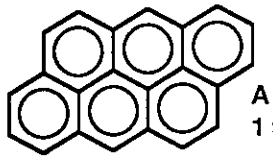
Dibenzo[a,i]pyrene
189-55-9



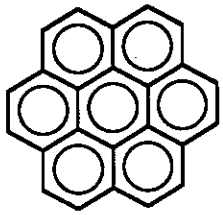
Dibenzo[a,e]pyrene
192-65-4



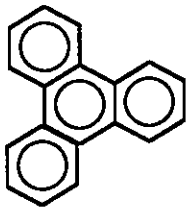
Dibenzo[a,l]pyrene
191-30-0



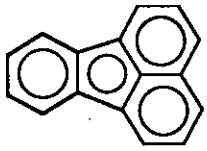
Anthanthrene
191-26-4



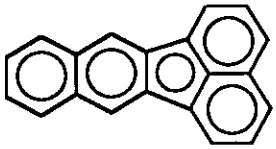
Coronene
191-07-1



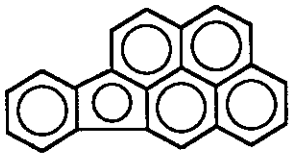
Triphenylene
217-59-4



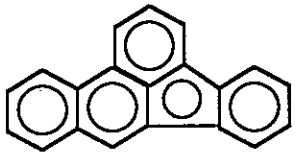
Fluoranthene
206-44-0



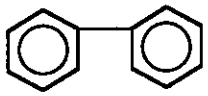
Benzo[k]=
fluoranthene
207-08-9



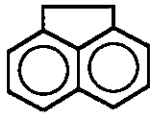
Indeno[1,2,3-cd]=
pyrene
193-39-5



Benzo[b]fluoranthene
205-99-2

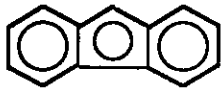


Biphenyl
92-52-4

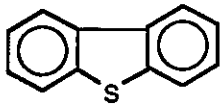


Acenaphthene
83-32-9

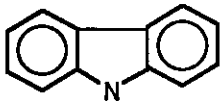
Acetanaphthylene
208-96-8



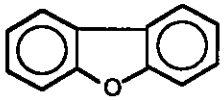
Fluorene
86-73-7



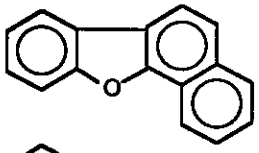
Dibenzothiophene
132-65-0



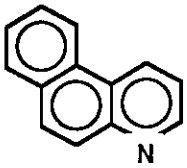
Carbazole
86-74-8



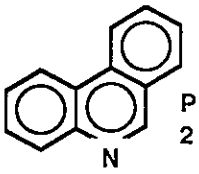
Dibenzofuran
132-64-9



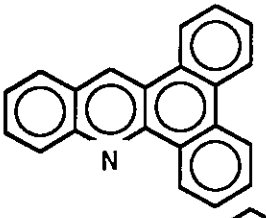
Benzo[b]naphtho=
[2,1-d]furan
239-30-5



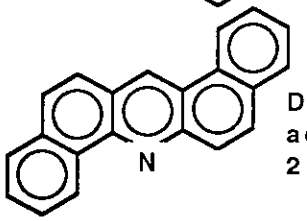
Benzo[f]quinoline
85-02-9



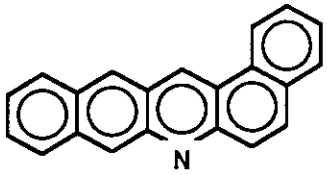
Phenanthridine
229-87-8



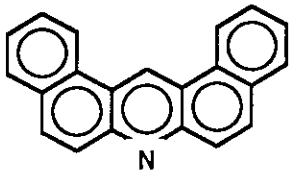
Dibenz[a,c]=
acridine
215-62-3



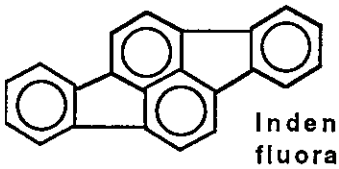
Dibenz[a,h]=
acridine
226-92-6



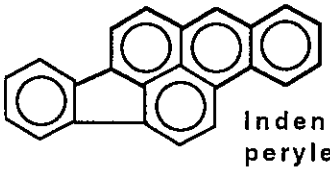
Dibenz[a,i]=
acridine
226-92-6



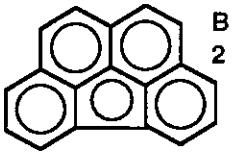
Dibenz[a,j]=
acridine
224-42-0



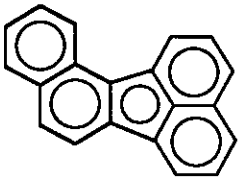
Indeno[1,2,3-cd]=
fluoranthene
101686-49-1



Indeno[1,2,3-cd]=
perylene
101686-49-1

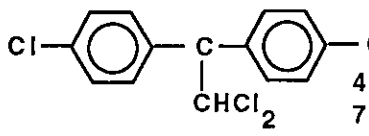


Benzo[ghi]fluoranthene
203-12-3

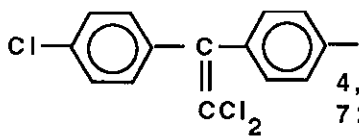


Benzo[j]fluor=
anthene
205-82-3

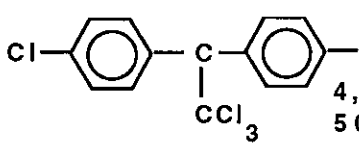
DDT and metabolites



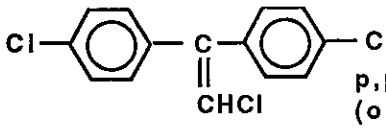
4,4'-DDD
72-54-8



4,4'-DDE
72-55-9

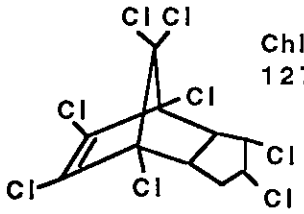


4,4-DDT
50-29-3

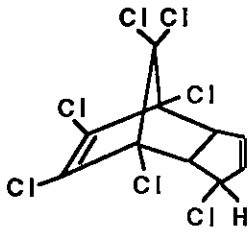


p,p'-TDE
(olefin)

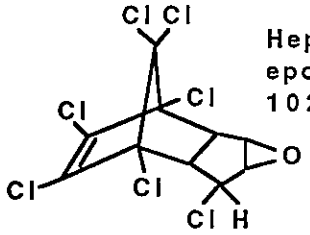
Cyclopendadiene pesticides



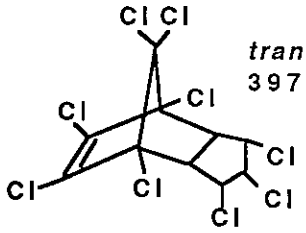
Chlordane
12789-03-6



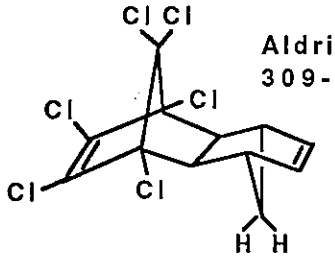
Heptachlor
76-44-8



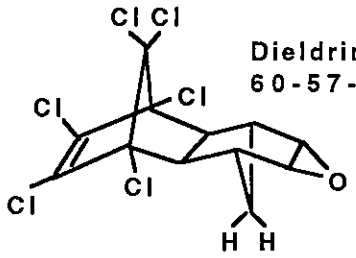
Heptachlor
epoxide
1024-57-3



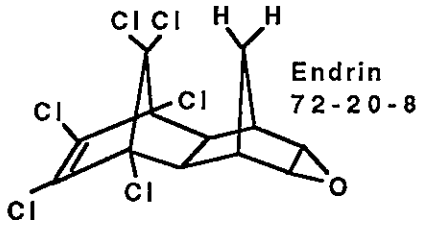
trans-Nonachlor
39765-80-5



Aldrin
309-00-2

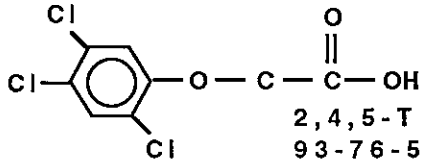


Dieldrin
60-57-1

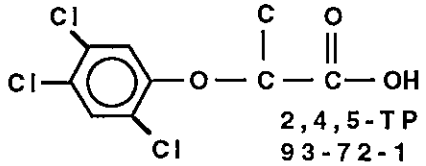


Endrin
72-20-8

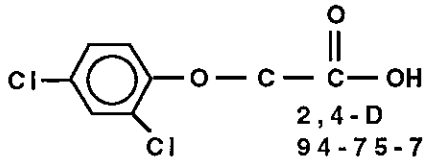
Aryloxyalkanoic acid herbicides



2,4,5-T
93-76-5



2,4,5-TP
93-72-1



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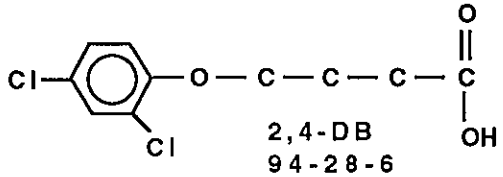
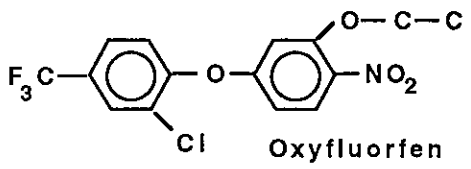
94-75-7

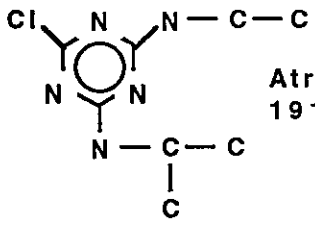


2,4-DB
94-28-6

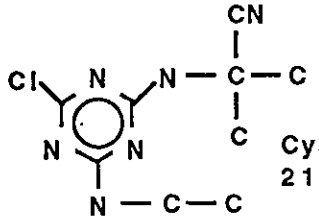


Oxyfluorfen
42874-03-3

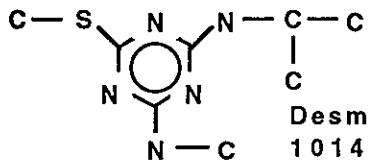
Triazine and other organonitrogen compounds



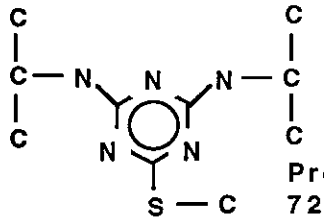
Atrazine
1912-24-9



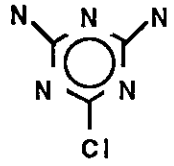
Cyanazine
21725-46-2



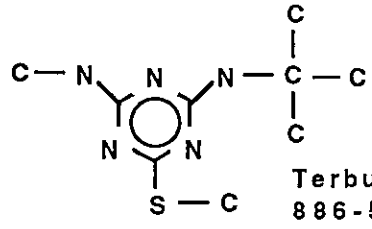
Desmetryn
1014-69-3



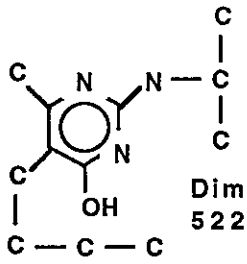
Prometryn
7287-19-6



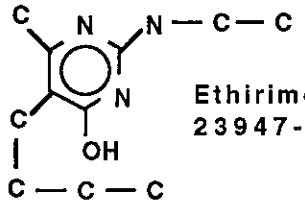
Simazine
122-34-9



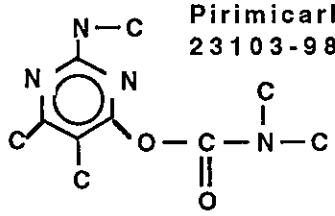
Terbutryn
886-50-0



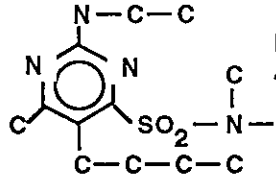
Dimethirimol
5221-53-4



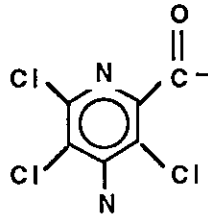
Ethirimol
23947-60-6



Pirimicarb
23103-98-2

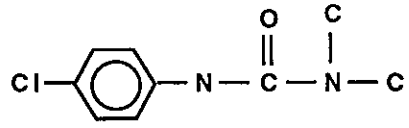


Bupimirate
41483-43-6

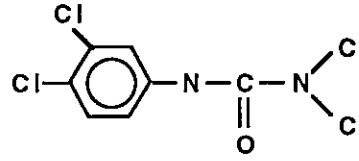


Picloram
1918-02-1

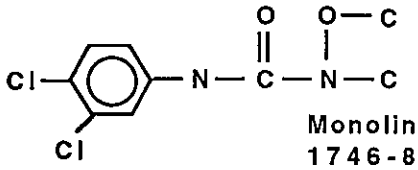
Urea derivatives



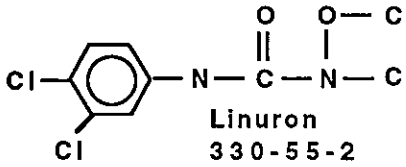
Monuron
150-68-5



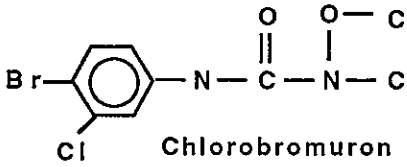
Diuron
330-54-1



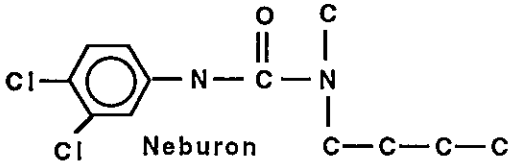
Monolinorun
1746-81-2



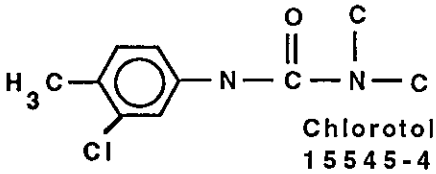
Linuron
330-55-2



Chlorobromuron
13360-45-7

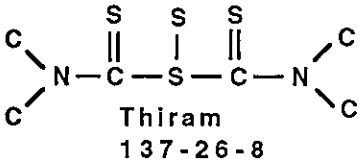


Neburon
555-37-3

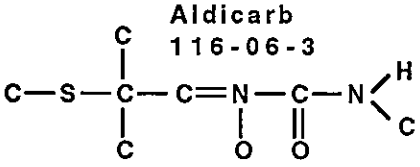


Chlorotoluron
15545-48-9

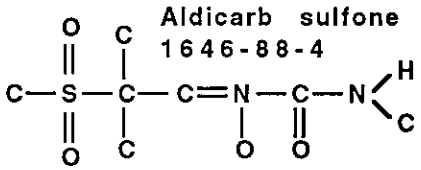
Organosulfur and organophosphorus compounds



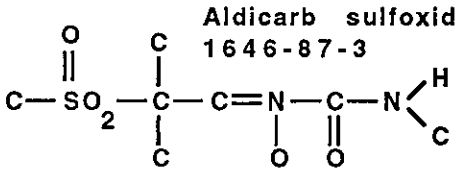
Thiram
137-26-8



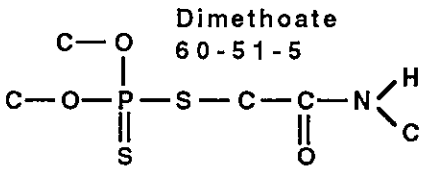
Aldicarb
116-06-3



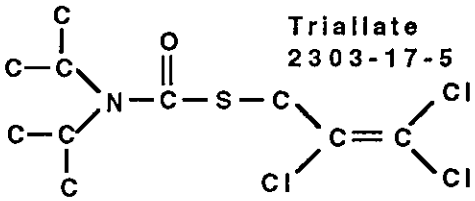
Aldicarb sulfone
1646-88-4



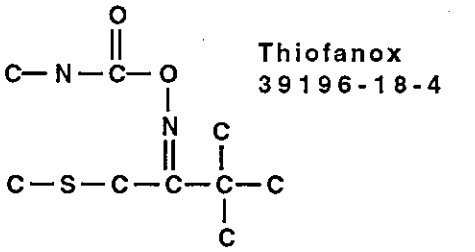
Aldicarb sulfoxide
1646-87-3



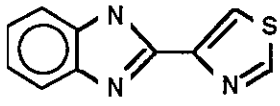
Dimethoate
60-51-5



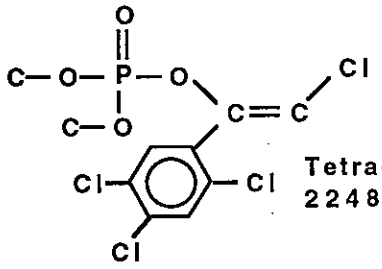
Triallate
2303-17-5



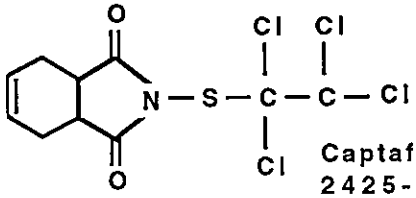
Thiofanox
39196-18-4



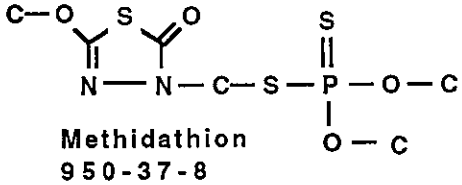
Thiabendazole
148-79-8



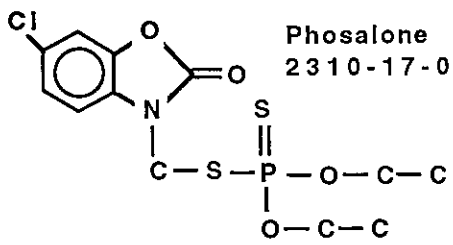
Tetrachlorvinphos
2248-79-9



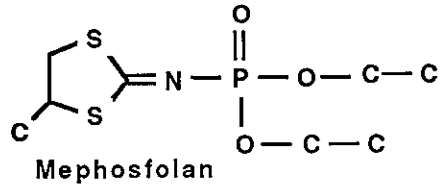
Captafol
2425-06-1



Methidathion
950-37-8

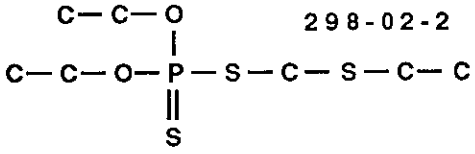


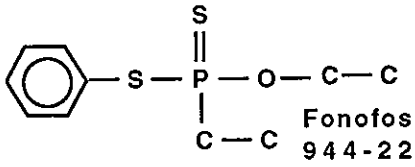
Phosalone
2310-17-0



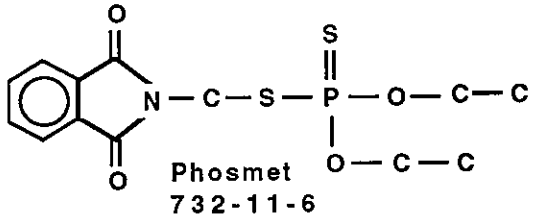
Mephosfolan
950-10-7

Phorate
298-02-2



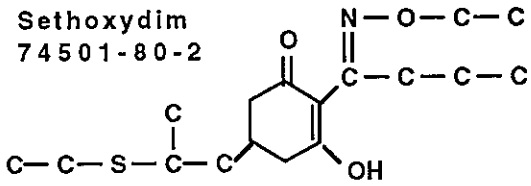


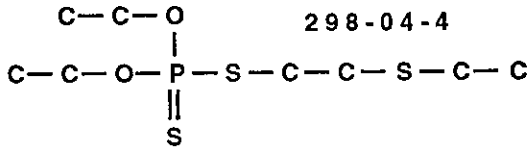
Fonofos
944-22-9



Phosmet
732-11-6

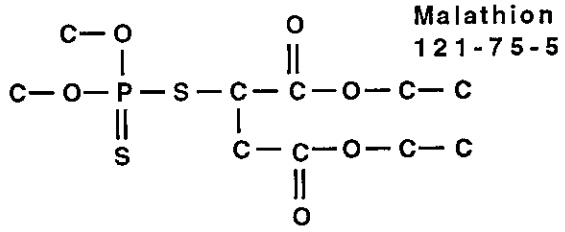
Sethoxydim
74501-80-2

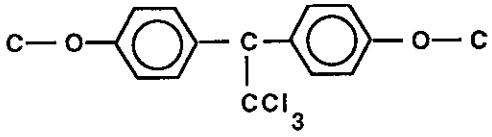




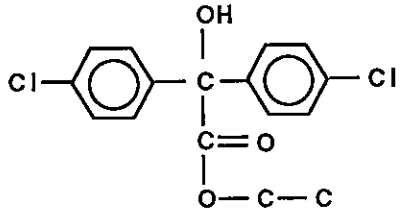
Disulfuton
298-04-4

Malathion
121-75-5

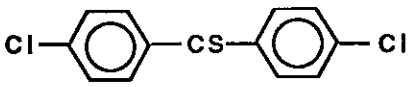




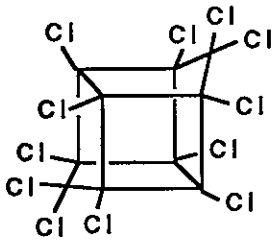
p,p-Methoxychlor
72-43-5



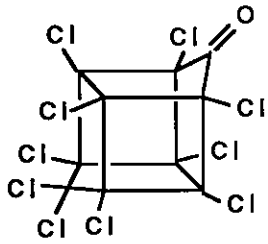
Chlorbenzilate
510-15-6



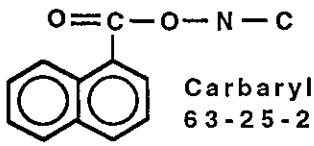
Chlorbenside
103-17-3



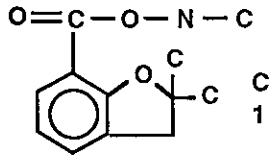
Mirex
2385-85-5



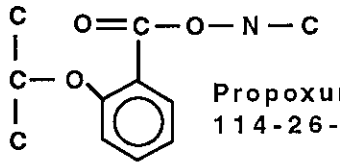
Kepone
143-50-0



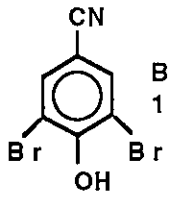
Carbaryl
63-25-2



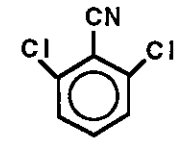
Carbofuran
1563-66-2



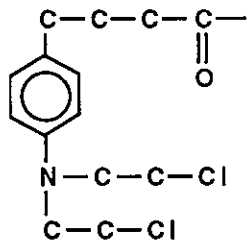
Propoxur
114-26-1



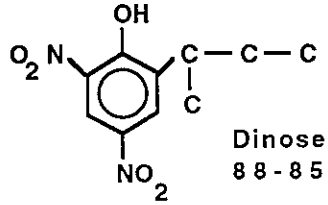
Bromoxynil
1089-84-5



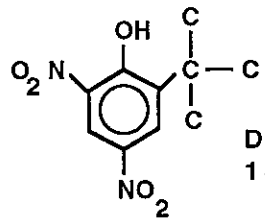
Dichlobenil
1194-65-6



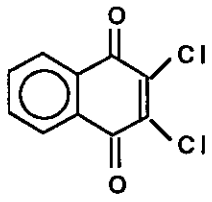
Chlorambucil
305-03-3



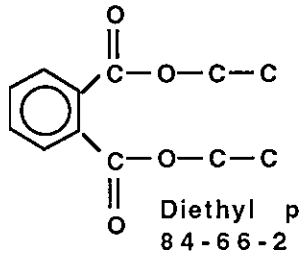
Dinoseb
88-85-7



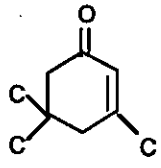
Dinoterb
1420-07-1



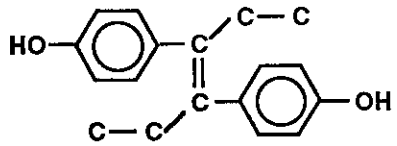
Dichlone
117-65-6



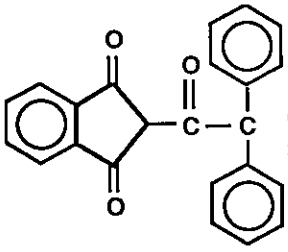
Diethyl phthalate
84-66-2



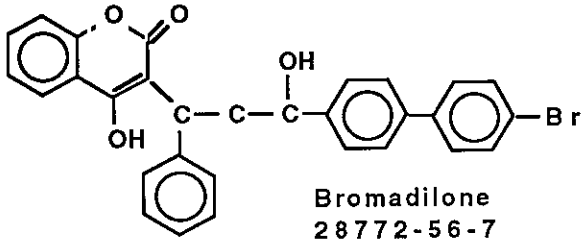
Isophorone
78-59-1



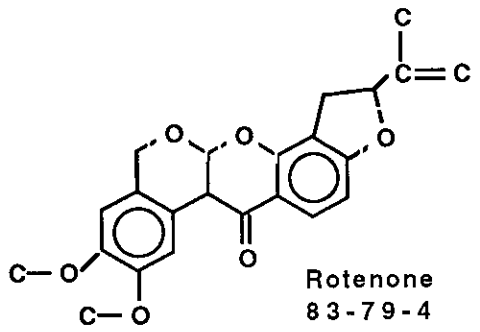
Diethylbestrol
56-53-1



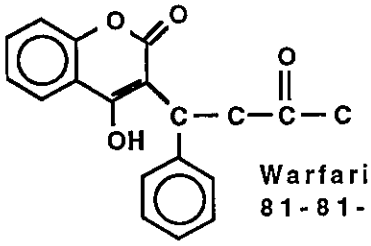
Chlorophacinone
3691-35-8



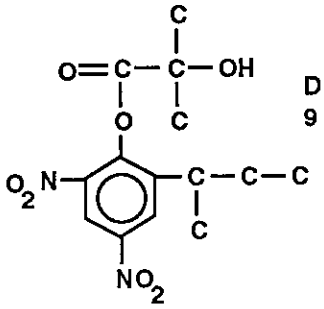
Bromadilone
28772-56-7



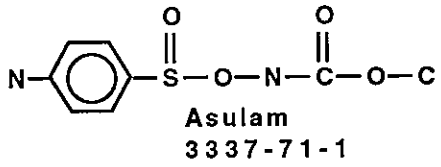
Rotenone
83-79-4



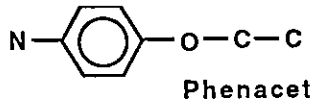
Warfarin
81-81-2



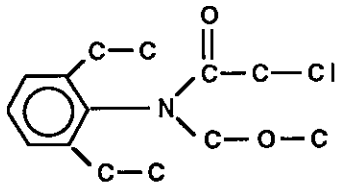
Dinobuton
973-21-7



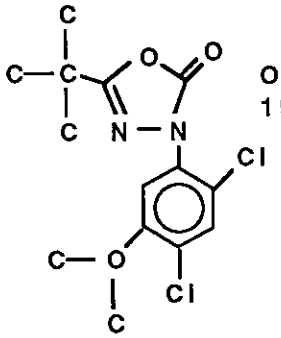
Asulam
3337-71-1



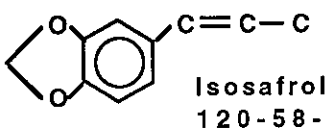
Phenacetin
62-44-2



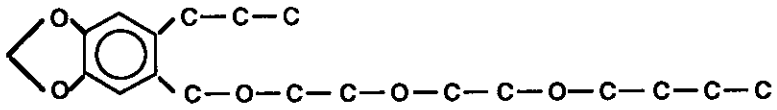
Alachlor
15972-60-8



Oxadiazon
19666-30-9

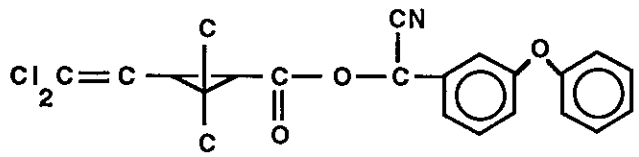


Isosafrole
120-58-1

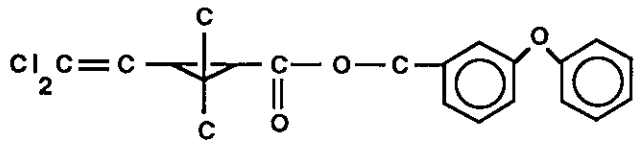


Piperonyl butoxide
51-03-6

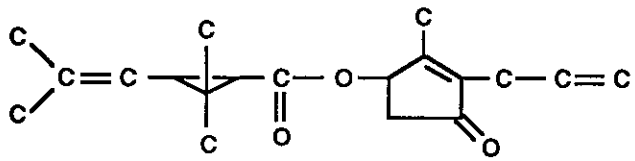
Pyrethroid insecticides



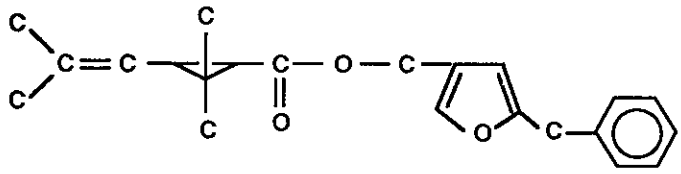
Cypermethrin
52315-07-8



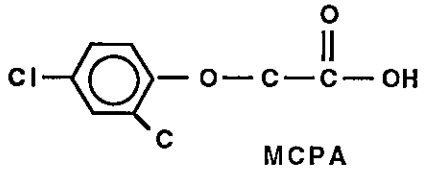
Permethrin
52645-53-1



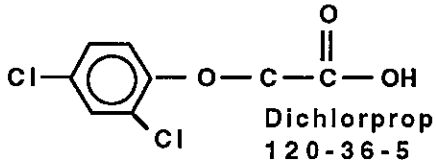
Allethrin
484-79-2



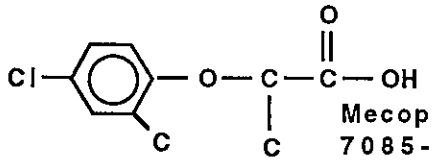
Resmethrin
10453-86-8



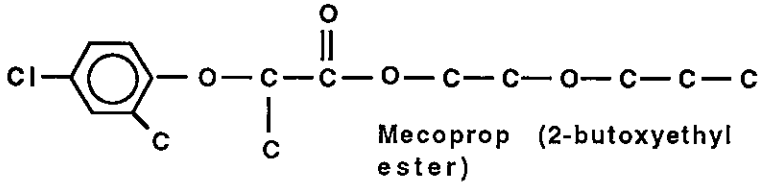
MCPA
94-74-6



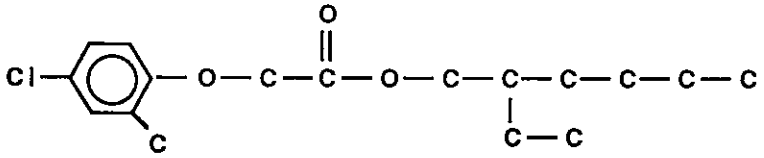
Dichlorprop
120-36-5



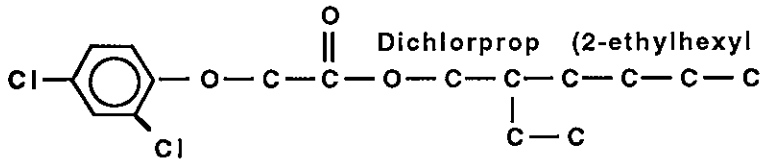
Mecoprop
7085-19-0



Mecoprop (2-butoxyethyl ester)

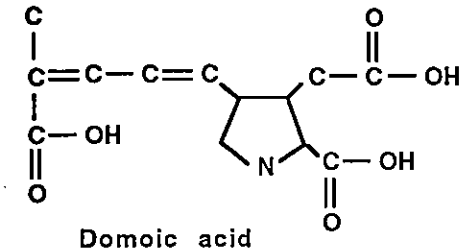


MCPA (2-ethylhexyl ester)

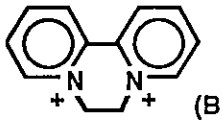


Dichlorprop (2-ethylhexyl ester)

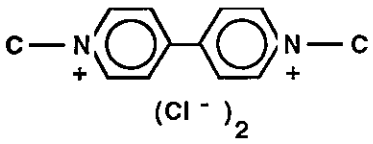
Others



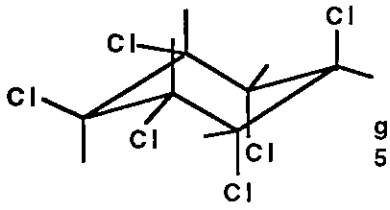
Domoic acid
14277-97-5



Diquat dibromide
85-00-7



Paraquat chloride
1910-42-5



gamma-HCH
58-89-9

Index of Elements with Associated Reference Materials

ASH: Ashes; INST: Instrumental performance; OIL: Oils; ROCK: Rocks and minerals; SED: Sediments; SLUD: Sludges; SOIL: Soils; TISS: Tissues; WAT: Waters.
* - Information value only.

Ag. ASH: * NIES 8, * SRM 1648, * SRM 1649, SRS019-50, SRS203-225. INST: A13-13, * GBW 07701, GBW 07702, GBW 07703, GBW 07704, GBW 07705, GBW 07706, GBW 07707, GBW 07708, GBW 07709, GBW 07710, GBW 07711, * GBW 07712, GBW 07713, GBW 07714, GBW 07715, GBW 07716, GBW 07717, GBW 07718, GBW 07719, GBW 07720, QCS-ICP, QCS-TMAA, QCS-TMWS, SRM 1643c, SRM 3151, SRM 3172, * SRM 610, * SRM 611, SRM 612, SRM 613, SRM 614, SRM 615. ROCK: AGV-1, BHVO-1, BIR-1, DNC-1, G-2, GSR-2, GSR-3, GSR-4, GSR-5, QLO-1, RGM-1, SCo-1, SDC-1, SDO-1, SGR-1, STM-1, W-2. SED: * CRM 280, GBW 07309, GBW 07310, GBW 07311, GBW 07312, GSD-10, GSD-11, GSD-12, GSD-9, * LKSD-1, * LKSD-2, * LKSD-3, * LKSD-4, MAG-1, * SL-1, * SRM 1941, * STSD-1, * STSD-2, * STSD-3, * STSD-4. SOIL: GBW 07401, GBW 07402, GBW 07403, GBW 07404, GBW 07405, GBW 07406, GBW 07407, GBW 07408, GSS-1, GSS-2, GSS-3, GSS-4, GSS-5, GSS-6, GSS-7, GSS-8, SRM 2709, SRM 2710, SRM 2711. TISS: LUTS-1, * MA-A-1/TM, NIES 9, SRM 1566a, SRM 1577b, * SRM 1974.

Al. ASH: * CRM 176, NIES 8, SRM 1633a, SRM 1648, SRM 2689, SRM 2690, SRM 2691. INST: A13-01, QCS-ICP, QCS-TMAA, SRM 1643c, * SRM 1871, * SRM 1872, * SRM 1873, SRM 3101, SRM 3171, SRM 3174. OIL: * SRM 1634b. ROCK: AGV-1, BCS-CRM 368, BCS-CRM 393, BCS-CRM 395, BHVO-1, BIR-1, DNC-1, G-2, GBW 07249, GSR-1, GSR-2, GSR-3, GSR-4, GSR-5, GSR-6, IPT 28, IPT 32, IPT 35, IPT 42, IPT 44, IPT 48, IPT 61, IPT 62, MGR-1, NOD-A-1, NOD-P-1, QLO-1, RGM-1, SARM 1, SARM 2, SARM 3, SARM 39, SARM 4, SARM 40, SARM 41, * SARM 43, SARM 44, SARM 45, SARM 47, SARM 48, * SARM 49, SARM 5, SARM 50, * SARM 6, SCo-1, SDC-1, SDO-1, SGR-1, SRM 120c, SRM 278, SRM 600, SRM 688, SRM 696, SRM 697, SRM 698, SRM 69b, SRM 81a, SRM 88b, SRM 97b, SRM 98b, STM-1, SY-2, SY-3, W-2. SED: BCSS-1, * CRM 277, * CRM 280, * CRM 320, GBW 07309, GBW 07310, GBW 07311, GBW 07312, GBW 07313, GSD-10, GSD-11, GSD-12, GSD-9, * HR-1, * LKSD-1, * LKSD-2, * LKSD-3, * LKSD-4, MAG-1, MESS-1, NIES 2, PACS-1, SARM 46, SARM 51, SARM 52, SD-M-2/TM, * SL-1, SRM 1646, * SRM 1941, SRM 2704, * STSD-1, * STSD-2, * STSD-3, * STSD-4, * SUD-1, * TH-1, * TH-2, * WQB-1, * WQB-2, * WQB-3. SLUD: * CRM 144, * CRM 146. SOIL: * CRM 141, GBW 07401, GBW 07402, GBW 07403, GBW 07404, GBW 07405, GBW 07406, GBW 07407, GBW 07408, GBW 08302, GBW 08303, GSS-1, GSS-2, GSS-3, GSS-4, GSS-5, GSS-6, GSS-7, GSS-8, SARM 42, SO-2, SO-3, SO-4, SRM 2709, SRM 2710, SRM 2711. TISS: * CRM 278, * GBW 08571, GBW 08572, SRM 1566a, * SRM 1577b, SRM 1598, * SRM 1974. WAT: * CRM 403, SLRS-2.

As. ASH: CRM 038, * CRM 176, GBW 08401, NIES 8, SRM 1633a, SRM 1648, * SRM 1649, SRS019-50, SRS203-225. INST: GBW 07510, GBW 07514, GBW 07701, GBW 07702, GBW 07703, GBW 07704, GBW 07705, GBW 07706, GBW 07707, GBW 07712, GBW 07713, GBW 07714, GBW 07715, GBW 07716, GBW 07717, GBW 07718, GBW 07719, GBW 08605, QCS-ICP, QCS-TMAA, QCS-TMWS, SRM 1643c, SRM 3103, SRM 3172. OIL: SRM 1634b. ROCK: AGV-1, BHVO-1, BIR-1, DNC-1, G-2, GBW 07249, GSR-1, GSR-2, * GSR-3, GSR-4, GSR-5, GSR-6, QLO-1, RGM-1, SCo-1, SDC-1, SDO-1, SGR-1, * SRM 120c, STM-1, W-2. SED: BCSS-1, CRM 277, CRM 280, CRM 320, GBW 07309, GBW 07310, GBW 07311, GBW 07312, GBW 07313, GBW 08301, GSD-10, GSD-11, GSD-12, GSD-9, * HR-1, * LKSD-1, * LKSD-2, * LKSD-3, * LKSD-4, MAG-1, MESS-1, NIES 2, PACS-1, SD-M-2/TM, SL-1, SRM 1646, * SRM 1941, SRM 2704, * STSD-1, * STSD-2, * STSD-

3, * STSD-4, * SUD-1, * TH-1, * TH-2, WQB-1, WQB-2, WQB-3. SLUD: * CRM 144, * CRM 146. SOIL: GBW 07401, GBW 07402, GBW 07403, GBW 07404, GBW 07405, GBW 07406, GBW 07407, GBW 07408, GBW 08302, GBW 08303, GSS-1, GSS-2, GSS-3, GSS-4, GSS-5, GSS-6, GSS-7, GSS-8, SOIL-7, SRM 2709, SRM 2710, SRM 2711, SRS003-50. TISS: CRM 278, CRM 414, CRM 422, DOLT-1, DORM-1, GBW 08571, GBW 08572, * IAEA-350, LUTS-1, MA-A-1/TM, MA-B-3/TM, NIES 9, SRM 1566a, * SRM 1577b, * SRM 1598, * SRM 1974, TORT-1. WAT: CASS-2, * CRM 403, NASS-4, SLEW-1, SLRS-2.

Au. INST: SRM 3121, SRM 3174, * SRM 610, * SRM 611, * SRM 612, * SRM 613, * SRM 614, * SRM 615, * SRM 616, * SRM 617. ROCK: AGV-1, BHVO-1, BIR-1, DNC-1, G-2, * GSR-1, * GSR-2, * GSR-3, * GSR-4, * GSR-5, * GSR-6, QLO-1, RGM-1, SCo-1, SDC-1, SDO-1, SGR-1, STM-1, W-2. SED: *GBW 07309, * GBW 07311, * GBW 07312, * GSD-11, * GSD-12, * GSD-9, * LKSD-1, * LKSD-2, * LKSD-3, * LKSD-4, MAG-1, * SL-1, * STSD-1, * STSD-2, * STSD-3, * STSD-4. SOIL: * GBW 07401, * GBW 07402, * GBW 07404, GBW 07405, * GBW 07406, * GBW 07407, * GBW 07408, * GSS-1, * GSS-2, * GSS-4, GSS-5, * GSS-6, * GSS-7, * GSS-8, * SRM 2709, * SRM 2710, * SRM 2711. TISS: * GBW 08571, * SRM 1566a, * SRM 1974.

B. INST: CRM 127, GBW 07701, GBW 07702, GBW 07703, GBW 07704, GBW 07705, GBW 07706, GBW 07707, GBW 07708, GBW 07709, GBW 07712, GBW 07713, GBW 07714, GBW 07715, GBW 07716, GBW 07717, GBW 07718, GBW 07719, QCS-ICP, SRM 1643c, SRM 3107, SRM 3174, * SRM 610, * SRM 611, * SRM 612, * SRM 613, * SRM 614, * SRM 615, * SRM 616, * SRM 617. ROCK: AGV-1, BHVO-1, BIR-1, DNC-1, G-2, GBW 07249, GSR-1, GSR-2, GSR-3, GSR-4, GSR-5, GSR-6, QLO-1, RGM-1, SCo-1, SDC-1, SDO-1, SGR-1, * SRM 278, STM-1, W-2. SED: GBW 07309, GBW 07310, GBW 07311, GBW 07312, GBW 07313, GSD-10, GSD-11, GSD-12, GSD-9, * LKSD-1, * LKSD-2, * LKSD-3, * LKSD-4, MAG-1, * SL-1, * SRM 1941, * STSD-1, * STSD-2, * STSD-3, * STSD-4. SOIL: GBW 07401, GBW 07402, GBW 07403, GBW 07404, GBW 07405, GBW 07406, * GBW 07407, GBW 07408, GSS-1, GSS-2, GSS-3, GSS-4, GSS-5, GSS-6, * GSS-7, GSS-8, * GBW 08571. ASH: * GBW 08401, * SRM 1633a, * SRM 1648, * SRM 1649, * SRM 2689, * SRM 2690, * SRM 2691, SRS001-100, SRS019-50, SRS203-225.

Ba. INST: A13-02, GBW 07504, GBW 07701, GBW 07702, GBW 07703, GBW 07704, GBW 07705, GBW 07706, GBW 07707, GBW 07708, GBW 07709, GBW 07712, GBW 07713, GBW 07714, GBW 07715, GBW 07716, GBW 07717, GBW 07718, GBW 07719, QCS-ICP, QCS-TMAA, QCS-TMAA, QCS-TMWS, SRM 1643c, * SRM 1871, * SRM 1872, SRM 1873, SRM 3104, SRM 3172. OIL: * SRM 1634b. ROCK: AGV-1, BCS-CRM 393, BHVO-1, BIR-1, DNC-1, G-2, GBW 07249, GSR-1, GSR-2, GSR-3, GSR-4, GSR-5, GSR-6, NOD-A-1, NOD-P-1, QLO-1, RGM-1, * SARM 1, SARM 2, SARM 2, SARM 3, SARM 39, SARM 4, * SARM 40, SARM 41, * SARM 43, * SARM 44, * SARM 45, * SARM 47, * SARM 48, SARM 5, SARM 50, * SARM 6, SCo-1, SDC-1, SDO-1, SGR-1, * SRM 278, * SRM 688, * SRM 97b, * SRM 98b, STM-1, W-2. SED: * CRM 277, * CRM 280, * CRM 320, GBW 07309, GBW 07310, GBW 07311, GBW 07312, GBW 07313, GBW 08301, GSD-10, GSD-11, GSD-12, GSD-9, * LKSD-1, * LKSD-2, * LKSD-3, * LKSD-4, MAG-1, * SARM 46, * SARM 51, * SARM 52, SD-M-2/TM, SL-1, SRM 2704, * STSD-1, * STSD-2, * STSD-3, * STSD-4. SOIL: GBW 07401, GBW 07402, GBW 07403, GBW 07404, GBW 07405, GBW 07406, GBW 07407, GBW 07408, * GBW 08302, * GBW 08303, GSS-1, GSS-2, GSS-3, GSS-4, GSS-5, GSS-6, GSS-7, GSS-8, * SARM 42, SO-2, SO-3, SO-4, SRM 2709, SRM 2710, SRM 2711, SRS003-50. TISS: * CRM 278, * GBW 08571, GBW 08572. WAT: SLRS-2.

Be. ASH: GBW 08401, * SRM 1633a. INST: GBW 07701, GBW 07702, GBW 07703, GBW 07704, GBW 07705, GBW 07706, GBW 07707, GBW 07708, GBW 07709, GBW 07710, GBW 07711, GBW 07712, GBW 07713, GBW 07714, GBW 07715, GBW 07716, GBW 07717, GBW 07718, GBW 07719, GBW 07720, QCS-ICP, QCS-TMAA, SRM 1643c, SRM 3105, SRM

3171, SRM 3174. ROCK: AGV-1, BHVO-1, BIR-1, DNC-1, G-2, GSR-1, GSR-2, GSR-3, GSR-4, GSR-5, GSR-6, QLO-1, RGM-1, SCo-1, SDC-1, SDO-1, SGR-1, STM-1, W-2. SED: BCSS-1, * CRM 277, * CRM 280, * CRM 320, GBW 07309, GBW 07310, GBW 07311, GBW 07312, * GBW 08301, GSD-10, GSD-11, GSD-12, GSD-9, * LKSD-1, * LKSD-2, * LKSD-3, * LKSD-4, MAG-1, MESS-1, * SRM 1646, * STSD-1, * STSD-2, * STSD-3, * STSD-4. SOIL: GBW 07401, GBW 07402, GBW 07403, GBW 07404, GBW 07405, GBW 07406, GBW 07407, GBW 07408, GBW 08302, * GBW 08303, GSS-1, GSS-2, GSS-3, GSS-4, GSS-5, GSS-6, GSS-7, GSS-8.

Bi. INST: GBW 07701, GBW 07702, GBW 07703, GBW 07704, GBW 07705, GBW 07706, GBW 07707, GBW 07708, GBW 07709, GBW 07710, GBW 07712, GBW 07713, GBW 07714, GBW 07715, GBW 07716, GBW 07717, GBW 07718, GBW 07719, GBW 07720, * SRM 1643c, SRM 3106. ROCK: AGV-1, BHVO-1, BIR-1, DNC-1, G-2, GSR-1, GSR-2, * GSR-3, GSR-4, GSR-5, GSR-6, QLO-1, RGM-1, SCo-1, SDC-1, SDO-1, SGR-1, STM-1, W-2. SED: GBW 07309, GBW 07310, GBW 07311, GBW 07312, GSD-10, GSD-11, GSD-12, GSD-9, MAG-1, * SL-1. SOIL: GBW 07401, GBW 07402, GBW 07403, GBW 07404, GBW 07405, GBW 07406, GBW 07407, GBW 07408, GSS-1, GSS-2, GSS-3, GSS-4, GSS-5, GSS-6, GSS-7, GSS-8.

Br. ASH: * NIES 8, * SRM 1648, * SRM 1649. INST: CRM 071, CRM 073, SRM 2142. ROCK: AGV-1, BHVO-1, BIR-1, G-2, QLO-1, RGM-1, SCo-1, SDC-1, SDO-1, STM-1, W-2. SED: * CRM 277, * CRM 280, * GBW 07309, * GBW 07310, * GBW 07311, * GBW 07312, * GSD-10, * GSD-11, * GSD-9, * LKSD-1, * LKSD-2, * LKSD-3, * LKSD-4, MAG-1, * NIES 2, SD-M-2/TM, SL-1, * SRM 2704, * STSD-1, * STSD-2, * STSD-3, * STSD-4. SOIL: GBW 07401, GBW 07402, GBW 07403, GBW 07404, * GBW 07405, * GBW 07406, GBW 07407, * GBW 07408, * GBW 08302, GSS-1, GSS-2, GSS-2, GSS-3, GSS-4, * GSS-5, * GSS-6, GSS-7, * GSS-8. TISS: * CRM 278, * CRM 422, * GBW 08571, * GBW 08572, MA-B-3/TM, * NIES 9, * SRM 1577b, * SRM 1974.

C. NST: CRM 034, CRM 035, CRM 036, CRM 071, CRM 072, CRM 073, CRM 127, CRM 183, GBW 07505, SRM 141c, SRM 143c, SRM 148. ROCK: BHVO-1, BIR-1, DNC-1, G-2, * GBW 07249, QLO-1, RGM-1, SCo-1, SDC-1, SDO-1, SGR-1, * SRM 278, STM-1, W-2. SED: BCSS-1, * GBW 07309, * GBW 07310, * GBW 07311, GBW 07312, * GBW 07313, * LKSD-1, * LKSD-2, * LKSD-3, * LKSD-4, MAG-1, MESS-1, PACS-1, SRM 2704, * STSD-1, * STSD-2, * STSD-3, * STSD-4. SOIL: * GBW 07401, * GBW 07402, GBW 07403, * GBW 07404, * GBW 07405, * GBW 07406, * GBW 07407, GBW 07408.

Ca. ASH: * CRM 176, NIES 8, SRM 1633a, SRM 2689, SRM 2690, SRM 2691. INST: A13-04, GBW 07506, QCS-ICP, QCS-TMAA, SRM 3109, SRM 3172. OIL: * SRM 1634b. ROCK: AGV-1, BCS-CRM 368, BCS-CRM 393, BCS-CRM 395, BHVO-1, BHVO-1, BIR-1, DNC-1, G-2, GBW 07249, GSR-1, GSR-2, GSR-3, GSR-4, GSR-5, GSR-6, IPT 28, IPT 32, IPT 35, IPT 42, IPT 44, IPT 48, * IPT 61, * IPT 62, MGR-1, NOD-A-1, NOD-P-1, QLO-1, RGM-1, SARM 1, SARM 2, SARM 3, SARM 39, SARM 4, SARM 40, SARM 41, SARM 43, SARM 44, SARM 45, * SARM 47, SARM 48, * SARM 49, SARM 5, SARM 50, SARM 6, SCo-1, SDC-1, SDO-1, SGR-1, SRM 278, SRM 600, * SRM 688, SRM 696, SRM 697, SRM 698, SRM 69b, SRM 88b, SRM 97b, SRM 98b, STM-1, SY-2, SY-3, W-2. SED: BCSS-1, * CRM 277, * CRM 280, * CRM 320, GBW 07309, GBW 07310, GBW 07311, GBW 07312, GBW 07313, GSD-10, GSD-11, GSD-12, GSD-9, * LKSD-1, * LKSD-2, * LKSD-3, * LKSD-4, MAG-1, MESS-1, NIES 2, PACS-1, SARM 46, SARM 51, SARM 52, SD-M-2/TM, * SL-1, SRM 1646, SRM 2704, * STSD-1, * STSD-2, * STSD-3, * STSD-4. SLUD: * CRM 144, * CRM 146. SOIL: * CRM 141, GBW 07401, GBW 07402, GBW 07403, GBW 07404, * GBW 07405, GBW 07406, GBW 07407, GBW 07408, GBW 08302, GBW 08303, GSS-1, GSS-2, GSS-3, GSS-4, GSS-6, GSS-7, GSS-8, SARM 42, SO-2, SO-3, SO-4, SO-4, SRM 2709, SRM 2710, SRM 2711. TISS: * CRM 278, * CRM 422, GBW 08571, GBW 08572, * IAEA-350, LUTS-1, MA-B-3/TM, NIES 9, SRM 1566a,

SRM 1577b, * SRM 1598, TORT-1. WAT: SLRS-2, SRM 2694.

Cd. ASH: CRM 038, CRM 176, GBW 08401, NIES 8, SRM 1633a, SRM 1648, * SRM 1649, SRS019-50, SRS203-225. INST: A13-03, GBW 07508, GBW 07509, GBW 07701, GBW 07702, GBW 07703, GBW 07704, GBW 07705, GBW 07706, GBW 07707, GBW 07708, GBW 07709, GBW 07710, GBW 07711, * GBW 07712, GBW 07713, GBW 07714, GBW 07715, GBW 07716, GBW 07717, GBW 07718, GBW 07719, GBW 07720, GBW 08602, GBW 08607, GBW 08608, QCS-ICP, QCS-TMAA, QCS-TMWS, SRM 1643c, SRM 3108, SRM 3171, SRM 3174. ROCK: AGV-1, BHVO-1, BIR-1, DNC-1, G-2, * GSR-1, GSR-2, GSR-3, GSR-4, * GSR-5, GSR-6, QLO-1, RGM-1, SCo-1, SDC-1, SDO-1, SGR-1, STM-1, W-2. SED: BCSS-1, CRM 277, CRM 280, CRM 320, GBW 07309, GBW 07310, GBW 07311, GBW 07312, GBW 08301, GSD-10, GSD-11, GSD-12, GSD-9, * HR-1, MAG-1, MESS-1, NIES 2, PACS-1, SD-M-2/TM, SL-1, SRM 1646, * SRM 1941, SRM 2704, * SUD-1, * TH-1, * TH-2, * WQB-1, * WQB-2, * WQB-3. SLUD: CRM 144, CRM 146. SOIL: CRM 141, GBW 07401, GBW 07402, GBW 07403, GBW 07404, GBW 07405, GBW 07406, GBW 07407, GBW 07408, GBW 08302, GBW 08303, GSS-1, GSS-2, GSS-3, GSS-4, GSS-5, GSS-6, GSS-7, GSS-8, SRM 2709, SRM 2710, SRM 2711, SRS003-50. TISS: CRM 278, CRM 414, CRM 422, DOLT-1, DORM-1, GBW 08571, GBW 08572, IAEA-350, LUTS-1, MA-A-1/TM, NIES 9, SRM 1566a, SRM 1577b, SRM 1598, * SRM 1974, TORT-1. WAT: CASS-2, CRM 403, NASS-4, SLEW-1, SLRS-2.

Ce. ASH: * NIES 8, * SRM 1633a, * SRM 1648, * SRM 1649. INST: GBW 07701, GBW 07702, GBW 07703, GBW 07704, GBW 07705, GBW 07706, GBW 07707, GBW 07708, GBW 07709, GBW 07712, GBW 07713, GBW 07714, GBW 07715, GBW 07716, GBW 07717, GBW 07718, GBW 07719, * SRM 1871, * SRM 1872, * SRM 1873, SRM 3110, * SRM 612, * SRM 613. ROCK: AGV-1, BHVO-1, BIR-1, DNC-1, G-2, GBW 07249, GSR-1, GSR-2, GSR-3, GSR-4, GSR-5, GSR-6, QLO-1, RGM-1, SARM 1, SARM 2, * SARM 3, * SARM 39, * SARM 4, * SARM 40, * SARM 41, * SARM 43, * SARM 44, * SARM 45, * SARM 47, * SARM 48, * SARM 50, SCo-1, SDC-1, SDO-1, SGR-1, * SRM 278, * SRM 688, * SRM 88b, STM-1, W-2. SED: * CRM 277, * CRM 280, * CRM 320, GBW 07309, GBW 07310, GBW 07311, GBW 07312, GBW 07313, GSD-10, GSD-11, GSD-12, GSD-9, * LKSD-1, * LKSD-2, * LKSD-3, * LKSD-4, MAG-1, * SARM 46, * SARM 51, * SARM 52, SD-M-2/TM, SL-1, * SRM 1646, * SRM 1941, * SRM 2704, * STSD-1, * STSD-2, * STSD-3, * STSD-4. SOIL: GBW 07401, GBW 07402, GBW 07403, GBW 07404, GBW 07405, GBW 07406, GBW 07407, GBW 07408, GBW 08302, GSS-1, GSS-2, GSS-3, GSS-4, GSS-5, GSS-6, GSS-7, GSS-8, * SARM 42, SOIL-7. TISS: * GBW 08571, * SRM 1566a, * SRM 1974.

Cl. ASH: * SRM 1648, * SRM 1649. INST: CRM 034, CRM 071, CRM 072, CRM 073, SRM 2144. ROCK: AGV-1, BHVO-1, BIR-1, DNC-1, G-2, GBW 07249, GSR-1, * GSR-2, GSR-3, * GSR-4, * GSR-5, * GSR-6, QLO-1, RGM-1, SARM 3, SCo-1, SDC-1, SGR-1, STM-1, W-2. SED: BCSS-1, * GBW 07309, * GBW 07310, GBW 07311, * GBW 07312, GBW 07313, * GSD-10, GSD-11, * GSD-12, * GSD-9, MAG-1, MESS-1, PACS-1, * SL-1, * SRM 1941, * SRM 2704. SOIL: * GBW 07401, * GBW 07402, * GBW 07403, * GBW 07404, * GBW 07405, GBW 07406, GBW 07407, * GBW 07408, * GSS-1, * GSS-2, * GSS-3, * GSS-4, * GSS-5, GSS-6, GSS-7, * GSS-8. TISS: * CRM 278, DOLT-1, DORM-1, * GBW 08571, MA-B-3/TM, * NIES 9, SRM 1566a, SRM 1577b, * SRM 1974, TORT-1.

Co. ASH: CRM 038, CRM 176, GBW 08401, NIES 8, * SRM 1633a, * SRM 1648, * SRM 1649. INST: A13-05, GBW 07701, GBW 07702, GBW 07703, GBW 07704, GBW 07705, GBW 07706, GBW 07707, GBW 07708, GBW 07712, GBW 07713, GBW 07714, GBW 07715, GBW 07716, GBW 07717, GBW 07718, QCS-ICP, QCS-TMAA, SRM 1643c, SRM 3113, SRM 3172, * SRM 610, * SRM 611, SRM 612, SRM 613, * SRM 614, * SRM 615. OIL: SRM 1634b. ROCK: AGV-1, BHVO-1, BIR-1, DNC-1, G-2, GBW 07249, GSR-1, GSR-2, GSR-3, GSR-4, GSR-5, GSR-6, NOD-A-1, NOD-P-1, QLO-1, RGM-1, * SARM 2, SARM 39, SARM 4, * SARM 40, * SARM

41, SARM 43, * SARM 44, SARM 45, SARM 47, SARM 5, SARM 50, SARM 6, SARM 6, SCo-1, SDC-1, SDO-1, SGR-1, * SRM 120c, * SRM 278, * SRM 278, * SRM 688, * SRM 688, SRM 88b, * SRM 88b, * SRM 97b, * SRM 98b, STM-1, W-2. SED: BCSS-1, * CRM 277, * CRM 280, * CRM 320, GBW 07309, GBW 07310, GBW 07311, GBW 07312, GBW 07313, GBW 08301, GSD-10, GSD-11, GSD-12, GSD-9, * HR-1, * LKSD-1, * LKSD-2, * LKSD-3, * LKSD-4, MAG-1, MESS-1, NIES 2, PACS-1, SARM 46, SARM 51, SARM 52, SD-M-2/TM, SL-1, SRM 1646, * SRM 1941, SRM 2704, * STSD-1, * STSD-2, * STSD-3, * STSD-4, * SUD-1, * TH-1, * TH-2, * WQB-1, * WQB-2, WQB-3. SLUD: CRM 144, CRM 146. SOIL: * CRM 141, GBW 07401, GBW 07402, GBW 07403, GBW 07404, GBW 07405, GBW 07406, GBW 07407, GBW 07408, GBW 08302, GBW 08303, GSS-1, GSS-2, GSS-3, GSS-4, GSS-5, GSS-6, GSS-7, GSS-8, SARM 42, SO-2, SO-3, SO-4, SOIL-7, SRM 2709, * SRM 2710, * SRM 2711. TISS: * CRM 278, * CRM 414, * CRM 422, DOLT-1, DORM-1, GBW 08571, * GBW 08572, * IAEA-350, LUTS-1, MA-A-1/TM, NIES 9, SRM 1566a, * SRM 1577b, SRM 1598, * SRM 1974, TORT-1. WAT: CASS-2, NASS-4, SLEW-1, SLRS-2.

Cr. ASH: * CRM 038, CRM 176, GBW 08401, NIES 8, SRM 1633a, SRM 1648, * SRM 1649, SRS001-100, SRS001-100, SRS019-50, SRS203-225. INST: A13-07, GBW 07701, GBW 07702, GBW 07703, GBW 07704, GBW 07705, GBW 07706, GBW 07707, GBW 07708, GBW 07709, GBW 07712, GBW 07713, GBW 07714, GBW 07715, GBW 07716, GBW 07717, GBW 07718, GBW 08607, GBW 08608, QCS-ICP, QCS-TMAA, QCS-TMWS, SRM 1643c, * SRM 1871, * SRM 1872, * SRM 1873, SRM 3112, SRM 3171. OIL: * SRM 1634b. ROCK: AGV-1, BCS-CRM 368, BCS-CRM 368, BCS-CRM 395, BHVO-1, BIR-1, DNC-1, G-2, GBW 07249, * GSR-1, GSR-2, GSR-3, GSR-4, GSR-5, GSR-6, QLO-1, RGM-1, SARM 1, SARM 2, * SARM 3, SARM 39, * SARM 4, * SARM 40, SARM 41, * SARM 43, SARM 44, SARM 45, SARM 47, SARM 48, SARM 5, SARM 5, SARM 50, SARM 6, SARM 6, SCo-1, SDC-1, SDO-1, SGR-1, * SRM 120c, * SRM 278, SRM 600, SRM 688, SRM 696, SRM 697, SRM 698, SRM 69b, SRM 81a, * SRM 88b, SRM 97b, SRM 98b, STM-1, W-2. SED: BCSS-1, CRM 277, CRM 280, CRM 320, GBW 07309, GBW 07310, GBW 07311, GBW 07312, GBW 07313, GBW 08301, GSD-10, GSD-11, GSD-12, GSD-9, * LKSD-1, * LKSD-2, * LKSD-3, * LKSD-4, MAG-1, MESS-1, NIES 2, PACS-1, SARM 46, SARM 51, SARM 52, SL-1, SRM 1646, * SRM 1941, SRM 2704, * STSD-1, * STSD-2, * STSD-3, * STSD-4, * TH-2. SLUD: * CRM 144, * CRM 146. SOIL: * CRM 141, GBW 07401, GBW 07402, GBW 07403, GBW 07404, GBW 07405, GBW 07406, GBW 07407, GBW 07408, GBW 08302, GBW 08303, GSS-1, GSS-2, GSS-3, GSS-4, GSS-5, GSS-6, GSS-7, GSS-8, SARM 42, SO-2, SO-3, SO-4, SOIL-7, SRM 2709, * SRM 2710, * SRM 2711, SRS003-50. TISS: CRM 278, DOLT-1, DORM-1, GBW 08571, GBW 08572, IAEA-350, LUTS-1, * MA-A-1/TM, * NIES 9, SRM 1566a, SRM 1598, * SRM 1974, TORT-1. WAT: CASS-2, NASS-4, SLEW-1, SLRS-2.

Cs. ASH: * NIES 8, * SRM 1633a, * SRM 1648, * SRM 1649. INST: SRM 3111. ROCK: AGV-1, BHVO-1, BIR-1, DNC-1, G-2, GSR-1, GSR-2, * GSR-3, GSR-4, GSR-5, GSR-6, QLO-1, RGM-1, SCo-1, SDC-1, SDO-1, SGR-1, * SRM 278, * SRM 88b, * SRM 97b, * SRM 98b, STM-1, W-2. SED: * CRM 277, * CRM 280, * CRM 320, GBW 07309, GBW 07310, GBW 07311, GBW 07312, GBW 07313, GSD-10, GSD-11, GSD-12, GSD-9, * LKSD-1, * LKSD-2, * LKSD-3, * LKSD-4, MAG-1, SD-M-2/TM, SL-1, * SRM 1646, * SRM 1941, * SRM 2704, * STSD-1, * STSD-2, * STSD-3, * STSD-4. SOIL: GBW 07401, GBW 07402, GBW 07403, GBW 07404, GBW 07405, GBW 07406, GBW 07407, GBW 07408, * GBW 08302, GSS-1, GSS-2, GSS-3, GSS-4, GSS-5, GSS-6, GSS-7, GSS-8, SOIL-7. TISS: * NIES 9, * SRM 1566a, * SRM 1598, * SRM 1974.

Cu. ASH: CRM 038, CRM 176, GBW 08401, NIES 8, SRM 1633a, SRM 1648, SRS001-100, SRS019-50. INST: A13-06, CRM 183, GBW 07701, GBW 07702, GBW 07703, GBW 07704, GBW 07705, GBW 07706, GBW 07707, GBW 07708, GBW 07709, GBW 07710, GBW 07711, GBW

07712, GBW 07713, GBW 07714, GBW 07715, GBW 07716, GBW 07717, GBW 07718, GBW 07719, GBW 07720, GBW 08607, GBW 08608, QCS-ICP, QCS-TMAA, SRM 1643c, SRM 3114, SRM 3172, * SRM 610, * SRM 611, * SRM 612, * SRM 613, SRM 614, SRM 615, * SRM 616, * SRM 617. ROCK: AGV-1, BCS-CRM 368, BCS-CRM 395, BHVO-1, BIR-1, DNC-1, G-2, GBW 07249, GSR-1, GSR-2, GSR-3, GSR-4, GSR-5, GSR-6, NOD-A-1, NOD-P-1, QLO-1, RGM-1, SARM 1, SARM 2, SARM 3, SARM 39, SARM 4, * SARM 40, SARM 41, * SARM 43, * SARM 44, SARM 45, * SARM 47, * SARM 48, SARM 5, SARM 50, SARM 6, SCo-1, SDC-1, SDO-1, SGR-1, * SRM 120c, SRM 278, * SRM 688, STM-1, W-2. SED: BCSS-1, CRM 277, CRM 280, CRM 320, GBW 07309, GBW 07310, GBW 07311, GBW 07312, GBW 07313, GBW 08301, GSD-10, GSD-11, GSD-12, GSD-9, * HR-1, * LKSD-1, * LKSD-2, * LKSD-3, * LKSD-4, MAG-1, MESS-1, NIES 2, PACS-1, SARM 46, SARM 51, SARM 52, SD-M-2/TM, SL-1, SRM 1646, SRM 270, * STSD-1, * STSD-2, * STSD-3, * STSD-4, * SUD-1, * TH-1, * TH-2, * WQB-1, * WQB-2, * WQB-3. SLUD: CRM 144, CRM 146. SOIL: CRM 141, GBW 07401, GBW 07402, GBW 07403, GBW 07404, GBW 07405, GBW 07406, GBW 07407, GBW 07408, GBW 08302, GBW 08303, GSS-1, GSS-2, GSS-3, GSS-4, GSS-5, GSS-6, GSS-7, GSS-8, SARM 42, SO-2, SO-3, SO-4, SOIL-7, SRM 2709, SRM 2710, SRM 2711. TISS: CRM 278, CRM 414, CRM 422, DOLT-1, DORM-1, GBW 08571, GBW 08572, IAEA-350, LUTS-1, MA-A-1/TM, MA-B-3/TM, NIES 9, SRM 1566a, SRM 1577b, SRM 1598, * SRM 1974, TORT-1. WAT: CASS-2, CRM 403, NASS-4, SLEW-1, SLRS-2.

Dy. INST: SRM 3115. ROCK: AGV-1, BHVO-1, BIR-1, DNC-1, G-2, GBW 07249, GSR-1, GSR-2, GSR-3, GSR-4, GSR-5, GSR-6, QLO-1, RGM-1, * SARM 1, * SARM 2, SCo-1, SDC-1, SDO-1, SGR-1, STM-1, W-2. SED: GBW 07309, GBW 07310, GBW 07311, GBW 07312, GBW 07313, GSD-10, GSD-11, GSD-12, GSD-9, * LKSD-1, * LKSD-2, * LKSD-3, * LKSD-4, MAG-1, SL-1, * SRM 2704, * STSD-1, * STSD-2, * STSD-3, * STSD-4. SOIL: GBW 07401, GBW 07402, GBW 07403, GBW 07404, GBW 07405, GBW 07406, GBW 07407, GBW 07408, * GBW 08302, GSS-1, GSS-2, GSS-3, GSS-4, GSS-5, GSS-6, GSS-7, GSS-8, SOIL-7.

Er. INST: SRM 3116. ROCK: AGV-1, BHVO-1, BIR-1, DNC-1, G-2, GBW 07249, GSR-1, GSR-2, GSR-3, GSR-4, GSR-5, * GSR-6, QLO-1, RGM-1, SCo-1, SDC-1, SDO-1, SGR-1, STM-1, W-2. SED: GBW 07309, GBW 07310, GBW 07311, GBW 07312, GBW 07313, GSD-10, GSD-11, GSD-12, GSD-9, MAG-1. SOIL: GBW 07401, GBW 07402, GBW 07403, GBW 07404, GBW 07405, GBW 07406, GBW 07407, GBW 07408, GSS-1, GSS-2, GSS-3, GSS-4, GSS-5, GSS-6, GSS-7, GSS-8.

Eu. ASH: * NIES 8, * SRM 1633a, * SRM 1648, * SRM 1649. INST: * SRM 1871, * SRM 1872, * SRM 1873, SRM 3117, * SRM 612, * SRM 613, * SRM 614, * SRM 615. ROCK: AGV-1, BHVO-1, BIR-1, DNC-1, G-2, GBW 07249, GSR-1, GSR-2, GSR-3, GSR-4, GSR-5, GSR-6, QLO-1, RGM-1, SARM 1, SARM 2, SARM 3, SARM 4, * SARM 5, SCo-1, SDC-1, SDO-1, SGR-1, * SRM 120c, * SRM 278, * SRM 688, * SRM 88b, * SRM 97b, * SRM 98b, STM-1, W-2. SED: * CRM 277, * CRM 280, * CRM 320, GBW 07309, GBW 07310, GBW 07311, GBW 07312, GBW 07313, GSD-10, GSD-11, GSD-12, GSD-9, * LKSD-1, * LKSD-2, * LKSD-3, * LKSD-4, MAG-1, SD-M-2/TM, * SL-1, * SRM 1646, * SRM 1941, * SRM 2704, * STSD-1, * STSD-2, * STSD-3, * STSD-4. SOIL: GBW 07401, GBW 07402, GBW 07403, GBW 07404, GBW 07405, GBW 07406, GBW 07407, GBW 07408, GBW 08302, GSS-1, GSS-2, GSS-3, GSS-4, GSS-5, GSS-6, GSS-7, GSS-8, SOIL-7. TISS: * GBW 08571, * SRM 1566a, * SRM 1974.

F. ASH: GBW 08402. INST: CRM 073, CRM 183, GBW 08604, SRM 2143. ROCK: AGV-1, BHVO-1, BIR-1, DNC-1, G-2, * GBW 07249, GSR-1, GSR-2, GSR-3, GSR-4, GSR-5, GSR-6, MGR-1, QLO-1, RGM-1, SARM 1, SARM 3, SCo-1, SDC-1, SDO-1, SGR-1, * SRM 278, * SRM 688, STM-1, SY-2, SY-3, W-2. SED: GBW 07309, GBW 07310, GBW 07311, GBW 07312, * GBW 07313, GSD-10, GSD-11, GSD-12, GSD-9, * LKSD-1, * LKSD-2, * LKSD-3, * LKSD-4, MAG-1, * STSD-1, * STSD-2, * STSD-3, * STSD-4. SOIL: GBW 07401, GBW

07402, GBW 07403, GBW 07404, GBW 07405, GBW 07406, GBW 07407, GBW 07408, GSS-1, GSS-2, GSS-3, GSS-4, GSS-5, GSS-6, GSS-7, GSS-8. TISS: GBW 08572, * SRM 1566a. WAT: SRM 2694.

Fe. ASH: CRM 038, CRM 176, GBW 08401, SRM 1633a, SRM 1648, * SRM 1649, SRM 2689, SRM 2690, SRM 2691. INST: A13-08, GBW 07507, QCS-ICP, QCS-TMAA, SRM 1643c, * SRM 1871, * SRM 1872, * SRM 1873, SRM 3126, SRM 3171, SRM 3174, SRM 610, SRM 611, SRM 612, SRM 613, * SRM 614, * SRM 615, * SRM 616, * SRM 617. OIL: SRM 1634b. ROCK: AGV-1, BCS-CRM 368, BCS-CRM 393, BCS-CRM 395, BHVO-1, BIR-1, DNC-1, G-2, GBW 07249, GSR-1, GSR-2, GSR-3, GSR-4, GSR-5, GSR-6, IPT 28, IPT 32, IPT 35, IPT 42, IPT 44, IPT 48, IPT 61, IPT 62, MGR-1, MGR-1, NOD-A-1, NOD-P-1, QLO-1, RGM-1, * SARM 1, SARM 2, SARM 3, SARM 39, SARM 4, SARM 40, * SARM 41, SARM 43, * SARM 44, SARM 45, * SARM 47, SARM 48, * SARM 49, SARM 5, SARM 50, SARM 6, SCo-1, SDC-1, SDO-1, SGR-1, SRM 120c, SRM 278, SRM 278, SRM 600, SRM 688, SRM 696, SRM 697, SRM 698, SRM 69b, SRM 81a, SRM 88b, SRM 97b, SRM 98b, STM-1, SY-2, SY-3, W-2. SED: BCSS-1, * CRM 277, * CRM 280, * CRM 320, GBW 07309, * GBW 07309, GBW 07310, * GBW 07310, GBW 07311, * GBW 07311, GBW 07312, * GBW 07312, GBW 07313, * GBW 07313, GBW 08301, GSD-10, GSD-11, GSD-12, GSD-9, * HR-1, * LKSD-1, * LKSD-1, * LKSD-3, * LKSD-4, MAG-1, MESS-1, NIES 2, PACS-1, SARM 46, * SARM 51, * SARM 52, SD-M-2/TM, SL-1, SRM 1646, * SRM 1941, SRM 2704, * STSD-1, * STSD-2, * STSD-3, * STSD-4, * SUD-1, * TH-1, * TH-2, * WQB-1, * WQB-2, WQB-3. SLUD: * CRM 144, * CRM 146. SOIL: * CRM 141, GBW 08302, GBW 08303, GSS-1, GSS-2, GSS-3, GSS-4, GSS-5, GSS-6, GSS-7, GSS-8, SARM 42, SO-2, SO-3, SO-4, SRM 2709, SRM 2710, SRM 2711. TISS: CRM 278, * CRM 414, CRM 422, DOLT-1, DORM-1, GBW 08571, GBW 08572, IAEA-350, LUTS-1, MA-A-1/TM, MA-B-3/TM, NIES 9, SRM 1566a, SRM 1577b, SRM 1598, * SRM 1974, TORT-1. WAT: CASS-2, NASS-4, SLEW-1, SLRS-2.

Ga. ASH: * SRM 1633a. INST: GBW 07510, GBW 07712, GBW 07713, GBW 07714, GBW 07715, GBW 07716, GBW 07717, GBW 07718, SRM 3119, * SRM 614, * SRM 615, * SRM 616, * SRM 617. ROCK: AGV-1, BHVO-1, BIR-1, DNC-1, G-2, GBW 07249, GSR-1, GSR-2, GSR-3, GSR-4, GSR-5, GSR-6, QLO-1, RGM-1, SARM 1, SARM 2, * SARM 3, * SARM 39, SARM 4, * SARM 40, * SARM 41, * SARM 44, * SARM 45, * SARM 47, * SARM 5, SCo-1, SDC-1, SDO-1, SGR-1, STM-1, W-2. SED: * CRM 280, * CRM 320, GBW 07309, GBW 07310, GBW 07311, GBW 07312, GBW 07313, GSD-10, GSD-11, GSD-12, GSD-9, MAG-1, * SARM 46, * SARM 51, * SARM 52, * SL-1, * SRM 2704. SOIL: GBW 07401, GBW 07402, GBW 07403, GBW 07404, GBW 07405, GBW 07406, GBW 07407, GBW 07408, GSS-1, GSS-2, GSS-3, GSS-4, GSS-5, GSS-6, GSS-7, GSS-8, * SARM 42.

Gd. INST: SRM 3118, * SRM 612, * SRM 613. ROCK: AGV-1, BHVO-1, BIR-1, DNC-1, G-2, GBW 07249, GSR-1, GSR-2, GSR-3, GSR-4, GSR-5, GSR-6, QLO-1, RGM-1, * SARM 1, SCo-1, SDC-1, SDO-1, SGR-1, * SRM 278, STM-1, W-2. SED: GBW 07309, GBW 07310, GBW 07311, GBW 07312, GBW 07313, GSD-10, GSD-11, GSD-12, GSD-9, MAG-1, * SL-1, * SRM 1941. SOIL: GBW 07401, GBW 07402, GBW 07403, GBW 07404, GBW 07405, GBW 07406, GBW 07407, GBW 07408, GSS-1, GSS-2, GSS-3, GSS-4, GSS-5, GSS-6, GSS-7, GSS-8.

Ge. INST: * SRM 1871, SRM 1872, * SRM 1873, SRM 3120. ROCK: AGV-1, BHVO-1, BIR-1, DNC-1, G-2, GSR-1, GSR-2, GSR-3, GSR-4, GSR-5, GSR-6, QLO-1, RGM-1, SCo-1, SDC-1, SDO-1, SGR-1, STM-1, W-2. SED: GBW 07309, GBW 07310, GBW 07311, GBW 07312, GSD-10, GSD-11, GSD-12, GSD-9, MAG-1, * SL-1, * SRM 1646. SOIL: GBW 07401, GBW 07402, GBW 07403, GBW 07404, GBW 07405, GBW 07406, GBW 07407, GBW 07408, GSS-1, GSS-2, GSS-3, GSS-4, GSS-5, GSS-6, GSS-7, GSS-8.

H. INST: CRM 034, CRM 035, CRM 036, CRM 071, CRM 072, CRM 073, CRM 127, CRM 183, SRM 141c, SRM 143c, SRM 148. ROCK: SDO-1, SGR-1. SED: MAG-1. WAT: SLAP.

Hf. ASH: * SRM 1633a, * SRM 1648, * SRM 1649. INST: SRM 3122, SRM 3174. ROCK: AGV-1, BHVO-1, BIR-1, DNC-1, GSR-1, GSR-2, GSR-3, GSR-4, GSR-5, GSR-6, QLO-1, RGM-1, SCo-1, SDC-1, SDO-1, SGR-1, * SRM 278, * SRM 688, * SRM 88b, * SRM 97b, * SRM 98b, STM-1, W-2. SED: GBW 07309, GBW 07310, GBW 07311, GBW 07312, GSD-10, GSD-11, GSD-12, GSD-9, * LKSD-1, * LKSD-2, * LKSD-3, * LKSD-4, MAG-1, SD-M-2/TM, SL-1, * SRM 1941, * SRM 2704, * STSD-1, * STSD-2, * STSD-3, * STSD-4. SOIL: GBW 07401, GBW 07402, GBW 07403, GBW 07404, GBW 07405, GBW 07406, GBW 07407, GBW 07408, * GBW 08302, GSS-1, GSS-2, GSS-3, GSS-4, GSS-5, GSS-6, GSS-7, GSS-8, SOIL-7. TISS: * GBW 08571, * SRM 1566a, * SRM 1974.

Hg. ASH: CRM 038, CRM 176, * GBW 08401, SRM 1633a, SRS203-225. INST: CRM 036, GBW 07503, GBW 08603, GBW 08609, QCS-TMAA, QCS-TMWS, SRM 1641b, SRM 3133. OIL: * SRM 1634b. ROCK: AGV-1, BHVO-1, BIR-1, DNC-1, G-2, * GSR-1, GSR-2, * GSR-3, * GSR-4, GSR-5, GSR-6, QLO-1, RGM-1, SCo-1, SDC-1, SDO-1, SGR-1, STM-1, W-2. SED: BEST-1, CRM 277, CRM 280, CRM 320, GBW 07309, GBW 07310, GBW 07311, GBW 07312, GBW 08301, GSD-10, GSD-11, GSD-12, GSD-9, * HR-1, MAG-1, * NIES 2, PACS-1, SD-M-2/TM, * SL-1, SRM 1646, SRM 2704, * SUD-1, * TH-2, WQB-1, WQB-2, WQB-3. SLUD: CRM 144, CRM 146. SOIL: CRM 141, GBW 07401, GBW 07402, GBW 07403, GBW 07404, GBW 07405, GBW 07406, GBW 07407, GBW 07408, * GBW 08302, GBW 08303, GSS-1, GSS-2, GSS-3, GSS-4, GSS-5, GSS-6, GSS-7, GSS-8, SO-2, SO-3, SO-4, SRM 2709, SRM 2710, SRM 2711, SRS003-50. TISS: CRM 278, CRM 414, CRM 422, DOLT-1, DORM-1, GBW 08571, GBW 08572, IAEA-350, LUTS-1, MA-A-1/TM, MA-B-3/TM, * NIES 9, SRM 1566a, * SRM 1577b, * SRM 1598, * SRM 1974, TORT-1. WAT: ORMS-1.

Ho. INST: SRM 3123. ROCK: AGV-1, BHVO-1, BIR-1, DNC-1, G-2, GBW 07249, GSR-1, GSR-2, GSR-3, GSR-4, GSR-5, GSR-6, QLO-1, RGM-1, SCo-1, SDC-1, SDO-1, SGR-1, STM-1, W-2. SED: GBW 07309, GBW 07310, GBW 07311, GBW 07312, GBW 07313, GSD-10, GSD-11, GSD-12, GSD-9, MAG-1, * SL-1. SOIL: GBW 07401, GBW 07402, GBW 07403, GBW 07404, GBW 07405, GBW 07406, GBW 07407, GBW 07408, GSS-1, GSS-2, GSS-3, GSS-4, GSS-5, GSS-6, GSS-7, GSS-8.

I. INST: CRM 072. ROCK: AGV-1, G-2. SED: * GBW 07309, GBW 07310, GBW 07311, GBW 07312, GSD-10, GSD-11, GSD-12, * GSD-9, MAG-1, * SL-1, * SRM 2704. SOIL: GBW 07401, GBW 07402, * GBW 07403, GBW 07404, GBW 07405, GBW 07406, GBW 07407, GBW 07408, GSS-1, GSS-2, * GSS-3, GSS-4, GSS-5, GSS-6, GSS-7, GSS-8. TISS: CRM 414, CRM 422, * NIES 9, SRM 1566a.

In. ASH: * SRM 1648. INST: GBW 07512, GBW 07513, GBW 07514, SRM 3124. ROCK: AGV-1, BHVO-1, G-2, * GSR-1, * GSR-2, * GSR-3, * GSR-4, GSR-5, * GSR-6, QLO-1, RGM-1, SCo-1, SDC-1, SDO-1, SGR-1, STM-1. SED: GBW 07309, GBW 07310, GBW 07311, GBW 07312, GSD-10, GSD-11, GSD-12, GSD-9, MAG-1, * SL-1. SOIL: GBW 07401, GBW 07402, GBW 07403, GBW 07404, GBW 07405, GBW 07406, GBW 07407, * GBW 07408, GSS-1, GSS-2, GSS-3, GSS-4, GSS-5, GSS-6, GSS-7, * GSS-8.

Ir. ROCK: BHVO-1, BIR-1, DNC-1, QLO-1, RGM-1, SCo-1, SDC-1, SGR-1, STM-1. SED: MAG-1, * SL-1.

K. ASH: * CRM 176, NIES 8, SRM 1633a, SRM 1648, SRM 2689, SRM 2690, SRM 2691. INST: QCS-ICP, QCS-TMAA, * SRM 1643c, SRM 3141, SRM 3171, * SRM 610, * SRM 611, * SRM 612, * SRM 613, SRM 614, SRM 615, SRM 616, SRM 617. ROCK: AGV-1, BCS-CRM 393, BHVO-1, BIR-1, DNC-1, G-2, GBW 07249, GSR-1, GSR-2, GSR-3, GSR-4, GSR-5, GSR-6, IPT 28, IPT 32, IPT 35, IPT 42, IPT 44, IPT 48, * IPT 61, * IPT 62, MGR-1, NOD-A-1, NOD-P-1, QLO-1, RGM-1, SARM 1, SARM 2, SARM 3, SARM 39, SARM 4, * SARM 40, SARM 41, * SARM 43, SARM 44, SARM 45, * SARM 47, SARM 48, * SARM 49, SARM 5, SARM 50, * SARM 6, SCo-1, SDC-1, SDO-1, SGR-1, SRM 120c, SRM 278, SRM 600, SRM 688, SRM 696, SRM 697, SRM 698, SRM 69b, SRM 88b, SRM 97b, SRM 98b, STM-1, SY-2, SY-3, W-2. SED: BCSS-1, * CRM 277, * CRM 280, * CRM 320, GBW 07309, GBW 07310, GBW

07311, GBW 07312, GBW 07313, GSD-10, GSD-11, GSD-12, GSD-9, * LKSD-1, * LKSD-2, * LKSD-3, * LKSD-4, MAG-1, MESS-1, NIES 2, PACS-1, SARM 46, SARM 51, SARM 52, SD-M-2/TM, * SL-1, * SRM 1646, * SRM 1941, SRM 2704, * STSD-1, * STSD-2, * STSD-3, * STSD-4. SLUD: * CRM 144, * CRM 146. SOIL: * CRM 141, GBW 07401, GBW 07402, GBW 07403, GBW 07404, GBW 07405, GBW 07406, GBW 07407, GBW 07408, GBW 08303, GSS-1, GSS-2, GSS-3, GSS-4, GSS-5, GSS-6, GSS-7, GSS-8, SARM 42, SO-2, SO-3, SO-4, SRM 2709, SRM 2710, SRM 2711. TISS: * CRM 278, * CRM 414, * CRM 422, DOLT-1, DORM-1, GBW 08571, GBW 08572, LUTS-1, MA-B-3/TM, NIES 9, SRM 1566a, SRM 1577b, SRM 1598, * SRM 1974, TORT-1. WAT: SLRS-2, SRM 2694.

La. ASH: * NIES 8, * SRM 1648, * SRM 1649. INST: GBW 07701, GBW 07702, GBW 07703, GBW 07704, GBW 07705, GBW 07706, GBW 07707, GBW 07712, GBW 07713, GBW 07714, GBW 07715, GBW 07716, GBW 07717, GBW 07718, SRM 3127, * SRM 612, * SRM 613, * SRM 614, * SRM 615, * SRM 616, * SRM 617. ROCK: AGV-1, BHVO-1, BIR-1, DNC-1, G-2, GBW 07249, GSR-1, GSR-2, GSR-3, GSR-4, GSR-5, GSR-6, QLO-1, RGM-1, SARM 1, * SARM 2, * SARM 3, * SARM 4, * SARM 5, * SARM 6, SCo-1, SDC-1, SDO-1, SGR-1, STM-1, W-2. SED: * CRM 277, * CRM 280, * CRM 320, GBW 07309, GBW 07310, GBW 07311, GBW 07312, GBW 07313, GSD-10, GSD-11, GSD-12, GSD-9, * LKSD-1, * LKSD-2, * LKSD-3, * LKSD-4, MAG-1, * NIES 2, SD-M-2/TM, SL-1, * SRM 1941, * SRM 2704, * STSD-1, * STSD-2, * STSD-3, * STSD-4. SOIL: GBW 07401, GBW 07402, GBW 07403, GBW 07404, GBW 07405, GBW 07406, GBW 07407, GBW 07408, GBW 08302, * GBW 08303, GSS-1, GSS-2, GSS-3, GSS-4, GSS-5, GSS-6, GSS-7, GSS-8, SOIL-7. TISS: * GBW 08571, * SRM 1566a, * SRM 1974. INST: GBW 07701, GBW 07702, GBW 07703, GBW 07704, GBW 07705, GBW 07706, GBW 07707, GBW 07708, GBW 07709, GBW 07712, GBW 07713, GBW 07714, GBW 07715, GBW 07716, GBW 07717, GBW 07718, GBW 07719, SRM 1643c, SRM 3129. ROCK: AGV-1, BHVO-1, BIR-1, DNC-1, G-2, GBW 07249, GSR-1, GSR-2, GSR-3, GSR-4, GSR-5, GSR-6, QLO-1, RGM-1, * SARM 1, * SARM 3, SCo-1, SDC-1, SDO-1, SGR-1, SRM 97b, SRM 98b, STM-1, W-2. SED: GBW 07309, GBW 07310, GBW 07311, GBW 07312, GBW 07313, GSD-10, GSD-11, GSD-12, GSD-9, * LKSD-1, * LKSD-2, * LKSD-3, * LKSD-4, MAG-1, * SL-1, * SRM 1646, SRM 2704, * STSD-1, * STSD-2, * STSD-3, * STSD-4. SOIL: GBW 07401, GBW 07402, GBW 07403, GBW 07404, GBW 07405, GBW 07406, GBW 07407, GBW 07408, GSS-1, GSS-2, GSS-3, GSS-4, GSS-5, GSS-6, GSS-7, GSS-8. TISS: * GBW 08571.

Lu. ASH: * NIES 8. INST: SRM 3130. ROCK: AGV-1, BHVO-1, BIR-1, DNC-1, G-2, GBW 07249, GSR-1, GSR-2, GSR-3, GSR-4, GSR-5, GSR-6, QLO-1, RGM-1, * SARM 1, * SARM 3, * SARM 4, SCo-1, SDC-1, SDO-1, SGR-1, * SRM 278, * SRM 688, STM-1, W-2. SED: GBW 07309, GBW 07310, GBW 07311, GBW 07312, GBW 07313, GSD-10, GSD-11, GSD-12, GSD-9, * LKSD-1, * LKSD-2, * LKSD-3, * LKSD-4, MAG-1, SD-M-2/TM, * SL-1, * SRM 2704, * STSD-1, * STSD-2, * STSD-3, * STSD-4. SOIL: GBW 07401, GBW 07402, GBW 07403, GBW 07404, GBW 07405, GBW 07406, GBW 07407, GBW 07408, * GBW 08302, GSS-1, GSS-2, GSS-3, GSS-4, GSS-5, GSS-6, GSS-7, GSS-8.

Mg. ASH: * CRM 176, NIES 8, SRM 1633a, * SRM 1648, SRM 2689, SRM 2690, SRM 2691, SRS019-50. INST: A13-10, QCS-ICP, QCS-TMAA, * SRM 1871, * SRM 1872, * SRM 1873, SRM 3131, SRM 3171. ROCK: AGV-1, BCS-CRM 368, BCS-CRM 393, BCS-CRM 395, BHVO-1, BIR-1, DNC-1, G-2, GBW 07249, GSR-1, GSR-2, GSR-3, GSR-4, GSR-5, GSR-6, IPT 28, IPT 32, IPT 35, IPT 42, IPT 44, IPT 48, * IPT 61, * IPT 62, MGR-1, NOD-A-1, NOD-P-1, QLO-1, RGM-1, * SARM 1, SARM 2, SARM 3, SARM 39, SARM 4, SARM 40, SARM 41, SARM 43, * SARM 44, SARM 45, SARM 47, SARM 48, * SARM 49, SARM 5, SARM 50, SARM 6, SCo-1, SDC-1, SDO-1, SGR-1, * SRM 278, SRM 600, * SRM 688, SRM 696, SRM 697, SRM 698, SRM 69b, SRM 88b, SRM 97b, SRM 98b, STM-1, SY-2, SY-3, W-2. SED: BCSS-1, * CRM 277, * CRM 280, * CRM 320, GBW 07309, GBW

07310, GBW 07311, GBW 07312, GBW 07313, GSD-10, GSD-11, GSD-12, GSD-9, * LKSD-1, * LKSD-2, * LKSD-3, * LKSD-4, MAG-1, MESS-1, PACS-1, SARM 46, SARM 51, SARM 52, * SL-1, SRM 1646, SRM 2704, * STSD-1, * STSD-2, * STSD-3, * STSD-4. SLUD: * CRM 144, * CRM 146. SOIL: * CRM 141, GBW 07401, GBW 07402, GBW 07403, GBW 07404, GBW 07405, GBW 07406, GBW 07407, GBW 07408, GBW 08302, GBW 08303, GSS-1, GSS-2, GSS-3, GSS-4, GSS-5, GSS-6, GSS-7, GSS-8, SARM 42, SO-2, SO-3, SO-4, SRM 2709, SRM 2710, SRM 2711. TISS: * CRM 278, * CRM 422, DOLT-1, DORM-1, GBW 08571, GBW 08572, LUTS-1, MA-B-3/TM, NIES 9, SRM 1566a, SRM 1577b, SRM 1598, * SRM 1974, TORT-1. WAT: SLRS-2, SRM 2694.

Mn. ASH: CRM 038, * CRM 176, GBW 08401, SRM 1633a, * SRM 1648, * SRM 2689, * SRM 2690, * SRM 2691. INST: A13-11, GBW 07507, GBW 07701, GBW 07702, GBW 07703, GBW 07704, GBW 07705, GBW 07706, GBW 07707, GBW 07708, GBW 07709, GBW 07712, GBW 07713, GBW 07714, GBW 07715, GBW 07716, GBW 07717, GBW 07718, GBW 07719, GBW 07720, QCS-ICP, QCS-TMAA, SRM 1643c, SRM 3132, SRM 3171, SRM 610, SRM 611, SRM 612, SRM 613. OIL: SRM 1634b. ROCK: AGV-1, BCS-CRM 368, BCS-CRM 368, BCS-CRM 393, BCS-CRM 395, BHVO-1, BIR-1, DNC-1, G-2, GBW 07249, GSR-1, GSR-2, GSR-3, GSR-4, GSR-5, GSR-6, IPT 35, IPT 44, IPT 48, MGR-1, NOD-A-1, NOD-P-1, QLO-1, RGM-1, SARM 1, SARM 2, SARM 3, SARM 3, SARM 39, SARM 4, SARM 4, SARM 40, SARM 41, * SARM 43, SARM 44, SARM 45, SARM 47, SARM 48, * SARM 49, SARM 5, SARM 5, SARM 50, SARM 6, SARM 6, SCo-1, SDC-1, SDO-1, SGR-1, SRM 120c, SRM 278, SRM 600, SRM 688, SRM 696, SRM 697, SRM 698, SRM 69b, SRM 88b, SRM 97b, SRM 98b, STM-1, SY-2, SY-3, W-2. SED: BCSS-1, * CRM 277, * CRM 280, * CRM 320, GBW 07309, GBW 07310, GBW 07311, GBW 07312, GBW 07313, GBW 08301, GSD-10, GSD-11, GSD-12, GSD-9, * HR-1, * LKSD-1, * LKSD-2, * LKSD-3, * LKSD-4, MAG-1, MESS-1, * NIES 2, PACS-1, SD-M-2/TM, SL-1, SRM 1646, * SRM 1941, SRM 2704, * STSD-1, * STSD-2, * STSD-3, * STSD-4, * SUD-1, * TH-1, * TH-2, * WQB-1, * WQB-2, WQB-3. SLUD: CRM 144, CRM 146. SOIL: * CRM 141, GBW 07401, GBW 07402, GBW 07403, GBW 07404, GBW 07405, GBW 07406, GBW 07407, GBW 07408, GBW 08302, GBW 08303, GSS-1, GSS-2, GSS-3, GSS-4, GSS-5, GSS-6, GSS-7, GSS-8, SARM 42, SO-2, SO-3, SO-4, SOIL-7, SRM 2709, SRM 2710, SRM 2711. TISS: CRM 278, CRM 414, CRM 422, DOLT-1, DORM-1, GBW 08571, GBW 08572, IAEA-350, LUTS-1, MA-A-1/TM, MA-B-3/TM, NIES 9, SRM 1566a, SRM 1577b, SRM 1598, * SRM 1974, TORT-1. WAT: CASS-2, NASS-4, SLEW-1, SLRS-2.

Mo. ASH: * NIES 8, * SRM 1633a, * SRM 1649. INST: GBW 07701, GBW 07702, GBW 07703, GBW 07704, GBW 07705, GBW 07706, GBW 07707, GBW 07708, GBW 07709, GBW 07710, GBW 07711, GBW 07712, GBW 07713, GBW 07714, GBW 07715, GBW 07716, GBW 07717, GBW 07718, GBW 07719, GBW 07720, QCS-ICP, QCS-TMAA, SRM 1643c, SRM 3134. ROCK: AGV-1, BHVO-1, BIR-1, DNC-1, G-2, GBW 07249, GSR-1, GSR-2, GSR-3, GSR-4, GSR-5, GSR-6, NOD-A-1, NOD-P-1, QLO-1, RGM-1, * SARM 39, * SARM 40, * SARM 41, * SARM 44, * SARM 48, SCo-1, SDC-1, SDO-1, SGR-1, * SRM 120c, STM-1, W-2. SED: * CRM 277, * CRM 280, * CRM 320, GBW 07309, GBW 07310, GBW 07311, GBW 07312, GBW 07313, GSD-10, GSD-11, GSD-12, GSD-9, * LKSD-1, * LKSD-2, * LKSD-3, * LKSD-4, MAG-1, PACS-1, * SARM 46, * SL-1, * SRM 1646, * STSD-1, * STSD-2, * STSD-3, * STSD-4. SOIL: GBW 07401, GBW 07402, GBW 07403, GBW 07404, GBW 07405, GBW 07406, GBW 07407, GBW 07408, * GBW 08303, GSS-1, GSS-2, GSS-3, GSS-4, GSS-5, GSS-6, GSS-7, GSS-8, * SARM 42. TISS: * CRM 414, * GBW 08571, SRM 1577b, SRM 1598, * SRM 1974, TORT-1. WAT: CASS-2, CRM 403, NASS-4, SLRS-2.

N. INST: CRM 035, CRM 036, CRM 071, CRM 072, CRM 073, CRM 127, SRM 141c, SRM 143c, SRM 148, SRM 2141. OIL: SRS950, SRS951, SRS952, SRS953, SRS954. ROCK: BHVO-1, G-2, SDO-1. SED: MAG-1. SOIL: GBW 07401, GBW 07402, GBW 07403, GBW 07404, GBW 07405, GBW

07406, GBW 07407, GBW 07408, GBW 08302. TISS: GBW 08572, * SRM 1566a, * SRM 1577b.

Na. ASH: CRM 038, * CRM 176, NIES 8, SRM 1633a, SRM 1648, SRM 2689, SRM 2690, SRM 2691. INST: QCS-ICP, QCS-TMAA, SRM 3152, SRM 3171. OIL: * SRM 1634b. ROCK: AGV-1, BHVO-1, BIR-1, DNC-1, G-2, GBW 07249, GSR-1, GSR-2, GSR-3, GSR-4, GSR-5, IPT 28, IPT 32, IPT 35, IPT 42, IPT 44, IPT 48, * IPT 61, * IPT 62, MGR-1, NOD-A-1, NOD-P-1, QLO-1, RGM-1, SARM 1, SARM 2, SARM 3, * SARM 39, SARM 4, * SARM 40, SARM 41, * SARM 43, * SARM 44, SARM 45, * SARM 47, SARM 48, * SARM 49, SARM 5, SARM 50, * SARM 6, SCo-1, SDC-1, SDO-1, SGR-1, SRM 120c, SRM 278, SRM 600, SRM 688, SRM 88b, SRM 97b, SRM 98b, STM-1, SY-2, SY-3, W-2. SED: BCSS-1, * CRM 277, * CRM 280, * CRM 320, GBW 07309, * GBW 07310, GBW 07311, GBW 07312, GBW 07313, * GSD-10, GSD-11, GSD-12, GSD-9, * LKSD-1, * LKSD-2, * LKSD-3, * LKSD-4, MAG-1, MESS-1, NIES 2, PACS-1, SARM 46, SARM 51, SARM 52, * SARM 52, SD-M-2/TM, SL-1, * SRM 1646, * SRM 1941, SRM 2704, * STSD-1, * STSD-2, * STSD-3, * STSD-4. SLUD: * CRM 144, * CRM 146. SOIL: * CRM 141, GBW 07401, GBW 07402, GBW 07403, GBW 07404, GBW 07405, GBW 07406, GBW 07407, GBW 07408, GBW 08302, GBW 08303, GSS-1, GSS-2, GSS-3, GSS-4, GSS-5, GSS-6, GSS-7, GSS-8, * SARM 42, SO-2, SO-3, SO-4, SRM 2709, SRM 2710, SRM 2711. TISS: * CRM 278, * CRM 422, DOLT-1, DORM-1, GBW 08571, GBW 08572, MA-B-3/TM, NIES 9, SRM 1566a, SRM 1577b, * SRM 1598, * SRM 1974, TORT-1. WAT: SLRS-2, SRM 2694.

Nb. INST: GBW 07507, GBW 07701, GBW 07702, GBW 07703, GBW 07704, GBW 07705, GBW 07706, GBW 07707, GBW 07708, GBW 07712, GBW 07713, GBW 07714, GBW 07715, GBW 07716, GBW 07717, GBW 07718, SRM 3137. ROCK: AGV-1, BHVO-1, BIR-1, DNC-1, G-2, * GBW 07249, GSR-1, GSR-2, GSR-3, GSR-4, GSR-5, GSR-6, QLO-1, RGM-1, SARM 1, SARM 3, SARM 3, SARM 39, * SARM 40, SARM 41, SARM 44, SARM 45, SARM 48, * SARM 50, SCo-1, SDC-1, SDO-1, SGR-1, STM-1, W-2. SED: GBW 07309, GBW 07310, GBW 07311, GBW 07312, * GBW 07313, GSD-10, GSD-11, GSD-12, GSD-9, * LKSD-1, * LKSD-2, * LKSD-3, * LKSD-4, MAG-1, * SARM 46, * SARM 51, SARM 52, * SL-1, * STSD-1, * STSD-2, * STSD-3, * STSD-4. SOIL: GBW 07401, GBW 07402, GBW 07403, GBW 07404, GBW 07405, GBW 07406, GBW 07407, GBW 07408, GSS-1, GSS-2, GSS-3, GSS-4, GSS-5, GSS-6, GSS-7, GSS-8, * SARM 42. INST: SRM 3135. ROCK: AGV-1, BHVO-1, BIR-1, DNC-1, G-2, GBW 07249, GSR-1, GSR-2, GSR-3, GSR-4, GSR-5, GSR-6, QLO-1, RGM-1, SARM 1, * SARM 2, SARM 3, * SARM 4, SCo-1, SDC-1, SDO-1, SGR-1, STM-1, W-2. SED: GBW 07309, GBW 07310, GBW 07311, GBW 07312, GBW 07313, GSD-10, GSD-11, GSD-12, GSD-9, * LKSD-1, * LKSD-2, * LKSD-3, * LKSD-4, MAG-1, SD-M-2/TM, SL-1, * STSD-1, * STSD-2, * STSD-3, * STSD-4. SOIL: GBW 07401, GBW 07402, GBW 07403, GBW 07404, GBW 07405, GBW 07406, GBW 07407, GBW 07408, GSS-1, GSS-2, GSS-3, GSS-4, GSS-5, GSS-6, GSS-7, GSS-8, SOIL-7.

Ni. ASH: * CRM 038, CRM 176, NIES 8, SRM 1633a, SRM 1648, SRS001-100, SRS019-50. INST: A13-12, GBW 07701, GBW 07702, GBW 07703, GBW 07704, GBW 07705, GBW 07706, GBW 07707, GBW 07708, GBW 07712, GBW 07713, GBW 07714, GBW 07715, GBW 07716, GBW 07717, GBW 07718, GBW 07719, GBW 08607, GBW 08608, QCS-ICP, QCS-TMAA, SRM 1643c, * SRM 1871, * SRM 1872, * SRM 1873, SRM 3136, SRM 3171, SRM 610, SRM 611, SRM 612, SRM 613, * SRM 614, * SRM 615. OIL: SRM 1618, SRM 1634b, SRS950, SRS951, SRS952, SRS953, SRS954. ROCK: AGV-1, BCS-CRM 368, BCS-CRM 395, BHVO-1, BIR-1, DNC-1, G-2, GBW 07249, GSR-1, GSR-2, GSR-3, GSR-4, GSR-5, GSR-6, NOD-A-1, NOD-P-1, QLO-1, RGM-1, * SARM 1, * SARM 2, SARM 39, SARM 4, * SARM 40, SARM 41, SARM 43, * SARM 44, SARM 45, SARM 47, SARM 5, * SARM 50, SARM 6, SARM 6, SCo-1, SDC-1, SDO-1, SGR-1, * SRM 120c, SRM 278, * SRM 688, STM-1, W-2. SED: BCSS-1, CRM 277, CRM 280, CRM 320, GBW 07309, GBW 07310, GBW 07311, GBW 07312, GBW 07313, * GBW

08301, GSD-10, GSD-11, GSD-12, GSD-9, * HR-1, * LKSD-1, * LKSD-2, * LKSD-3, * LKSD-4, MAG-1, MESS-1, NIES 2, PACS-1, * SARM 46, SARM 51, SARM 52, SD-M-2/TM, SL-1, SRM 1646, SRM 2704, * STSD-1, * STSD-2, * STSD-3, * STSD-4, * SUD-1, * TH-1, * TH-2, * WQB-1, * WQB-2, WQB-3. SLUD: CRM 144, CRM 146, * CRM 141, GBW 07401, GBW 07402, GBW 07403, GBW 07404, GBW 07405, GBW 07406, GBW 07407, GBW 07408, GBW 08302, GBW 08303, GSS-1, GSS-2, GSS-3, GSS-4, GSS-5, GSS-6, GSS-7, GSS-8, SARM 42, SO-2, SO-3, SO-4, SRM 2709, SRM 2710, SRM 2711. TISS: * CRM 278, DOLT-1, DORM-1, GBW 08571, * IAEA-350, LUTS-1, MA-A-1/TM, SRM 1566a, * SRM 1598, * SRM 1974, TORT-1. WAT: CASS-2, CRM 403, NASS-4, SLEW-1, SLRS-2.

O. INST: CRM 034, CRM 036, CRM 071, CRM 072, * SRM 1871, * SRM 1872, * SRM 1873. ROCK: AGV-1, G-2, QLO-1, RGM-1, SCo-1. SED: MAG-1. WAT: SLAP.

Os. ROCK: AGV-1, BHVO-1, G-2, QLO-1, RGM-1, SCo-1, SDC-1, SGR-1, STM-1. SED: MAG-1.

P. ASH: * CRM 176, * NIES 8, SRM 2689, SRM 2690, SRM 2691. INST: CRM 183, GBW 07513, * SRM 1871, * SRM 1872, * SRM 1873, SRM 3139. ROCK: AGV-1, BHVO-1, BIR-1, DNC-1, G-2, GBW 07249, GSR-1, GSR-2, GSR-3, GSR-4, GSR-5, GSR-6, IPT 28, IPT 32, IPT 35, IPT 42, IPT 44, IPT 48, MGR-1, NOD-A-1, NOD-P-1, QLO-1, RGM-1, SARM 2, SARM 2, SARM 3, SARM 39, * SARM 4, SARM 40, SARM 41, * SARM 43, SARM 44, SARM 45, * SARM 47, * SARM 48, SARM 5, SARM 50, * SARM 6, SCo-1, SDC-1, SDO-1, SGR-1, SRM 278, SRM 600, SRM 688, SRM 696, SRM 697, SRM 698, SRM 69b, SRM 88b, * SRM 97b, * SRM 98b, STM-1, SY-2, SY-3, W-2. SED: BCSS-1, * CRM 277, * CRM 280, * CRM 320, GBW 07309, GBW 07310, GBW 07311, GBW 07312, GBW 07313, GSD-10, GSD-11, GSD-12, GSD-9, * LKSD-1, * LKSD-2, * LKSD-3, * LKSD-4, MAG-1, MESS-1, * NIES 2, PACS-1, SARM 46, SARM 51, SARM 52, * SL-1, SRM 1646, SRM 2704, * STSD-1, * STSD-2, * STSD-3, * STSD-4. SLUD: * CRM 144, * CRM 146. SOIL: * CRM 141, GBW 07401, GBW 07402, GBW 07403, GBW 07404, GBW 07405, GBW 07406, GBW 07407, GBW 07408, GBW 08302, GBW 08303, GSS-1, GSS-2, GSS-3, GSS-4, GSS-5, GSS-6, GSS-7, GSS-8, * SARM 42, SO-2, SO-3, SO-4, SRM 2709, SRM 2710, SRM 2711. TISS: * CRM 278, * GBW 08571, GBW 08572, MA-B-3/TM, * NIES 9, SRM 1566a, SRM 1577b, TORT-1.

Pb. ASH: CRM 038, CRM 176, GBW 08401, NIES 8, SRM 1633a, SRM 1648, SRS019-50, SRS203-225. INST: A13-09, CRM 035, GBW 07501, GBW 07505, GBW 07701, GBW 07702, GBW 07703, GBW 07704, GBW 07705, GBW 07706, GBW 07707, GBW 07708, GBW 07709, GBW 07710, GBW 07711, GBW 07712, GBW 07713, GBW 07714, GBW 07715, GBW 07716, GBW 07717, GBW 07718, GBW 07719, GBW 07720, GBW 08601, GBW 08607, GBW 08608, QCS-ICP, QCS-TMAA, QCS-TMWS, SRM 1643c, SRM 1871, SRM 1872, * SRM 1873, SRM 3128, SRM 3172, SRM 3174, SRM 610, SRM 611, SRM 612, SRM 613, SRM 614, SRM 615, SRM 616, SRM 617. OIL: * SRM 1634b. ROCK: AGV-1, BCS-CRM 368, BCS-CRM 395, BHVO-1, BIR-1, DNC-1, G-2, GBW 07249, GSR-1, GSR-2, GSR-3, GSR-4, GSR-5, GSR-6, NOD-A-1, NOD-P-1, QLO-1, RGM-1, SARM 1, * SARM 2, SARM 3, * SARM 39, * SARM 40, * SARM 41, * SARM 44, * SARM 45, * SARM 47, SARM 48, * SARM 50, SCo-1, SDC-1, SDO-1, SGR-1, * SRM 120c, SRM 278, SRM 688, STM-1, W-2. SED: BCSS-1, CRM 277, CRM 280, CRM 320, GBW 07309, GBW 07310, GBW 07311, GBW 07312, GBW 07313, GBW 08301, GSD-10, GSD-11, GSD-12, GSD-9, * HR-1, * LKSD-1, * LKSD-2, * LKSD-3, * LKSD-4, MAG-1, MESS-1, NIES 2, PACS-1, * SARM 46, SARM 51, SARM 52, SD-M-2/TM, SL-1, SRM 1646, SRM 2704, * STSD-1, * STSD-2, * STSD-3, * STSD-4, * SUD-1, * TH-1, * TH-2, * WQB-1, * WQB-2, * WQB-3. SLUD: CRM 144, CRM 146. SOIL: CRM 141, GBW 07401, GBW 07402, GBW 07403, GBW 07404, GBW 07405, GBW 07406, GBW 07407, GBW 07408, GBW 08302, GBW 08303, GSS-1, GSS-2, GSS-3, GSS-4, GSS-5, GSS-6, GSS-7, GSS-8, * SARM 42, SO-2, SO-3, SO-4, SOIL-7, SRM 2709, SRM 2710, SRM 2711. TISS: CRM

278, CRM 414, CRM 422, DOLT-1, DORM-1, GBW 08571, GBW 08572, * IAEA-350, LUTS-1, * MA-A-1/TM, MA-B-3/TM, NIES 9, SRM 1566a, SRM 1577b, * SRM 1598, * SRM 1974, SRM 955a, TORT-1. WAT: CASS-2, CRM 403, NASS-4, SLEW-1, SLRS-2.

Pd. INST: SRM 3138. ROCK: BHVO-1, BIR-1, DNC-1, NOD-A-1, NOD-P-1, QLO-1, RGM-1, SCo-1, SDC-1, SGR-1, STM-1, W-2. SED: MAG-1.

Pr. INST: SRM 3142. ROCK: AGV-1, BHVO-1, BIR-1, DNC-1, G-2, GBW 07249, GSR-1, GSR-2, GSR-3, GSR-4, GSR-5, GSR-6, QLO-1, RGM-1, SCo-1, SDC-1, SDO-1, SGR-1, STM-1, W-2. SED: GBW 07309, GBW 07310, GBW 07311, GBW 07312, GBW 07313, GSD-10, GSD-11, GSD-12, GSD-9, MAG-1. SOIL: GBW 07401, GBW 07402, GBW 07403, GBW 07404, GBW 07405, GBW 07406, GBW 07407, GBW 07408, GSS-1, GSS-2, GSS-3, GSS-4, GSS-5, GSS-6, GSS-7, GSS-8.

Pt. INST: SRM 3140. ROCK: BHVO-1, BIR-1, DNC-1, G-2, NOD-A-1, NOD-P-1, QLO-1, RGM-1, SCo-1, SDC-1, SGR-1, STM-1. SED: MAG-1, * SL-1.

Ra. ROCK: G-2.

Rb. ASH: * NIES 8, SRM 1633a, * SRM 1648, * SRM 1649. INST: SRM 1643c, SRM 3145, SRM 610, SRM 611, SRM 612, SRM 613, SRM 614, SRM 615, * SRM 616, * SRM 617. ROCK: AGV-1, BHVO-1, BIR-1, DNC-1, G-2, GBW 07249, GSR-1, GSR-2, GSR-3, GSR-4, GSR-4, GSR-5, GSR-6, QLO-1, RGM-1, SARM 1, SARM 2, SARM 3, SARM 39, * SARM 40, SARM 41, SARM 44, SARM 45, SARM 48, SARM 50, SCo-1, SDC-1, SDO-1, SGR-1, SRM 278, SRM 688, * SRM 97b, * SRM 98b, STM-1, W-2. SED: GBW 07309, GBW 07310, GBW 07311, GBW 07312, GBW 07313, GSD-10, GSD-11, GSD-12, GSD-9, * LKSD-1, * LKSD-2, * LKSD-3, * LKSD-4, MAG-1, * NIES 2, * SARM 46, SARM 51, SARM 52, SD-M-2/TM, SL-1, * SRM 1646, * SRM 1941, * SRM 2704, * STSD-1, * STSD-2, * STSD-3, * STSD-4. SOIL: GBW 07401, GBW 07402, GBW 07403, GBW 07404, GBW 07405, GBW 07406, GBW 07407, GBW 07408, GBW 08302, * GBW 08303, GSS-1, GSS-2, GSS-3, GSS-4, GSS-5, GSS-6, GSS-7, GSS-8, SARM 42, SO-2, SO-3, SO-4, SOIL-7. TISS: * CRM 278, * GBW 08571, IAEA-350, MA-B-3/TM, NIES 9, * SRM 1566a, SRM 1577b, SRM 1598, * SRM 1974.

Re. INST: SRM 3143. ROCK: AGV-1, BHVO-1, G-2, QLO-1, RGM-1, SCo-1, SDC-1, SGR-1, STM-1. SED: MAG-1.

Rh. INST: SRM 3144. ROCK: AGV-1, BHVO-1, BIR-1, DNC-1, G-2, QLO-1, RGM-1, SCo-1, SDC-1, SGR-1, STM-1. SED: MAG-1.

Ru. ROCK: AGV-1, BHVO-1, G-2, NOD-A-1, NOD-P-1, QLO-1, RGM-1, SCo-1, SDC-1, SGR-1, STM-1. SED: MAG-1, * SL-1.

S. ASH: * CRM 176, * SRM 1633a, * SRM 1648, * SRM 1649, SRM 2689, SRM 2690, SRM 2691. INST: CRM 071, CRM 072, CRM 183, GBW 07501, GBW 07502, GBW 07503, GBW 07504, SRM 143c, SRM 3154. OIL: SRM 1634b, SRS950, SRS951, SRS952, SRS953, SRS954. ROCK: BCS-CRM 393, BHVO-1, DNC-1, GBW 07249, * GSR-1, * GSR-2, GSR-3, GSR-4, GSR-5, GSR-6, MGR-1, QLO-1, RGM-1, * SARM 3, * SARM 39, * SARM 40, * SARM 41, * SARM 43, * SARM 44, * SARM 45, * SARM 47, * SARM 50, SCo-1, SDC-1, SDO-1, SGR-1, * SRM 120c, SRM 600, SRM 696, SRM 697, SRM 698, SRM 69b, STM-1, SY-2, SY-3, W-2. SED: BCSS-1, GBW 07309, GBW 07310, GBW 07311, GBW 07312, GBW 07313, GSD-10, GSD-11, GSD-12, GSD-9, * LKSD-1, * LKSD-2, * LKSD-3, * LKSD-4, MAG-1, MESS-1, PACS-1, * SARM 46, * SARM 51, * SARM 52, * SL-1, * SRM 1646, * SRM 1941, SRM 2704, * STSD-1, * STSD-2, * STSD-3, * STSD-4. SOIL: GBW 07401, GBW 07402, GBW 07403, GBW 07404, GBW 07405, GBW 07406, GBW 07407, GBW 07408, GSS-1, GSS-2, GSS-3, GSS-4, GSS-5, GSS-6, GSS-7, GSS-8, * SARM 42, SRM 2709, SRM 2710, SRM 2711. TISS: * CRM 422, * GBW 08572, * NIES 9, SRM 1566a, SRM 1577b, TORT-1.

Sb. ASH: CRM 176, NIES 8, SRM 1633a, * SRM 1648, * SRM 1649. INST: GBW 07512, GBW 07701, GBW 07702, GBW 07703, GBW 07704, GBW 07705, GBW 07706, GBW 07707, GBW 07708, GBW 07709, GBW 07710, GBW 07711, GBW 07712, GBW 07713, GBW 07714, GBW 07715, GBW 07716, GBW 07717, GBW 07718, GBW 07719, GBW 07720, QCS-ICP, QCS-TMAA, SRM 3102, * SRM 614, * SRM 615, * SRM 616, * SRM 617.

ROCK: AGV-1, BHVO-1, BIR-1, DNC-1, G-2, GBW 07249, GSR-1, GSR-2, GSR-3, GSR-4, GSR-5, GSR-6, QLO-1, RGM-1, SCo-1, SDC-1, SDO-1, SGR-1, * SRM 278, * SRM 97b, * SRM 98b, STM-1, W-2. SED: BCSS-1, * CRM 277, * CRM 280, * CRM 320, GBW 07309, GBW 07310, GBW 07311, GBW 07312, GBW 07313, GSD-10, GSD-11, GSD-12, GSD-9, * LKSD-1, * LKSD-2, * LKSD-3, * LKSD-4, MAG-1, MESS-1, * NIES 2, PACS-1, SD-M-2/TM, SL-1, * SRM 1646, * SRM 1941, SRM 2704, * STSD-1, * STSD-2, * STSD-3, * STSD-4. SOIL: GBW 07401, GBW 07402, GBW 07403, GBW 07404, GBW 07405, GBW 07406, GBW 07407, GBW 07408, * GBW 08302, GSS-1, GSS-2, GSS-3, GSS-4, GSS-5, GSS-6, GSS-7, GSS-8, SOIL-7, SRM 2709, SRM 2710, SRM 2711. TISS: * GBW 08571, * IAEA-350, * MA-A-1/TM, * NIES 9, * SRM 1566a, * SRM 1577b, * SRM 1974. WAT: SLRS-2.

Sc. ASH: * NIES 8, * SRM 1633a, * SRM 1648, * SRM 1649. INST: SRM 3148, * SRM 614, * SRM 615. ROCK: AGV-1, BHVO-1, BIR-1, DNC-1, G-2, GBW 07249, GSR-1, GSR-2, GSR-3, GSR-4, GSR-5, GSR-6, QLO-1, RGM-1, SCo-1, SDC-1, SDO-1, SGR-1, * SRM 278, * SRM 688, * SRM 88b, * SRM 97b, * SRM 98b, STM-1, W-2. SED: CRM 277, CRM 280, CRM 320, GBW 07309, GBW 07310, GBW 07311, GBW 07312, GBW 07313, GSD-10, GSD-11, GSD-12, GSD-9, * LKSD-1, * LKSD-2, * LKSD-3, * LKSD-4, MAG-1, * NIES 2, SD-M-2/TM, SL-1, * SRM 1646, * SRM 1941, * SRM 2704, * STSD-1, * STSD-2, * STSD-3, * STSD-4. SOIL: GBW 07401, GBW 07402, GBW 07403, GBW 07404, GBW 07405, GBW 07406, GBW 07407, GBW 07408, GBW 08302, * GBW 08303, GSS-1, GSS-2, GSS-3, GSS-4, GSS-5, GSS-6, GSS-7, GSS-8, SOIL-7. TISS: * CRM 414, * GBW 08571, * NIES 9, * SRM 1566a, * SRM 1974.

Se. ASH: CRM 176, GBW 08401, * NIES 8, SRM 1633a, SRM 1648, * SRM 1649, SRS019-50, SRS203-225. INST: GBW 07509, GBW 07511, QCS-ICP, QCS-TMAA, QCS-TMWS, SRM 1643c, SRM 3149, SRM 3172. OIL: SRM 1634b. ROCK: BHVO-1, BIR-1, DNC-1, * GSR-1, * GSR-2, * GSR-3, * GSR-4, * GSR-5, GSR-6, QLO-1, RGM-1, SCo-1, SDC-1, SDO-1, SGR-1, STM-1, W-2. SED: BCSS-1, CRM 277, CRM 280, CRM 320, GBW 07309, GBW 07310, GBW 07311, GBW 07312, GBW 08301, GSD-10, GSD-11, GSD-12, GSD-9, * HR-1, MAG-1, MESS-1, PACS-1, * SL-1, * SRM 1646, * SRM 1941, SRM 2704, * SUD-1, * TH-1, * TH-2, WQB-1, WQB-2, WQB-3. SLUD: * CRM 144, * CRM 146. SOIL: * CRM 141, GBW 07401, GBW 07402, GBW 07403, GBW 07404, GBW 07405, GBW 07406, GBW 07407, GBW 07408, GBW 08302, * GBW 08303, GSS-1, GSS-2, GSS-3, GSS-4, GSS-5, GSS-6, GSS-7, GSS-8, SRM 2709, SRM 2711. TISS: CRM 278, CRM 414, CRM 422, DOLT-1, DORM-1, GBW 08571, GBW 08572, IAEA-350, LUTS-1, MA-A-1/TM, MA-B-3/TM, * NIES 9, SRM 1566a, SRM 1577b, SRM 1598, * SRM 1974, TORT-1. WAT: * NASS-4.

Si. ASH: * CRM 176, SRM 1633a, SRM 2689, SRM 2690, SRM 2691. INST: QCS-ICP, SRM 1871, * SRM 1872, SRM 1873, SRM 3150. ROCK: AGV-1, BCS-CRM 368, BCS-CRM 393, BCS-CRM 395, BHVO-1, BIR-1, DNC-1, G-2, GBW 07249, GSR-1, GSR-2, GSR-3, GSR-4, GSR-5, GSR-6, IPT 28, IPT 32, IPT 35, IPT 42, IPT 44, IPT 48, IPT 61, IPT 62, MGR-1, NOD-A-1, NOD-P-1, QLO-1, RGM-1, SARM 1, SARM 3, SARM 39, SARM 40, SARM 41, SARM 43, SARM 44, SARM 45, SARM 47, SARM 48, SARM 49, SARM 50, SCo-1, SDC-1, SDO-1, SGR-1, SRM 278, SRM 600, SRM 688, SRM 696, SRM 697, SRM 698, SRM 69b, SRM 88b, SRM 97b, SRM 98b, STM-1, SY-2, SY-3, W-2. SED: BCSS-1, * CRM 277, * CRM 280, * CRM 320, GBW 07309, GBW 07310, GBW 07311, GBW 07312, GBW 07313, GSD-10, GSD-11, GSD-12, GSD-9, * LKSD-1, * LKSD-2, * LKSD-3, * LKSD-4, MAG-1, MESS-1, * NIES 2, PACS-1, SARM 46, SARM 51, SARM 52, * SRM 1646, * SRM 1941, SRM 2704, * STSD-1, * STSD-2, * STSD-3, * STSD-4. SLUD: * CRM 144, * CRM 146. SOIL: * CRM 141, GBW 07401, GBW 07402, GBW 07403, GBW 07404, GBW 07405, GBW 07406, GBW 07407, GBW 07408, GBW 08302, * GBW 08303, GSS-1, GSS-2, GSS-3, GSS-4, GSS-5, GSS-6, GSS-7, GSS-8, SARM 42, SO-2, SO-3, SO-4, SRM 2709, SRM 2710, SRM 2711.

Sm. ASH: * NIES 8, * SRM 1648, * SRM 1649. INST: SRM 3147, * SRM 612, * SRM 613. ROCK: AGV-1, BHVO-1, BIR-1, DNC-1, G-2, GBW 07249, GSR-1, GSR-2, GSR-3, GSR-4, GSR-5, GSR-6, QLO-1, RGM-1, SARM 1, * SARM 2, * SARM 3, * SARM 4, SCo-1, SDC-1, SDO-1, SGR-1, * SRM 278, * SRM 688, STM-1, W-2. SED: GBW 07309, GBW 07310, GBW 07311, GBW 07312, GBW 07313, GSD-10, GSD-11, GSD-12, GSD-9, * LKSD-1, * LKSD-2, * LKSD-3, * LKSD-4, MAG-1, SD-M-2/TM, SL-1, * SRM 1941, * SRM 2704, * STSD-1, * STSD-2, * STSD-3, * STSD-4. SOIL: GBW 07401, GBW 07402, GBW 07403, GBW 07404, GBW 07405, GBW 07406, GBW 07407, GBW 07408, GBW 08302, GSS-1, GSS-2, GSS-3, GSS-4, GSS-5, GSS-6, GSS-7, GSS-8, SOIL-7. TISS: * GBW 08571, * SRM 1566a, * SRM 1974.

Sn. ASH: * SRM 1649. INST: CRM 034, GBW 07701, GBW 07702, GBW 07703, GBW 07704, GBW 07705, GBW 07706, GBW 07707, GBW 07708, GBW 07709, GBW 07710, GBW 07711, GBW 07712, GBW 07713, GBW 07714, GBW 07715, GBW 07716, GBW 07717, GBW 07718, GBW 07719, GBW 07720, SRM 3161. ROCK: AGV-1, BHVO-1, BIR-1, G-2, GSR-1, GSR-2, GSR-3, GSR-4, GSR-5, * GSR-6, QLO-1, RGM-1, SCo-1, SDC-1, SDO-1, SGR-1, STM-1. SED: BCSS-1, * CRM 280, * CRM 320, GBW 07309, GBW 07310, GBW 07311, GBW 07312, GSD-10, GSD-11, GSD-12, GSD-9, * LKSD-1, * LKSD-2, * LKSD-3, * LKSD-4, MAG-1, MESS-1, PACS-1, PACS-1, PACS-1, PACS-1, * SL-1, * SRM 2704, * STSD-1, * STSD-2, * STSD-3, * STSD-4. SOIL: GBW 07401, GBW 07402, GBW 07403, GBW 07404, GBW 07405, GBW 07406, GBW 07407, GBW 07408, GSS-1, GSS-2, GSS-3, GSS-4, GSS-5, GSS-6, GSS-7, GSS-8. TISS: NIES 11, * SRM 1566a, TORT-1.

Sr. ASH: NIES 8, SRM 1633a, * SRM 2689, * SRM 2690, * SRM 2691. INST: GBW 07701, GBW 07702, GBW 07703, GBW 07704, GBW 07705, GBW 07706, GBW 07707, GBW 07708, GBW 07709, GBW 07710, GBW 07711, GBW 07712, GBW 07713, GBW 07714, GBW 07715, GBW 07716, GBW 07717, GBW 07718, GBW 07719, SRM 1643c, SRM 3153, SRM 3172, SRM 610, SRM 611, SRM 612, SRM 613, SRM 614, SRM 615, SRM 616, SRM 617. ROCK: AGV-1, BCS-CRM 368, BCS-CRM 393, BCS-CRM 395, BHVO-1, BIR-1, DNC-1, G-2, GBW 07249, GSR-1, GSR-2, GSR-3, GSR-4, GSR-5, GSR-6, IPT 35, IPT 44, IPT 48, NOD-A-1, NOD-P-1, QLO-1, RGM-1, SARM 1, SARM 2, SARM 3, SARM 3, * SARM 39, SARM 4, * SARM 40, SARM 41, SARM 43, SARM 44, SARM 45, * SARM 47, SARM 48, * SARM 49, SARM 5, SARM 50, * SARM 6, SCo-1, SDC-1, SDO-1, SGR-1, * SRM 120c, SRM 278, SRM 688, SRM 88b, SRM 97b, SRM 98b, STM-1, W-2. SED: GBW 07309, GBW 07310, GBW 07311, GBW 07312, GBW 07313, GSD-10, GSD-11, GSD-12, GSD-9, * LKSD-1, * LKSD-2, * LKSD-3, * LKSD-4, MAG-1, * NIES 2, PACS-1, SARM 46, SARM 51, SARM 52, SD-M-2/TM, * SL-1, * SRM 2704, * STSD-1, * STSD-2, * STSD-3, * STSD-4. SOIL: GBW 07401, GBW 07402, GBW 07403, GBW 07404, GBW 07405, GBW 07406, GBW 07407, GBW 07408, GBW 08302, GBW 08303, GSS-1, GSS-2, GSS-3, GSS-4, GSS-5, GSS-6, GSS-7, GSS-8, SARM 42, SO-2, SO-3, SO-4, SOIL-7, SRM 2709, SRM 2711. TISS: * CRM 278, * CRM 414, * CRM 422, GBW 08571, GBW 08572, LUTS-1, MA-B-3/TM, NIES 9, SRM 1566a, SRM 1577b, * SRM 1974, TORT-1. WAT: SLRS-2.

Ta. INST: GBW 07507, * SRM 1871, * SRM 1872, * SRM 1873, SRM 3155. ROCK: AGV-1, BHVO-1, BIR-1, DNC-1, G-2, GSR-1, * GSR-2, GSR-3, * GSR-4, GSR-5, * GSR-6, QLO-1, RGM-1, SCo-1, SDC-1, SDO-1, SGR-1, * SRM 278, STM-1, W-2. SED: GBW 07309, * GBW 07310, GBW 07311, GBW 07312, * GSD-10, GSD-11, GSD-12, GSD-9, * LKSD-1, * LKSD-2, * LKSD-3, * LKSD-4, MAG-1, * SL-1, * SRM 1941, * STSD-1, * STSD-2, * STSD-3, * STSD-4. SOIL: GBW 07401, * GBW 07402, * GBW 07403, GBW 07404, GBW 07405, GBW 07406, GBW 07407, GBW 07408, * GBW 08302, GSS-1, * GSS-2, * GSS-3, GSS-4, GSS-5, GSS-6, GSS-7, GSS-8, SOIL-7. TISS: * SRM 1566a, * SRM 1974.

Tb. INST: SRM 3157. ROCK: AGV-1, BHVO-1, BIR-1, DNC-1, G-2, GBW 07249, GSR-1, GSR-2, GSR-3, GSR-4, GSR-5, GSR-6,

QLO-1, RGM-1, SARM 1, * SARM 3, SCo-1, SDC-1, SDO-1, SGR-1, * SRM 278, * SRM 688, STM-1, W-2. SED: GBW 07309, GBW 07310, GBW 07311, GBW 07312, GBW 07313, GSD-10, GSD-11, GSD-12, GSD-9, * LKSD-1, * LKSD-2, * LKSD-3, * LKSD-4, MAG-1, SD-M-2/TM, * SL-1, * SRM 1941, * STSD-1, * STSD-2, * STSD-3, * STSD-4. SOIL: GBW 07401, GBW 07402, GBW 07403, GBW 07404, GBW 07405, GBW 07406, GBW 07407, GBW 07408, * GBW 08302, GSS-1, GSS-2, GSS-3, GSS-4, GSS-5, GSS-6, GSS-7, GSS-8, SOIL-7. TISS: * SRM 1566a.

Te. INST: GBW 07508, * SRM 1643c, SRM 3156. ROCK: AGV-1, BHVO-1, BIR-1, DNC-1, G-2, GSR-1, GSR-2, * GSR-3, GSR-4, * GSR-5, * GSR-6, QLO-1, RGM-1, SCo-1, SDC-1, SGR-1, STM-1, W-2. SED: * GBW 07309, * GBW 07310, * GBW 07311, GBW 07312, * GSD-10, * GSD-11, GSD-12, * GSD-12, * GSD-9, MAG-1, * SL-1, * SRM 1646. SOIL: * GBW 07401, * GBW 07402, GBW 07403, * GBW 07404, * GBW 07405, * GBW 07406, GBW 07408, * GSS-1, * GSS-2, GSS-3, * GSS-4, * GSS-5, * GSS-6, GSS-8.

Th. ASH: * CRM 038, * NIES 8, SRM 1633a, * SRM 1648, * SRM 1649. INST: * SRM 1871, * SRM 1872, * SRM 1873, SRM 3159, SRM 610, SRM 611, SRM 612, SRM 613, SRM 614, SRM 615, SRM 616, SRM 617. ROCK: AGV-1, BHVO-1, BIR-1, DNC-1, G-2, GBW 07249, GSR-1, GSR-2, GSR-3, GSR-4, GSR-5, GSR-6, QLO-1, RGM-1, SARM 1, SARM 2, SARM 3, * SARM 39, * SARM 40, * SARM 41, SARM 44, * SARM 45, SARM 48, * SARM 50, SCo-1, SDC-1, SGR-1, SRM 278, SRM 688, * SRM 88b, * SRM 97b, * SRM 98b, STM-1, W-2. SED: * CRM 277, * CRM 280, * CRM 320, GBW 07309, GBW 07310, GBW 07311, GBW 07312, GBW 07313, GSD-10, GSD-11, GSD-12, GSD-9, IAEA-313, IAEA-314, * LKSD-1, * LKSD-2, * LKSD-3, * LKSD-4, MAG-1, * SARM 46, * SARM 51, * SARM 52, SD-M-2/TM, SL-1, * SRM 1646, * SRM 1941, * SRM 2704, * STSD-1, * STSD-2, * STSD-3, * STSD-4. SOIL: GBW 07401, GBW 07402, GBW 07403, GBW 07404, GBW 07405, GBW 07406, GBW 07407, GBW 07408, GBW 08302, GBW 08303, GSS-1, GSS-2, GSS-3, GSS-4, GSS-5, GSS-6, GSS-7, GSS-8, IAEA-312, * SARM 42, SOIL-7, SRM 2709, SRM 2710, SRM 2711. TISS: * GBW 08571, * SRM 1566a, * SRM 1974.

Ti. ASH: * CRM 176, * SRM 1633a, * SRM 1648, SRM 2689, SRM 2690, SRM 2691. INST: GBW 07701, GBW 07702, GBW 07703, GBW 07704, GBW 07705, GBW 07706, GBW 07707, GBW 07708, GBW 07709, GBW 07710, GBW 07712, GBW 07713, GBW 07714, GBW 07715, GBW 07716, GBW 07717, GBW 07718, GBW 07719, QCS-ICP, * SRM 1871, * SRM 1872, * SRM 1873, SRM 3162, SRM 3174, * SRM 610, * SRM 611, * SRM 612, * SRM 613, * SRM 614, * SRM 615, * SRM 616, * SRM 617. ROCK: AGV-1, BCS-CRM 368, BCS-CRM 393, BCS-CRM 395, BHVO-1, BIR-1, DNC-1, G-2, GBW 07249, GSR-1, GSR-2, GSR-3, GSR-4, GSR-5, GSR-6, IPT 28, IPT 32, IPT 35, IPT 42, IPT 44, IPT 48, IPT 61, IPT 62, MGR-1, NOD-A-1, NOD-P-1, QLO-1, RGM-1, SARM 1, SARM 2, SARM 3, SARM 3, SARM 39, SARM 4, SARM 4, SARM 40, SARM 41, * SARM 43, SARM 44, SARM 45, * SARM 47, SARM 48, * SARM 49, SARM 5, SARM 5, SARM 50, SARM 6, SCo-1, SDC-1, SDO-1, SDO-1, SGR-1, SRM 120c, SRM 278, SRM 600, SRM 688, SRM 696, SRM 697, SRM 698, SRM 69b, SRM 81a, * SRM 88b, SRM 97b, SRM 98b, STM-1, SY-2, SY-3, W-2. SED: BCSS-1, * CRM 277, * CRM 280, * CRM 320, GBW 07309, GBW 07310, GBW 07311, GBW 07312, GBW 07313, GSD-10, GSD-11, GSD-12, GSD-9, * LKSD-1, * LKSD-1, * LKSD-2, * LKSD-2, * LKSD-3, * LKSD-3, * LKSD-4, * LKSD-4, MAG-1, MESS-1, * NIES 2, PACS-1, SARM 46, SARM 51, SARM 52, SL-1, * SRM 1646, * SRM 1941, SRM 2704, * STSD-1, * STSD-1, * STSD-2, * STSD-2, * STSD-3, * STSD-3, * STSD-4, * STSD-4. SLUD: * CRM 144, * CRM 146. SOIL: * CRM 141, GBW 07401, GBW 07402, GBW 07403, GBW 07404, GBW 07405, GBW 07406, GBW 07407, GBW 07408, GBW 08302, GBW 08303, GSS-1, GSS-2, GSS-3, GSS-4, GSS-5, GSS-6, GSS-7, GSS-8, SARM 42, SO-2, SO-3, SO-4, SRM 2709, SRM 2710, SRM 2711. TISS: * CRM 278, * GBW 08571, * GBW 08572, * NIES 9.

Tl. ASH: CRM 176, SRM 1633a. INST: QCS-ICP, QCS-TMAA, * SRM 1643c, SRM

3158, * SRM 610, * SRM 611, * SRM 612, * SRM 613, * SRM 614, * SRM 615, * SRM 616, * SRM 617. ROCK: AGV-1, BHVO-1, BIR-1, DNC-1, G-2, GBW 07249, GSR-1, * GSR-2, * GSR-3, GSR-4, GSR-5, * GSR-6, QLO-1, RGM-1, SCo-1, SDC-1, SGR-1, SRM 278, STM-1, W-2. SED: * CRM 280, * CRM 320, GBW 07309, GBW 07310, GBW 07311, GBW 07312, GSD-10, GSD-11, GSD-12, GSD-9, MAG-1, * SRM 1646, SRM 2704. SOIL: GBW 07401, GBW 07402, * GBW 07403, GBW 07404, GBW 07405, GBW 07406, * GBW 07407, GBW 07408, GSS-1, GSS-2, * GSS-3, GSS-4, GSS-5, GSS-6, * GSS-7, GSS-8, SRM 2709, SRM 2710, SRM 2711. TISS: * SRM 1598.

Tm. INST: SRM 3160, AGV-1, BHVO-1, BIR-1, DNC-1, G-2, GBW 07249, GSR-1, * GSR-2, GSR-3, GSR-4, GSR-5, GSR-6, QLO-1, RGM-1, * SARM 1, SCo-1, SDC-1, SDO-1, SGR-1, STM-1, W-2. SED: GBW 07309, GBW 07310, GBW 07311, GBW 07312, GBW 07313, GSD-10, GSD-11, GSD-12, GSD-9, MAG-1, * SL-1. SOIL: GBW 07401, GBW 07402, GBW 07403, GBW 07404, GBW 07405, GBW 07406, GBW 07407, GBW 07408, GSS-1, GSS-2, GSS-3, GSS-4, GSS-5, GSS-6, GSS-7, GSS-8.

U. ASH: SRM 1633a, SRM 1648, * SRM 1649. INST: * SRM 1871, * SRM 1872, * SRM 1873, SRM 3164, SRM 610, SRM 611, SRM 612, SRM 613, SRM 614, SRM 615, SRM 616, SRM 617. ROCK: AGV-1, BHVO-1, BIR-1, DNC-1, G-2, GBW 07249, GSR-1, GSR-2, GSR-3, GSR-4, GSR-5, GSR-6, QLO-1, RGM-1, * SARM 1, SARM 3, SCo-1, SDC-1, SDO-1, SGR-1, SRM 120c, SRM 278, * SRM 688, STM-1, W-2. SED: * CRM 277, * CRM 280, * CRM 320, GBW 07309, GBW 07310, GBW 07311, GBW 07312, GBW 07313, GSD-10, GSD-11, GSD-12, GSD-9, IAEA-313, IAEA-314, * LKSD-1, * LKSD-2, * LKSD-3, * LKSD-4, MAG-1, SD-M-2/TM, SL-1, * SRM 1941, SRM 2704, * STSD-1, * STSD-2, * STSD-3, * STSD-4. SOIL: GBW 07401, GBW 07402, GBW 07403, GBW 07404, GBW 07405, GBW 07406, GBW 07407, GBW 07408, GBW 08302, * GBW 08303, GSS-1, GSS-2, GSS-3, GSS-4, GSS-5, GSS-6, GSS-7, GSS-8, IAEA-312, SOIL-7. TISS: * NIES 9, SRM 1566a. WAT: NASS-4, SLRS-2.

V. ASH: * CRM 038, * CRM 176, GBW 08401, NIES 8, SRM 1633a, SRM 1648, SRS019-50. INST: A13-16, GBW 07701, GBW 07702, GBW 07703, GBW 07704, GBW 07705, GBW 07706, GBW 07707, GBW 07708, GBW 07709, GBW 07712, GBW 07713, GBW 07714, GBW 07715, GBW 07716, GBW 07717, GBW 07718, GBW 07719, QCS-ICP, QCS-TMAA, SRM 1643c, SRM 3165. OIL: RM 8505, SRM 1618, SRM 1634b, SRS950, SRS951, SRS952, SRS953, SRS954. ROCK: AGV-1, BHVO-1, BIR-1, DNC-1, G-2, GBW 07249, GSR-1, GSR-2, GSR-3, GSR-4, GSR-5, GSR-6, NOD-A-1, NOD-P-1, QLO-1, RGM-1, * SARM 1, SARM 2, SARM 3, SARM 39, SARM 4, SARM 40, SARM 41, SARM 44, SARM 45, * SARM 47, * SARM 48, SARM 5, SARM 50, SARM 6, SCo-1, SDC-1, SDO-1, SGR-1, SRM 120c, SRM 600, * SRM 688, SRM 696, SRM 697, SRM 698, SRM 69b, STM-1, W-2. SED: BCSS-1, * CRM 277, * CRM 280, * CRM 320, GBW 07309, GBW 07310, GBW 07311, GBW 07312, GBW 07313, * GBW 08301, GSD-10, GSD-11, GSD-12, GSD-9, * HR-1, * LKSD-1, * LKSD-2, * LKSD-3, * LKSD-4, MAG-1, MESS-1, * NIES 2, PACS-1, SARM 46, SARM 51, SARM 52, SD-M-2/TM, SL-1, SRM 1646, * SRM 1941, SRM 2704, * STSD-1, * STSD-2, * STSD-3, * STSD-4, * SUD-1, * TH-1, * TH-2, * WQB-1, * WQB-2, * WQB-3. SOIL: GBW 07401, GBW 07402, GBW 07403, GBW 07404, GBW 07405, GBW 07406, GBW 07407, GBW 07408, GBW 08302, GSS-1, GSS-2, GSS-3, GSS-4, GSS-5, GSS-6, GSS-7, GSS-8, SARM 42, SO-2, SO-2, SO-3, SO-4, SOIL-7, SRM 2709, SRM 2710, SRM 2711. TISS: NIES 9, SRM 1566a, * SRM 1577b, * SRM 1598, * SRM 1974, TORT-1. WAT: * CRM 403, SLRS-2.

W. ASH: * SRM 1648, * SRM 1649. INST: GBW 07506, GBW 07701, GBW 07702, GBW 07703, GBW 07704, GBW 07705, GBW 07706, GBW 07707, GBW 07708, GBW 07709, GBW 07710, GBW 07712, GBW 07713, GBW 07714, GBW 07715, GBW 07716, GBW 07717, GBW 07718, GBW 07719, GBW 07720, SRM 3163. ROCK: AGV-1, BHVO-1, BIR-1, DNC-1, G-

2, GBW 07249, GSR-1, * GSR-2, * GSR-3, GSR-4, GSR-5, GSR-6, QLO-1, RGM-1, SCo-1, SDC-1, SDO-1, SGR-1, STM-1, W-2. SED: GBW 07309, GBW 07310, GBW 07311, GBW 07312, GBW 07313, GSD-10, GSD-11, GSD-12, GSD-9, * LKSD-1, * LKSD-2, * LKSD-3, * LKSD-4, MAG-1, * SL-1, * STSD-1, * STSD-2, * STSD-3, * STSD-4. SOIL: GBW 07401, GBW 07402, GBW 07403, GBW 07404, GBW 07405, GBW 07406, GBW 07407, GBW 07408, GSS-1, GSS-2, GSS-3, GSS-4, GSS-5, GSS-6, GSS-7, GSS-8. INST: GBW 07701, GBW 07702, GBW 07703, GBW 07704, GBW 07705, GBW 07706, GBW 07707, GBW 07712, GBW 07713, GBW 07714, GBW 07715, GBW 07716, GBW 07717, GBW 07718, SRM 3167. ROCK: AGV-1, BHVO-1, BIR-1, DNC-1, G-2, GBW 07249, GSR-1, GSR-2, GSR-3, GSR-4, GSR-5, GSR-6, QLO-1, RGM-1, SARM 1, SARM 3, SARM 39, * SARM 4, SARM 40, SARM 41, SARM 44, SARM 45, * SARM 47, SARM 48, * SARM 5, SARM 50, SCo-1, SDC-1, SDO-1, SGR-1, STM-1, W-2. SED: GBW 07309, GBW 07310, GBW 07311, GBW 07312, GBW 07313, GSD-10, GSD-11, GSD-12, GSD-9, * LKSD-1, * LKSD-2, * LKSD-3, * LKSD-4, MAG-1, * SARM 46, SARM 51, SARM 52, * SL-1, * STSD-1, * STSD-2, * STSD-3, * STSD-4. SOIL: GBW 07401, GBW 07402, GBW 07403, GBW 07404, GBW 07405, GBW 07406, GBW 07407, GBW 07408, GSS-1, GSS-2, GSS-3, GSS-4, GSS-5, GSS-6, GSS-7, GSS-8, SARM 42, SOIL-7.

Yb. INST: GBW 07701, GBW 07702, GBW 07703, GBW 07704, GBW 07705, GBW 07706, GBW 07707, GBW 07708, GBW 07709, GBW 07712, GBW 07713, GBW 07714, GBW 07715, GBW 07716, GBW 07717, GBW 07718, GBW 07719, GBW 07720, SRM 3166, * SRM 612, * SRM 613. ROCK: AGV-1, BHVO-1, BIR-1, DNC-1, G-2, GBW 07249, GSR-1, GSR-2, GSR-3, GSR-4, GSR-5, GSR-6, QLO-1, RGM-1, SARM 1, * SARM 2, * SARM 3, * SARM 4, * SARM 5, SCo-1, SDC-1, SDO-1, SGR-1, * SRM 278, * SRM 688, STM-1, W-2. SED: GBW 07309, GBW 07310, GBW 07311, GBW 07312, GBW 07313, GSD-10, GSD-11, GSD-12, GSD-9, * LKSD-1, * LKSD-2, * LKSD-3, * LKSD-4, MAG-1, SD-M-2/TM, SL-1, * SRM 2704, * STSD-1, * STSD-2, * STSD-3, * STSD-4. SOIL: GBW 07401, GBW 07402, GBW 07403, GBW 07404, GBW 07405, GBW 07406, GBW 07407, GBW 07408, GBW 08302, GSS-1, GSS-2, GSS-3, GSS-4, GSS-5, GSS-6, GSS-7, GSS-8, SOIL-7.

Zn. INST: A13-14. ASH: CRM 038, CRM 176, GBW 08401, NIES 8, SRM 1633a, SRM 1648, * SRM 1649, SRS019-50. INST: GBW 07502, GBW 07511, GBW 07701, GBW 07702, GBW 07703, GBW 07704, GBW 07705, GBW 07706, GBW 07707, GBW 07708, GBW 07709, GBW 07710, GBW 07711, GBW 07712, GBW 07713, GBW 07714, GBW 07715, GBW 07716, GBW 07717, GBW 07718, GBW 07719, GBW 07720, GBW 08607, GBW 08608, QCS-ICP, QCS-TMAA, SRM 1643c, SRM 1873, SRM 3168, SRM 3172, * SRM 610, * SRM 611. OIL: SRM 1634b. ROCK: AGV-1, BCS-CRM 368, BCS-CRM 395, BHVO-1, BIR-1, DNC-1, G-2, GBW 07249, GSR-1, GSR-2, GSR-3, GSR-4, GSR-5, GSR-6, NOD-A-1, NOD-P-1, QLO-1, RGM-1, SARM 1, * SARM 2, SARM 3, SARM 39, SARM 4, SARM 40, SARM 41, * SARM 43, SARM 44, SARM 45, SARM 47, SARM 48, SARM 5, SARM 50, SARM 6, SCo-1, SDC-1, SDO-1, SGR-1, * SRM 120c, * SRM 278, SRM 600, * SRM 688, SRM 696, SRM 697, SRM 698, SRM 69b, * SRM 97b, * SRM 98b, STM-1, W-2. SED: BCSS-1, CRM 277, CRM 280, CRM 320, GBW 07309, GBW 07310, GBW 07311, GBW 07312, GBW 07313, * GBW 08301, GSD-10, GSD-11, GSD-12, GSD-9, * HR-1, * LKSD-1, * LKSD-2, * LKSD-3, * LKSD-4, MAG-1, MESS-1, NIES 2, PACS-1, SARM 46, SARM 51, SARM 52, SD-M-2/TM, SL-1, SRM 1646, * SRM 1941, SRM 2704, * STSD-1, * STSD-2, * STSD-3, * STSD-4, * SUD-1, * TH-1, * TH-2, * WQB-1, * WQB-2, WQB-3. SLUD: CRM 144, CRM 146. SOIL: CRM 141, GBW 07401, GBW 07402, GBW 07403, GBW 07404, GBW 07405, GBW 07406, GBW 07407, GBW 07408, GBW 08302, GBW 08303, GSS-1, GSS-2, GSS-3, GSS-4, GSS-5, GSS-6, GSS-7, GSS-8, SARM 42, SO-2, SO-3, SO-4, SOIL-7, SRM 2709, SRM 2710, SRM 2711. TISS: CRM 278, CRM 414, CRM 422, DOLT-1, DORM-1, GBW 08571, GBW 08572, IAEA-350, LUTS-1, MA-A-1/TM, MA-B-3/TM, NIES 9, SRM 1566a, SRM

1577b, SRM 1598, * SRM 1974, TORT-1. WAT: CASS-2, CRM 403, NASS-4, SLEW-1, SLRS-2.

Zr. INST: GBW 07701, GBW 07702, GBW 07703, GBW 07704, GBW 07705, GBW 07706, GBW 07707, GBW 07708, GBW 07709, GBW 07712, GBW 07713, GBW 07714, GBW 07715, GBW 07716, GBW 07717, GBW 07718, GBW 07719, * SRM 1871, * SRM 1872, * SRM 1873, SRM 3169, SRM 3174. ROCK: AGV-1, BHVO-1, BIR-1, DNC-1, G-2, GBW 07249, GSR-1, GSR-2, GSR-3, GSR-4, GSR-5, GSR-6, IPT 61, IPT 62, QLO-1, RGM-1, SARM 1, * SARM 2, SARM 3, SARM 3, SARM 39, * SARM 4, SARM 40, SARM 41, SARM 44, SARM 45, SARM 48, SARM 50, SCo-1, SDC-1, SDO-1, SGR-1, SRM 600, SRM 696, SRM 697, SRM 698, SRM 69b, SRM 81a, * SRM 97b, * SRM 98b, STM-1, W-2. SED: GBW 07309, GBW 07310, GBW 07311, GBW 07312, GBW 07313, GSD-10, GSD-11, GSD-12, GSD-9, * LKSD-1, * LKSD-2, * LKSD-3, * LKSD-4, MAG-1, SARM 46, SARM 51, SARM 52, SD-M-2/TM, * SL-1, * SRM 2704, * STSD-1, * STSD-2, * STSD-3, * STSD-4. SOIL: GBW 07401, GBW 07402, GBW 07403, GBW 07404, GBW 07405, GBW 07406, GBW 07407, GBW 07408, GSS-1, GSS-2, GSS-3, GSS-4, GSS-5, GSS-6, GSS-7, GSS-8, SARM 42, SOIL-7.

Index of Isotopes with Associated Reference Materials

INST: Instrumental performance; ROCK: Rocks and minerals; SED: Sediments; SOIL: Soils; TISS: Tissues; WAT: Waters.
* - Information value only.

Ac-228. SOIL: SRM 4353.
Ag-110m. TISS: IAEA-307, IAEA-308.
Am-241. INST: SRM 4322. SED: * IAEA-367, * IAEA-368, SRM 4350B, SRM 4354. SOIL: SRM 4353, SRM 4355. TISS: IAEA-307, IAEA-308.
Am-243. INST: SRM 4332C.
Ba-133. INST: SRM 4251B.
Be-9+10. INST: SRM 4325.
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Cm-243. INST: SRM 4329.
Cm-244. INST: SRM 4320.
Co-60. INST: SRM 4915D. SED: IAEA-367, IAEA-368, SRM 4350B, SRM 4354.
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Cs-134. TISS: IAEA-308, MA-B-3/RN.
Cs-137. INST: SRM 4233C. SED: IAEA-367, * IAEA-368, SD-N-2, SL-2, SRM 4350B, SRM 4354. SOIL: SOIL-6, SRM 4353, SRM 4355. TISS: IAEA-307, IAEA-308, IAEA-352. WAT: IAEA-298.
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Eu-154. INST: SRM 4276C. SED: SRM 4350B.
Eu-155. INST: SRM 4276C. SED. * IAEA-367, IAEA-368.
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Ga-67. INST: SRM 4416LM.
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H-3. INST: SRM 4361B, SRM 4926D, SRM 4927D, SRM 4947C.
I-125. INST: SRM 4407LP.
I-129. INST: SRM 4949B.
I-131. INST: SRM 4401LR.
I-29I. INST: SRM 4949B.
In-111. INST: SRM 4417LK.
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Mo-99/Tc-99m. INST: SRM 4412LQ.
Ni-63. INST: SRM 4226B.
O-18. WAT: SLAP, VSMOW.
P-32. INST: SRM 4406LL.
Pb-210. SED: IAEA-368. TISS. * IAEA-307, IAEA-308, IAEA-352, IAEA-352.
Po-208. INST: SRM 4327.
Pu-238. INST: SRM 4323. SED. * IAEA-367, IAEA-368, SRM 4350B, SRM 4354. SOIL: SRM 4353. TISS: IAEA-307, IAEA-308.
Pu-239. SOIL: SOIL-6.
Pu-239+240. SED: IAEA-367, IAEA-368, SRM 4350B, SRM 4354. SOIL: SRM 4353, SRM 4355. TISS: IAEA-307, IAEA-308. WAT: IAEA-298.
Pu-240. INST: SRM 4338.
Pu-241. SED. * IAEA-367.
Pu-242. INST: SRM 4334D.
Ra-226. SED: IAEA-313, IAEA-314, * IAEA-367, IAEA-368, SRM 4350B. SOIL: IAEA-312, SOIL-6, SRM 4353. TISS: IAEA-307.
Ru-106. TISS: IAEA-307, IAEA-308.
Sb-125. INST: SRM 4276C.
Se-75. INST: SRM 4409LD.
Sr-90. INST: SRM 4423. INST: SRM 4423, SRM 4919G. SED: IAEA-367, * IAEA-368, SRM 4354. SOIL: SOIL-6, SRM 4353. TISS. * IAEA-307, * IAEA-352. WAT: IAEA-298.
Tc-99. INST: SRM 4288, SRM 4410HR.
Th-228. SED. * IAEA-367, * IAEA-368, SRM 4354. SOIL: SRM 4353, SRM 4355. TISS. * IAEA-307, IAEA-308.
Th-229. INST: SRM 4328.
Th-230. SED. * IAEA-367, * IAEA-368. SOIL: SRM 4353, SRM 4355.
Th-232. SED. * IAEA-368, SD-N-2, SRM 4354. SOIL: SRM 4353, SRM 4355.
Tl-201. INST: SRM 4404LO.
U-228. TISS. * IAEA-307.
U-232. INST: SRM 4324.
U-234. SED. * IAEA-367, * IAEA-368. SOIL: SRM 4353.
U-235. SED. * IAEA-367, * IAEA-368, SRM 4354.
U-238. INST: SRM 4321. SED. * IAEA-367, IAEA-368, SRM 4354. SOIL: SRM 4353.
Xe-133. INST: SRM 4415LP.

Index of Organic Compounds with Associated Reference Materials

ASH: Ashes; GAS: Gases; INST: Instrumental performance; OIL: Oils; SED: Sediments; SLUD: Sludges; SOIL: Soils; TISS: Tissues.
* - Information value only.

1,1,1,2-Tetrachloroethane. INST: C-138H, C-138L, NSI 0335, VOC-2.
1,1,1-Trichloroacetone. INST: NSI 1181.
1,1,1-Trichloroethane. GAS: SRM 1804. INST: C-139H, C-139L, NSI 0010, VOA-2.
1,1,2,2-Tetrachioroethane. INST: C-139H, C-139L, NSI 0014, VOA-2.
1,1,2-Trichloroethane. INST: C-139H, C-139L, NSI 0013, VOA-1.
1,1-Dichloroethane. INST: C-139H, C-139L.
1,1-Dichloro-1-propene. INST: NSI 1166.
1,1-Dichloroethane. INST: NSI 0012, VOA-2.
1,1-Dichloroethylene. INST: C-028, C-139H, C-139L, NSI 0027, VOA-1.
1,1-Dichloropropylene. INST: C-138H, C-138L, VOC-1.
1,2,3,4-Tetrachlorobenzene. INST: NSI 0177, NSI 0225. SED: EC-2, EC-3, * EC-4, * EC-5, * EC-6, * EC-7.
1,2,3,5-Tetrachlorobenzene. SED: EC-2, * EC-3, * EC-4, * EC-5.
1,2,3-Trichlorobenzene. INST: C-140H, C-140L, NSI 0175, VOB. SED: EC-2, EC-3, * EC-4, * EC-5, * EC-6.
1,2,3-Trichloropropane. INST: C-133H, C-133L, NSI 0368, VOC-2.
1,2,4,5-Tetrachlorobenzene. SED: EC-2, * EC-3, * EC-4, * EC-5, * EC-6, * EC-7.
1,2,4-Trichlorobenzene. INST: C-140H, C-140L, C-150, GBN-1, NSI 0007, VOB. SED: EC-2, * EC-3, * EC-4, * EC-5, * EC-6, * EC-7.
1,2,4-Trimethylbenzene. INST: C-133H, C-133L, VOB, NSI 1107.
1,2-Dibromo-3-chloropropane. INST: C-138H, C-138L, EDB, NSI 0993, VOC-1.
1,2-Dibromoethane. GAS: SRM 1804. INST: C-133H, C-133L, EDB, NSI 0171, VOC-1.
1,2-Dichlorobenzene. INST: C-134H, C-134L, C-150, CR 2280, GBN-1, NSI 0023, VOA-2. SED: EC-2, EC-3, * EC-4, * EC-5.
1,2-Dichlorobenzene-d_4. INST: NSI 0776.
1,2-Dichloroethane. GAS: SRM 1804. INST: C-028, C-139H, C-139L, NSI 0009, VOA-1.
1,2-Dichloropropane. GAS: SRM 1804. INST: C-139H, C-139L, NSI 0030, VOA-1.
1,2-Epoxybutane. INST: NSI 0286.
1,2-Epoxypropane. INST: NSI 0308.
1,2-Propanediol. INST: NSI 0524.
1,2:3,4-Diepoxybutane. INST: NSI 0577.
1,2:3,4:5,6:7,8-Tetrabenzonaphthalene. INST: SRM 869.
1,3,5-Trichlorobenzene. INST: NSI 0176. SED: EC-2, EC-3, * EC-4, * EC-5, * EC-6, * EC-7.
1,3,5-Trimethylbenzene. INST: C-138H, C-138L, NSI 1103, VOB.
1,3-Butadiene. GAS: SRM 1804.
1,3-Dichloro-2-propanol. INST: C-142, NSI 0928.
1,3-Dichlorobenzene. INST: C-134H, C-134L, C-150, GBN-1, NSI 0214, VOA-1. SED: EC-2, EC-3, * EC-4, * EC-5.
1,3-Dichloropropane. INST: C-138H, C-138L, NSI 1109, VOC-2.
1,3-Dichloropropylene(*cis* & *trans*). INST: NSI 0218.
1,3-Dimethylphenanthrene. SED: * SRM 1941. TISS: * SRM 1974.
1,3-Dinitrobenzene. INST: NSI 0527.
1,3-Dinitropyrene. INST: SRM 1596.
1,3-Propane sultone. INST: NSI 0403.
1,4-Dichlorobenzene. INST: C-028, C-134H, C-134L, C-150, C-155, C-157, CR 2300, GBN-2, NSI 0025, P11-15, VOA-1. SED: EC-2, * EC-3, * EC-5.
1,4-Dichlorobenzene-d_4. INST: C-157.
1,4-Dichlorobutane-d_8. INST: NSI 0196.
1,4-Naphthoquinone. INST: NSI 0355.
1,4-Phenylenediamine. INST: NSI 0275.
1,6-Dimethylphenanthrene. SED: * SRM 1941. TISS: * SRM 1974.
1,6-Dinitropyrene. INST: SRM 1596.
1,7-Dimethylphenanthrene. SED: * SRM 1941. TISS: * SRM 1974.
1,8-Dinitropyrene. INST: SRM 1596.
1-(o-Chlorophenyl)-2-thiourea. INST: NSI 0384.
1-Acetul-2-thiourea. INST: NSI 0292.
1-Fluoronaphthalene. INST: NSI 0195.
1-Hydroxychlordene. INST: CR 3960.
1-Methylbenz[a]anthracene. INST: CRM 093.
1-Methylchrysene. INST: CRM 077.

1-Methylnaphthalene. INST: SRM 1491, SRM 2260. SED: * SRM 1941. TISS: * SRM 1974.
1-Methylphenanthrene. INST: SRM 1491, SRM 2260. SED: * SRM 1941. TISS: * SRM 1974.
1-Naphthol. INST: CR 4925.
1-Naphthylamine. INST: NSI 0419.
1-Nitronaphthalene. INST: CRM 306.
1-Nitropyrene. ASH: SRM 1650. INST: CRM 168, CRM 305, SRM 1596, SRM 1614.
1-Nitrosopiperidine. INST: NSI 0458.
1-Propanamine. INST: NSI 0657.
10-Azabenzo[a]pyrene. INST: CRM 092.
2,10-Dimethylphenanthrene. SED: * SRM 1941. TISS: * SRM 1974.
2,2',4,4',5,6'-Hexachlorobiphenyl. INST: CPCB 048, PCG.
2,2'-Bipyridyl. INST: P16-07.
2,2-Dichloropropane. INST: C-140H, C-140L, NSI 1167, VOC-1.
2,3,5-Trichlorophenol. INST: NSI 0222.
2,3,5-Trimethylnaphthalene. INST: SRM 1491, SRM 2260.
2,3,6-Trichlorophenol. INST: NSI 0181.
2,3,7,8-TCDD. INST: SRM 1614.
2,3,7,8-TCDD-^{13}C. INST: SRM 1614.
2,3-Dichloro-1-propene. INST: NSI 0170.
2,3-Dimethylphenanthrene. SED: * SRM 1941.
2,4'-DDD. INST: SRM 1492, SRM 2261. TISS: * SRM 1974.
2,4'-DDE. INST: SRM 1492, SRM 2261. TISS: * SRM 1974.
2,4'-DDT. INST: SRM 1492, SRM 2261. OIL: SRM 1588. TISS: * SRM 1974.
2,4,5-T. INST: CR 6840, NSI 0370, P13-10.
2,4,5-T (methyl ester). INST: P13-11.
2,4,5-T Butoxyethanol ester ether. INST: CR 6860.
2,4,5-T Butyl ester. INST: CR 6870.
2,4,5-T Isooctyl ester. INST: CR 6880.
2,4,5-T Propylene glycol butyl ester ether. INST: CR 6885.
2,4,5-TB. INST: CR 6900.
2,4,5-TP. INST: C-156, CR 6120, EPH, HER, NSI 0552, P13-06.
2,4,5-Trichlorophenol. INST: C-151, CR 6890, NSI 0179.
2,4,6-TBA (acid). INST: P13-12.
2,4,6-Tribromophenol. INST: C-131.
2,4,6-Trichlorophenol. INST: C-148, C-151, GAC, NSI 0019, SRM 1584.
2,4,6-Trimethylphenol. OIL: * SRM 1580.
2,4-D. INST: C-156, CR 2940, EPH, HER, NSI 0330, P13-02.
2,4-D (methyl ester). INST: P13-03.
2,4-D Butoxyethanol ester ether. INST: CR 2960.
2,4-D, 2-Ethylhexyl ester. INST: CR 2996.
2,4-D, Butyl esters, mixed. INST: CR 2980.
2,4-D, Diethanolamine salt, formulation. INST: CR 2985.
2,4-D, Dimethylamine salt, formulation. INST: CR 2990.
2,4-D, Isobutyl ester, mixed. INST: CR 3000.
2,4-D, Isopropyl ester. INST: CR 3040.
2,4-D, mixed Isooctyl ester. INST: CR 3020.
2,4-D, Propylene glycol butyl ester ether. INST: CR 3060.
2,4-D, Sodium salt. INST: CR 3070.
2,4-DB. INST: CR 3080, P13-04.
2,4-DB, Butyl ester. INST: CR 3100.
2,4-DB, Isobutyl ester. INST: CR 3120.
2,4-Diaminotoluene. INST: NSI 0932.
2,4-Dichlorobenzoic acid. INST: P13-05.
2,4-Dichlorophenol. INST: C-148, GAC, NSI 0029, QCS-PHEN, SRM 1584, SRM 1586.
2,4-Dichlorophenol-d3. INST: SRM 1586.
2,4-Dichlorotoluene. INST: NSI 0149.
2,4-Dimethylphenol. INST: C-148, GAC, NSI 0224, SRM 1584. OIL: * SRM 1580.
2,4-Dimethylphenol-3,5,6-d3. INST: NSI 0190.
2,4-Dinitrophenol. INST: C-148, GAC, NSI 0057, * SRM 1584.
2,4-Dinitrotoluene. INST: C-152, GBN-1, NAI, NSI 0033, C-153.
2,4-Dinitrophenol. INST: QCS-PHEN.
2,4-Dinitrotoluene. INST: C-155.
2,5,6-Trimethylphenol. OIL: * SRM 1580.
2,5-Dimethylphenol. OIL: * SRM 1580.
2,6-Dichlorophenol. INST: NSI 0302.
2,6-Dimethylnaphthalene. INST: SRM 1491, SRM 2260. SED: * SRM 1941.
2,6-Dimethylphenanthrene. SED: * SRM 1941. TISS: * SRM 1974.
2,6-Dimethylphenol. OIL: SRM 1580.
2,6-Dinitrotoluene. INST: C-152, C-153, GBN-1, NAI, NSI 0034.
2,7-Dimethylphenanthrene. SED: * SRM 1941. TISS: * SRM 1974.
2,9-Dimethylphenanthrene. SED: * SRM 1941. TISS: * SRM 1974.
2-Aminobenzimidazole. INST: CR 0171.
2-Chloroethanol. INST: C-142.
2-Chloroethyl vinyl ether. INST: NSI 0017.

2-Chloronaphthalene. INST: C-150, GBN-1, NSI 0018.
2-Chlorophenol. INST: C-148, GAC, NSI 0022, QCS-PHEN, SRM 1584.
2-Chlorophenol-d_4. INST: NSI 0116.
2-Chlorotoluene. INST: C-133H, C-133L, NSI 0150, VOC-2.
2-Ethylphenanthrene. TISS: * SRM 1974.
2-Fluoroacetamide. INST: NSI 0299.
2-Fluorobiphenyl. INST: NSI 0194.
2-Fluorophenol. INST: C-131, NSI 0193.
2-Hexanone. INST: C-109H, C-109L, NSI 0336.
2-Methyl-1-propanol. INST: C-142, NSI 0659.
2-Methyl-4,6-dinitrophenol. INST: GAC.
2-Methylanthracene. SED: * SRM 1941.
2-Methylchrysene. INST: CRM 078.
2-Methylnaphthalene. INST: NSI 0562, * SRM 1491, * SRM 2260. SED: * SRM 1941. SLUD: SRS101-100. SOIL: SRS103-100, SRS103-100. TISS: * SRM 1974.
2-Methylphenanthrene. SED: * SRM 1941.
2-Naphthylamine. INST: NSI 0565.
2-Nitro-7-methoxynaphtho[2,1-b]furan. INST: CRM 312.
2-Nitrofluoranthene. INST: SRM 1614.
2-Nitrofluorene. ASH: * SRM 1650. INST: SRM 1614.
2-Nitronaphthalene. INST: CRM 307.
2-Nitrophenol. INST: C-148, GAC, NSI 0055, SRM 1584, SRM 1586.
2-Nitrophenol-d_4. INST: SRM 1586.
2-Phenylphenol. INST: CR 5490, P16-24.
2-Picoline. INST: NSI 0688.
3,10-Dimethylphenanthrene. SED: * SRM 1941. TISS: * SRM 1974.
3,3'-Dichlorobenzidine (as dihydrochloride). INST: NSI 0026.
3,6-Dimethylphenanthrene. TISS: * SRM 1974.
3,9-Dimethylphenanthrene. TISS: * SRM 1974.
3-Chlorophenol. INST: NSI 0182.
3-Chloropropionitrile. INST: C-142, NSI 0375.
3-Chlorotoluene. INST: NSI 0151.
3-Hydroxybenzo[a]pyrene. INST: CRM 343 .
3-Hydroxycarbofuran. INST: C-147, CR 1041.
3-Ketocarbofuran phenol. INST: CR 1042.
3-Methylchrysene. INST: CRM 079.
3-Methylphenanthrene. SED: * SRM 1941.
3-Nitrofluoranthene. INST: CRM 310.
3-Nitrophenol. INST: NSI 0662.
4,4'-Bipyridyl. INST: P16-08.
4,4'-DDD. INST: C-093, CHP-1, CR 1780, GBW 06408, GPE-1, NSI 0092, SRM 1492, SRM 2261. OIL: * CRM 349, SRM 1588. SED: IAEA-357, * SRM 1941. TISS: IAEA-351, MA-A-1/OC, MA-A-3/OC, MA-B-3/OC, * SRM 1974.
4,4'-DDE. INST: C-093, CHP-1, CR 1860, GBW 06407, GPE-2, NSI 0091, P11-10, RM 8467, RM 8467, SRM 1492, SRM 1583, SRM 2261. OIL: * CRM 349, SRM 1588. SED: IAEA-357, * SRM 1941. TISS: IAEA-351, MA-A-1/OC, MA-A-3/OC, MA-B-3/OC, * SRM 1974.
4,4'-DDT. INST: C-093, CHP-1, CR 1920, GBW 06405, GPE-2, NSI 0124, P11-12, RM 8469, RM 8469, SRM 1492, SRM 1583, SRM 2261. OIL: * CRM 349, SRM 1588. SED: IAEA-357, * SRM 1941. TISS: IAEA-351, MA-A-1/OC, MA-A-3/OC, MA-B-3/OC, * SRM 1974.
4,4'-Dibromooctafluorobiphenyl. INST: NSI 0234.
4,4'-Dichlorobiphenyl. INST: CPCB 011.
4,4'-Methylene bis(2-chloroaniline). INST: NSI 0322.
4,6-Dinitro-o-cresol. INST: C-148, CR 2770, NSI 0058, P16-19, SRM 1584.
4-Amino-5-chloropyridaz-6-one. INST: CR 0186.
4-Aminobiphenyl. INST: NSI 0578.
4-Aminopyridine. INST: NSI 0297.
4-Bromo-2,5-dichlorophenol. INST: CR 0822.
4-Bromofluorobenzene. INST: C-158, NSI 0233.
4-Bromophenyl phenyl ether. INST: C-149, HAL, NSI 0039, GBN-2.
4-Chloro-3-methylphenol. INST: C-148, GAC, NSI 0020, SRM 1584.
4-Chloroaniline. INST: C-075, NSI 0305.
4-Chlorophenol. INST: NSI 0183.
4-Chlorophenyl phenyl ether. INST: C-149, NSI 0038, GBN-2, HAL.
4-Chlorotoluene. INST: C-140H, C-140L, NSI 0152, VOC-1.
4-CPA. INST: P13-01.
4-Dimethylaminoazobenzene. INST: NSI 0429.
4-Isopropyltoluene. INST: C-138H, C-138L, NSI 1108.
4-Methyl-2-pentanone. INST: C-109H, C-109L, NSI 0349.
4-Methylchrysene. INST: CRM 080.

4-Methylphenanthrene. SED: * SRM 1941.
4-Methylphenanthrene. TISS: * SRM 1974.
4-Nitrophenol. INST: C-148, CR 5060, GAC, NSI 0056, SRM 1584.
4H-Cyclopenta[def]phenanthrene-4-one. INST: CRM 338 .
5-Methylchrysene. INST: CRM 081R.
5-Nitro-o-toluidine. INST: NSI 0344.
6-Methylchrysene. INST: CRM 082.
6-Nitrobenzo[a]pyrene. ASH: * SRM 1650. INST: CRM 311, * SRM 1614.
6-Nitrochrysene. INST: CRM 309, SRM 1614.
7,12-Dimethylbenz[a]anthracene. INST: NSI 0567.
7-Nitrobenz[a]anthracene. ASH: * SRM 1650. INST: SRM 1614.
7H-Dibenzo[c,g]carbazole. INST: CRM 266.
9-Ethylphenanthrene. TISS: * SRM 1974.
9-Fluorenone. ASH: * SRM 1650.
9-Methylphenanthrene. SED: * SRM 1941. TISS: * SRM 1974.
9-Nitroanthracene. INST: CRM 308, SRM 1614.
Acenaphthene. INST: C-098H, C-098L, GBN-2, NSI 0001, PNA-1, SRM 1491, SRM 1647b, SRM 2260. SED: * EC-2, * EC-3, * EC-4, * EC-5, * EC-6, * EC-7, HS-3, HS-4, HS-5, HS-6, SES-1, * SRM 1941. SOIL: SRS103-100.
Acenaphthenes. OIL: SRS954.
Acenaphthylene. INST: C-098H, C-098L, NSI 0075, PNA-2, SRM 1491, SRM 1647b, SRM 2260. SED: * EC-2, * EC-3, * EC-4, * EC-5, * EC-6, * EC-7, HS-3, HS-4, HS-5, HS-6, * SRM 1941. SOIL: SRS103-100.
Acephate. INST: CR 0025.
Acetone. INST: C-109H, C-109L, NSI 0284.
Acetonitrile. INST: NSI 0473.
Acetophenone. INST: NSI 0411.
Acrolein. INST: C-141, NSI 0002.
Acrylamide. INST: NSI 0270.
Acrylonitrile. INST: NSI 0003, C-141.
Alachlor. INST: CR 4160, NSI 1089.
Aldicarb. INST: C-147, CR 0060, NSI 0954.
Aldicarb sulfone. INST: C-147, CR 0062, NSI 0995.
Aldicarb sulfoxide. INST: C-147, NSI 0996.
Aldrin. INST: C-093, CHP-1, CR 0080, GPE-2, NSI 0220, P11-23, RM 8464, SRM 1492, SRM 1583, SRM 2261. TISS: IAEA-351, MA-A-1/OC, MA-A-3/OC, MA-B-3/OC.
Alkylbenzenes. OIL: SRS954.
Allethrin. INST: CR 0100.
Allyl alcohol. INST: C-142, NSI 0475.
Allyl chloride. INST: C-142, NSI 0476.
alpha,alpha-Dimethylphenethylamine. INST: NSI 0847.
alpha-Chlordane. INST: CR 1220, NSI 0903. OIL: * CRM 349.
alpha-Chlordene. INST: CR 1261. TISS: SRS903.
alpha-HCH. INST: C-093, CHP-3, CR 0620, GBW 06401, GPE-1, NSI 0100, P11-01. OIL: * CRM 350, SRM 1588. TISS: MA-A-1/OC, MA-B-3/OC.
alpha-Tocopherol. OIL: SRM 1588.
Amdro. INST: CR 0110.
Ametryne. INST: CR 0120.
Aminocarb. INST: CR 0180.
Amitraz. INST: CR 0195.
Amitrole. INST: CR 0200.
Amobam. INST: CR 0220.
Ancymidol. INST: CR 0230.
Aniline. INST: NSI 0542.
Anthanthrene. INST: CRM 091.
Anthracene. INST: C-098H, C-098L, GBN-2, NSI 0076, PNA-1, SRM 1491, SRM 1644, SRM 1647b, SRM 2260. SED: EC-1, * EC-2, * EC-3, * EC-4, * EC-5, * EC-6, * EC-7, HS-3, HS-4, HS-5, HS-6, IAEA-357, SES-1, SRM 1941. SOIL: SRS103-100. TISS: SRM 1974.
Anthraquinone. INST: CR 0250, P16-01.
ANTU. INST: CR 0260.
Aroclor 1016. INST: CR 5700, NSI 0125, P01, P02, P03, PC1.
Aroclor 1221. INST: CR 5701, NSI 0126, PC2.
Aroclor 1232. INST: CR 5702, PC3.
Aroclor 1242. INST: CR 5703, NSI 0132, P04, P05, P06, PC4. OIL: SRM 1581. TISS: MA-A-1/OC.
Aroclor 1248. INST: CR 5704, NSI 0108, PC5.
Aroclor 1254. INST: CR 5705, NSI 0135, P07, P08, P09, PC6. SED: CS-1, IAEA-357. TISS: IAEA-351, MA-A-1/OC, MA-A-3/OC, MA-B-3/OC.
Aroclor 1260. INST: CR 5706, NSI 0129, P10, P11, P12, PC7. OIL: SRM 1581. TISS: IAEA-351, MA-B-3/OC.
Aroclor 1262. INST: CR 5707, NSI 0130.
Aroclor 1268. INST: CR 5708, NSI 0131.
Aspon. INST: CR 0300.
Asulam. INST: CR 0310, P16-02.
Atraton. INST: CR 0320.
Atrazine. INST: CR 0420, NSI 1090, P16-03.

Azinphosethyl. INST: CR 3840.
Azinphosmethyl. INST: CR 3820.
Azobenzene. INST: CR 0340, P16-04.
b-Chlordene. TISS: SRS903.
Barban. INST: CR 0400.
Bendiocarb. INST: CR 0472.
Benefin. INST: CR 0480.
Benomyl. INST: CR 0500.
Bensulide. INST: CR 0520.
Bentazon. INST: CR 0425.
Bentranil. INST: P16-05.
Benzadox. INST: CR 0577.
Benzal chloride. INST: NSI 0512.
Benzene. GAS: SRM 1804, SRM 1805, SRM 1806, SRM 1811, SRM 1812. INST: C-027, C-028, C-092, C-134H, C-134L, GBW 06104, NSI 0004, SRM 1586, VOA-2.
Benzene-d_6. INST: SRM 1586.
Benzidine (as dihydrochloride). INST: NSI 0005.
Benzoic acid. INST: NSI 0541.
Benzonitrile. INST: NSI 0701.
Benzophenone. INST: SRM 1543.
Benzotrichloride. INST: NSI 0291.
Benzoylprop ethyl. INST: CR 0578.
Benzo[a[pyrene. INST: C-098H, C-098L, NSI 0071, PNA-2, SRM 1586, SRM 869, SRM 869.
Benzo[a]fluoranthene. INST: CRM 097. SED: * SRM 1941. TISS: * SRM 1974.
Benzo[a]fluorenone. INST: CRM 342 .
Benzo[a]pyrene. ASH: SRM 1649, SRM 1650. INST: CRM 051R, GBN-2, SRM 1491, SRM 1644, SRM 1647b, SRM 2260. OIL: SRM 1580, SRM 1582. SED: EC-1, EC-2, EC-3, * EC-4, * EC-5, * EC-6, * EC-7, HS-3, HS-4, HS-5, HS-6, IAEA-357, SES-1, SRM 1941. SOIL: SRS103-100, SRS103-100. TISS: SRM 1974.
Benzo[a]pyrene-d_{12}. INST: SRM 1586.
Benzo[b+k]fluoranthene. SOIL: SRS103-100.
Benzo[b]chrysene. INST: CRM 046.
Benzo[b]fluoranthene. ASH: * SRM 1649. INST: C-098H, C-098L, CRM 047 , GBN-2, NSI 0072, PNA-2, SRM 1491, SRM 1647b, SRM 2260. SED: EC-1, EC-2, * EC-3, * EC-4, * EC-5, * EC-6, * EC-7, HS-3, HS-4, HS-5, HS-6, SES-1, SRM 1941. TISS: SRM 1974.
Benzo[b]naphtho[1,2-d]thiophene. INST: CRM 137.
Benzo[b]naphtho[2,1-d]thiophene. INST: CRM 135.
Benzo[b]naphtho[2,3-d]thiophene. INST: CRM 136.
Benzo[b]naphto[1,2-d]furan. INST: CRM 340 .
Benzo[b]naphto[2,1-d]furan. INST: CRM 341 .
Benzo[c,d]pyren-6-one. INST: CRM 339 .
Benzo[c]chrysene. INST: CRM 140.
Benzo[c]phenanthrene. INST: CRM 134.
Benzo[e]pyrene. ASH: * SRM 1649, * SRM 1650. INST: CRM 050, SRM 1491, SRM 2260. OIL: SRM 1580, * SRM 1582. SED: EC-1, EC-2, EC-3, * EC-4, * EC-5, IAEA-357, * SRM 1941. TISS: * SRM 1974.
Benzo[f]quinoline. OIL: SRM 1580.
Benzo[ghi]fluoranthene. INST: CRM 139.
Benzo[ghi]perylene. ASH: SRM 1649, SRM 1650. INST: C-098H, C-098L, CRM 052, GBN-2, NSI 0077, PNA-2, SRM 1491, SRM 1647b, SRM 2260. OIL: * SRM 1582. SED: EC-1, EC-2, * EC-3, * EC-4, * EC-5, * EC-6, * EC-7, HS-3, HS-4, HS-5, HS-6, IAEA-357, SES-1, SRM 1941. TISS: SRM 1974.
Benzo[ghi]perylene-$^{13}C_{12}$. INST: NSI 0199.
Benzo[j]fluoranthene. INST: CRM 049. SED: * SRM 1941. TISS: * SRM 1974.
Benzo[k]fluoranthene. ASH: * SRM 1649, * SRM 1650. INST: C-098H, C-098L, CRM 048, GBN-1, NSI 0073, PNA-1, SRM 1491, SRM 1647b, SRM 2260. SED: EC-1, EC-2, * EC-3, * EC-4, * EC-5, * EC-6, * EC-7, HS-3, HS-4, HS-5, HS-6, SES-1, SRM 1941. TISS: * SRM 1974.
Benzyl alcohol. INST: NSI 0326.
Benzyl benzoate. INST: CR 0580.
Benzyl chloride. INST: NSI 0169.
Benz[a]acridine. INST: CRM 157.
Benz[a]anthracene. ASH: SRM 1649, SRM 1650. INST: C-098H, C-098L, CRM 271, GBN-1, NSI 0070, PNA-2, SRM 1491, SRM 1644, SRM 1647b, SRM 2260. OIL: SRM 1582. SED: EC-1, EC-2, EC-3, * EC-4, * EC-5, * EC-6, * EC-7, HS-3, HS-4, HS-5, HS-6, IAEA-357, SES-1, SRM 1941. SOIL: SRS103-100. TISS: * SRM 1974.
Benz[c]acridine. INST: CRM 158.
beta-BHC. INST: C-093, CHP-3, CR 0640, GBW 06402, GPE-2, NSI 0101, P11-02.
beta-HCH. OIL: * CRM 350.
BHC mixed. INST: CR 0600.
Bifenox. INST: CR 0733.
Bioallethrin. INST: CR 0734.
Biphenyl. INST: CR 0740, P16-06, SRM 1491, SRM 2260. SED: * SRM 1941.

bis(2-Chloroethoxy) methane. INST: NSI 0041.
bis(2-Chloroethoxy)ether. INST: C-149.
bis(2-Chloroethoxy)methane. INST: C-149. INST: GBN-1. INST: HAL.
bis(2-Chloroethyl) ether. INST: NSI 0016. INST: C-149. INST: GBN-1. INST: HAL.
bis(2-Chloroisopropyl) ether. INST: NSI 0040. INST: C-149. INST: HAL.
bis(2-Ethylhexyl)adipate. INST: NSI 1211.
bis(2-Ethylhexyl)phthalate. INST: C-146, GBN-2, NSI 0064, PHE, SRM 1586.
bis(2-Ethylhexyl)phthalate-d_4. INST: SRM 1586.
Blazer, acid. INST: CR 0761.
Bomyl. INST: CR 0780.
BPMC. INST: CR 0791.
Bromacil. INST: CR 0800.
Bromadilone. INST: CR 0816.
Bromobenzene. GAS: SRM 1811, SRM 1812. INST: C-140H, C-140L, NSI 0406, VOC-1.
Bromochloroacetonitrile. INST: NSI 1186.
Bromochloromethane. INST: C-140H, C-140L, NSI 0136, VOC-2.
Bromodichloromethane. INST: C-139H, C-139L, NSI 0046, SRM 1639, TRI, VOA-2.
Bromoform. INST: C-139H, C-139L, NSI 0212, SRM 1639, TRI, VOA-2.
Bromomethane. GAS: SRM 1804. INST: C-137, NSI 0044.
Bromophos. INST: CR 0840.
Bromophos ethyl. INST: CR 0860.
Bromopropylate. INST: CR 0872.
Bromoxynil. INST: CR 0820, P16-09.
Bromoxynil octanoate. INST: P16-10.
Brucine. INST: NSI 0522.
Bunema. INST: CR 0916.
Bupirimate. INST: P16-36.
Butachlor. INST: CR 0922.
Buthidazole. INST: CR 0926.
Butralin. INST: CR 0933.
Butyl benzyl phthalate. INST: C-146, GBN-2, NSI 0065, PHE.
Butylate. INST: CR 0940.
Cacodylic acid. INST: CR 0961.
Calcium arsenate. INST: CR 0980.
Captafol. INST: CR 1000.
Captan. INST: CR 1020.
Carbaryl. INST: C-147, P16-11, CR 1060.
Carbazole. OIL: * SRM 1582.
Carbendazim. INST: CR 1071.
Carbetamide. INST: CR 1074.
Carbofuran. INST: C-147, CR 1040, NSI 0715.
Carbofuran phenol. INST: CR 1043.
Carbon disulfide. INST: NSI 0363.
Carbon tetrachloride. GAS: SRM 1804, SRM 1813, SRM 1814. INST: C-028, C-139H, C-139L, NSI 0360, SRM 1586, SRM 1639, VOA-1.
Carbon tetrachloride-^{13}C. INST: SRM 1586.
Carbophenothion. INST: CR 1080.
Carboxin. INST: CR 1100.
CDAA. INST: CR 1140.
Chloral hydrate. INST: NSI 1179.
Chloramben. INST: CR 0140.
Chlorambucil. INST: NSI 0566.
Chloranil. INST: CR 1180.
Chlorbenside. INST: P11-06.
Chlorbromuron. INST: CR 1188.
Chlordane. INST: CP2, CR 1200, NSI 0089, P11-08.
Chlordecone. INST: CR 1280.
Chlordene. INST: CR 1260.
Chlordimeform. INST: CR 1480.
Chlorfenvinphos. INST: CR 1300.
Chlorloluron. INST: CR 1512.
Chlormephos. INST: CR 1316.
Chlorobenzene. GAS: SRM 1804, SRM 1811, SRM 1812. INST: C-028, C-134H, C-134L, NSI 0006, SRM 1586, VOA-1.
Chlorobenzene-d_5. INST: C-157, SRM 1586.
Chlorobenzilate. INST: CR 1360, NSI 0574.
Chlorobromuron. INST: P14-01.
Chlorodibromomethane. INST: C-139H, C-139L, NSI 0200, SRM 1639, TRI.
Chloroethane. INST: C-137, NSI 0015.
Chloroform. GAS: SRM 1804, SRM 1813, SRM 1814. INST: C-028, C-139H, C-139L, NSI 0021, SRM 1639, TRI, VOA-2.
Chloromethane. INST: C-137, NSI 0043.
Chloroneb. INST: CR 1380.
Chlorophacinone. INST: CR 1425.
Chloropicrin. INST: CR 1462.
Chlorothalonil. INST: CR 1640.
Chlorotoluron. INST: P14-02.
Chlorpropham. INST: CR 1420.
Chlorpyriphos. INST: CR 2900.
Chlorpyriphos methyl. INST: CR 2902.
Chrysene. ASH: * SRM 1649, * SRM 1650. INST: C-098H, C-098L, CRM 269, GBN-2, NSI 0074, PNA-1, SRM 1491, SRM 1647b, SRM 2260. SED: HS-3, HS-4, HS-5, HS-6, IAEA-357, SES-1, * SRM 1941. SOIL: SRS103-100. TISS: * SRM 1974.

Chrysene/triphenylene. SED: * EC-1, * EC-2, * EC-3, * EC-4, * EC-5, * EC-6, * EC-7.
cis-1,2-Dichloroethylene. INST: C-133H, C-133L, NSI 0173, VOC-2.
cis-1,3-Dichloro-1-propene. INST: C-139H, C-139L.
cis-Chlordane. INST: SRM 1492, SRM 2261. OIL: SRM 1588. SED: * SRM 1941. TISS: * SRM 1974, SRS903.
cis-Nonachlor. TISS: SRS903.
cis-Permethrin. INST: P17-01.
Clofentezine. INST: P16-37.
Coronene. INST: CRM 272.
Coumafuryl. INST: CR 3720.
Coumaphos. INST: CR 1540.
CPMC. INST: CR 1543.
Crotoxyphos. INST: CR 1500.
Crufomate. INST: CR 6020.
Cryolite. INST: CR 1546.
Crotonaldehyde. INST: NSI 0479.
Cyanazine. INST: CR 1552, P16-35.
Cyanophos. INST: CR 1580.
Cycloate. INST: CR 1591.
Cyclohaxanone. INST: NSI 0675.
Cycloheximide. INST: CR 1600.
Cypermethrin. INST: CR 1612, P17-04.
Cyprazine. INST: CR 1615.
Cythioate. INST: CR 1621.
Dalapon. INST: CR 1660, NSI 1091.
Daminozide. INST: CR 1681.
DCPA. INST: CR 1720.
DDD. TISS: SRS903.
DDD, mixed. INST: CR 1750.
DDE. TISS: SRS903.
DDT. TISS: SRS903.
DDT, mixed isomers. INST: CR 1880.
DEET. INST: P16-12.
DEF. INST: CR 1940.
delta-HCH. INST: C-093, CR 0660, GBW 06404, NSI 0103, P11-03, SRM 1583.
Deltamethrin. INST: CR 1930.
Demeton, mixed isomers. INST: CR 1983.
Desmedipham. INST: CR 2006.
Desmetryn. INST: P16-32.
Di-n-butyl phthalate. INST: C-146, CR 2120, GBN-1, NSI 0066, PHE.
Di-n-octyl phthalate. INST: C-146, GBN-1, NSI 0067, PHE.
Diallate. INST: CR 2040, NSI 0067.
Diaphene. INST: CR 2060.
Diazinon. INST: CR 2080.
Dibenzofuran. INST: NSI 0261. SOIL: SRS103-100.
Dibenzothiophene. OIL: SRM 1582, SRS954.
Dibenzo[a,e]fluoranthene. INST: CRM 265.
Dibenzo[a,e]pyrene. INST: CRM 133.
Dibenzo[a,h]pyrene. INST: CRM 159.
Dibenzo[a,i]pyrene. INST: CRM 268.
Dibenzo[a,l]pyrene. INST: CRM 096.
Dibenzo[b,d]furan. INST: CRM 337 .
Dibenz[a,c]acridine. INST: CRM 155.
Dibenz[a,c]anthracene. INST: CRM 094.
Dibenz[a,h]acridine. INST: CRM 153.
Dibenz[a,h]anthracene. ASH: * SRM 1649. INST: C-098H, C-098L, CRM 138, GBN-2, NSI 0231, SRM 1491, SRM 1647b, SRM 2260. SED: * EC-1, EC-2, * EC-3, * EC-4, * EC-5, * EC-6, * EC-7, HS-3, HS-4, HS-5, HS-6, * IAEA-357, SES-1. TISS: * SRM 1974.
Dibenz[a,i]acridine. INST: CRM 152.
Dibenz[a,j]acridine. INST: CRM 154.
Dibenz[a,j]anthracene. INST: CRM 095.
Dibenz[c,h]acridine. INST: CRM 156.
Dibromochloromethane. INST: VOA-2.
Dibromochloropropane . INST: CR 2090.
Dibromofluoromethane. INST: C-158.
Dibromomethane. INST: C-140H, C-140L, NSI 1097, VOC-1.
Dibutyl chlorendate. INST: CR 2112.
Dibutyl ether. INST: NSI 0255.
Dicamba. INST: CR 2140.
Dichlobenil. INST: CR 2200, P11-13.
Dichlofenthion. INST: CR 2220.
Dichlone. INST: CR 2180, NSI 0670, P11-14.
Dichloran. INST: CR 2260.
Dichloroacetonitrile. INST: NSI 0486.
Dichlorodifluoromethane. INST: C-135, NSI 0346.
Dichloromethane. GAS: SRM 1804. INST: C-139H, C-139L, NSI 0042.
Dichloropropene, mixed iso-mers. INST: CR 2305.
Dichlorosalicylic acid. INST: CR 2308.
Dichlorprop. INST: CR 2309, P13-13.
Dichlorprop (2-ethylhexyl ester). INST: P13-17.
Dichlorvos. INST: CR 2320.
Diclofop methyl. INST: CR 2330.
Dicloran. INST: P11-16.
Dicofol. INST: CR 2340.
Dicyclohexyl phthalate. INST: NSI 0318.
Dieldrin. INST: C-093, CHP-1, CR 2380, GPE-1, NSI 0088, P11-22, RM 8465, SRM 1492, SRM 2261. OIL: * CRM 349, * CRM 350, SRM 1588. SED: * SRM 1941. TISS: * SRM 1974.
Diethyl ether. INST: NSI 0285.

Diethyl phosphate. INST: CR 2386.
Diethyl phthalate. INST: C-146, GBN-1, NSI 0068, PHE.
Diethylamine. INST: NSI 0689.
Diethylstilbestrol. INST: NSI 0540.
Difenoxuron. INST: CR 2391.
Difenzoquat. INST: CR 2395.
Diflubenzuron. INST: CR 2406.
Dimethirimol. INST: CR 2416, P16-33.
Dimethoate. INST: CR 2420, NSI 0345, P12-04.
Dimethyl phosphate. INST: CR 2458, C-146, CR 2460, GBN-2, NSI 0069, PHE.
Dinaphthenebenzene. OIL: SRS954.
Dinex. INST: NSI 0862.
Dinitramine. INST: CR 2551.
Dinobuton. INST: P16-13.
Dinocap. INST: CR 2560.
Dinoseb. INST: CR 2760, NSI 0455, P16-14.
Dinoseb acetate. INST: CR 2566.
Dinoterb. INST: P16-15.
Dinoterb acetate. INST: P16-16.
Diothyl. INST: CR 2570.
Diphacinone. INST: CR 2600.
Diphenamid. INST: CR 2620.
Diphenyl mercury. INST: CR 2640.
Diphenyl sulphone. INST: P16-17.
Diphenylamine. INST: NSI 0263.
Dipropetryne. INST: CR 2653.
Diquat dibromide. INST: CR 2660, P16-18.
Disulfoton. INST: CR 2720, NSI 0654.
Ditalimphos. INST: CR 2730.
Dithianon. INST: CR 2721.
Diuron. INST: CR 2740, P14-03.
Dodine. INST: CR 2780.
Domoic acid. INST: DACS-1. TISS: MUS-1.
Drazoxolon. INST: CR 2792.
DSMA. INST: CR 2860.
Edifenphos. INST: CR 3160.
Endosulfan I. INST: C-093, CHP-3, CR 3200, GPE-2, NSI 0093, P11-19.
Endosulfan II. INST: CHP-3, CR 3220, GPE-2, NSI 0094, P11-20, C-093.
Endosulfan mixed isomers. INST: CR 3180.
Endosulfan sulfate. INST: C-093, NSI 0095.
Endothall. INST: NSI 0622.
Endothall, acid. INST: CR 3240.
Endrin. INST: C-093, C-143, CL1, CR 3260, EPH, GPE-1, NSI 0096, P11-21.
Endrin aldehyde. INST: C-093, CHP-3, CR 3261, NSI 0097.
Endrin ketone. INST: C-093, CR 3262, NSI 1036.
Epichlorohydrin. INST: NSI 0258.
EPN. INST: CR 3280.
EPTC. INST: CR 3300.
Ethane. GAS: GBW 08125, GBW 08126, GBW 08131, GBW 08132.
Ethazol. INST: CR 6590.
Ethephon. INST: CR 3330.
Ethiolate. INST: CR 3335.
Ethion. INST: CR 3340.
Ethirimol. INST: CR 3359, P16-34.
Ethofumesate. INST: CR 3373.
Ethoprop. INST: CR 5880.
Ethyl acrylate. INST: NSI 0704.
Ethyl methacrylate. INST: C-142, NSI 0687.
Ethyl methanesulfonate. INST: NSI 0456.
Ethyl parathion. INST: CR 5245, NSI 0560.
Ethylan. INST: CR 5380.
Ethylbenzene. GAS: SRM 1804. INST: C-027, C-092, C-134H, C-134L, NSI 0036, VOA-1.
Ethylene. GAS: GBW 08127, GBW 08128, GBW 08131.
Ethylenediamine. INST: NSI 0358.
Ethylenethiourea. INST: NSI 0329.
Ethylhexanediol. INST: CR 3380.
Ethylmercury chloride. INST: CR 3400.
Etrimfos. INST: CR 3412.
EXD. INST: CR 3420.
Famphur. INST: CR 3440, NSI 0727.
Fenac. INST: CR 3460.
Fenaminosulf. INST: CR 2020.
Fenamiphos. INST: CR 3470.
Fenbutatin-oxide. INST: CR 7013.
Fensulfothion. INST: CR 3500.
Fenthion. INST: CR 3520.
Fentin acetate. INST: CR 3527.
Fentin chloride. INST: CR 3532.
Fentin hydroxide. INST: CR 3540.
Fenvalerate. INST: CR 3555.
Ferbam. INST: CR 3600.
Flourene. TISS: * SRM 1974.
Fluchloralin. INST: CR 0407.
Fluometuron. INST: CR 3620.
Fluoranthene. ASH: SRM 1649, SRM 1650. INST: C-098H, C-098L, CRM 160, GBN-2, NSI 0037, PNA-2, SRM 1491, SRM 1647b, SRM 2260. OIL: SRM 1580, SRM 1582. SED: EC-1, EC-2, EC-3, * EC-4, * EC-5, * EC-6, * EC-7, HS-3, HS-4, HS-5, HS-6, SES-1, SRM 1941. SOIL: SRS103-100, SRS103-100. TISS: SRM 1974.
Fluorene. INST: C-098H, C-098L, GBN-2, NSI 0078, SRM 1491, SRM 1647b, SRM 2260. SED: * EC-2, * EC-3, * EC-4, * EC-5, * EC-6, * EC-7, HS-3, HS-4, HS-5, HS-6, *

IAEA-357, SES-1, * SRM 1941. SLUD: SRS101-100. SOIL: SRS103-100.
Fluorenes. OIL: SRS954.
Fluoridamid. INST: CR 3623.
Fluorobenzene. INST: NSI 0232.
Flurecol, n-butyl ester. INST: CR 3630.
Folpet. INST: CR 3660.
Fonotos. INST: CR 2910.
Formetanate-HC* INST: CR 3680.
Formothion. INST: CR 3722.
Fosamine ammonium. INST: CR 4156.
Furan. INST: NSI 0671.
gamma-HCH. INST: C-093, C-143, CL1, CR 0680, CR 1240, EPH, GBW 06403, GPE-1, NSI 0102, NSI 0797, P11-04, RM 8466, RM 8466, SRM 1492, SRM 1583, SRM 2261. OIL: * CRM 349, * CRM 350. TISS: IAEA-351, MA-A-1/OC, MA-A-3/OC, MA-B-3/OC, SRS903.
gamma-Chlordene. INST: CR 1263.
Gibberellic acid. INST: CR 3790.
Glyoxime. INST: CR 3796.
Glyphosine. INST: CR 3802.
Glyphosphate. INST: CR 3801.
Halowax 1000. INST: CR 5720.
Halowax 1001. INST: CR 5721.
Halowax 1013. INST: CR 5722.
Halowax 1014. INST: CR 5723.
Halowax 1051. INST: CR 5724.
Halowax 1099. INST: CR 5725.
Halowax-1. INST: NSI 0472.
Halowax-1001. INST: NSI 0471.
Halowax-1099. INST: NSI 0470.
Heptachlor. INST: C-093, C-143, CHP-1, CR 3860, GPE-1, NSI 0098, RM 8468, SRM 1492, SRM 2261. SED: IAEA-357.
Heptachlor epoxide. INST: C-093, C-143, CHP-3, CR 3880, GPE-1, NSI 0099, SRM 1492, * SRM 1583, SRM 2261. SED: * SRM 1941.
Heptenophos. INST: CR 3885.
Hexachlorobenzene. INST: C-150, C-155, CR 3920, GBN-1, NSI 0008, P11-31, SRM 1492, SRM 2261. OIL: * CRM 350, SRM 1588. SED: EC-2, EC-3, * EC-4, * EC-5, * EC-6, * EC-7, IAEA-357. TISS: MA-A-3/OC, IAEA-351, MA-B-3/OC.
Hexachlorobutadiene. INST: C-133H, C-133L, C-150, C-155, GBN-1, NSI 0050, VOB. SED: EC-2, EC-3, * EC-4, * EC-5, * EC-6, * EC-7.
Hexachlorocyclopentadiene. INST: C-150, NSI 0051.
Hexachloroethane. INST: C-150, C-155, GBN-2, NSI 0011.
Hexachloroethylene. SED: * EC-6, * EC-7.
Hexachlorophene. INST: CR 3940, NSI 0323.
Hexachloropropene. INST: NSI 0364.
Hexazinone. INST: CR 7001.
IBP. INST: CR 4011.
Indeno[1,2,3-cd]fluoranthene. INST: CRM 267. TISS: * SRM 1974.
Indeno[1,2,3-cd]pyrelene. ASH: SRM 1649.
Indeno[1,2,3-cd]pyrene. ASH: * SRM 1650. INST: C-098H, C-098L, CRM 053, NSI 0081, PNA-1, SRM 1491, SRM 1647b, SRM 2260. OIL: * SRM 1582. SED: EC-1, EC-2, * EC-3, * EC-4, * EC-5, * EC-6, * EC-7, HS-3, HS-4, HS-5, HS-6, IAEA-357, SES-1, SRM 1941. TISS: SRM 1974.
Indomethacin. INST: NSI 0395.
Iodofenphos. INST: CR 4103.
Ioxynil. INST: CR 4040, P16-20.
Ioxynil octanoate. INST: P16-21.
Isodrin. INST: CR 4045, NSI 0856.
Isofenphos. INST: CR 4050.
Isophorone. INST: C-152, C-153, GBN-1, NAI, NSI 0052.
Isoprocarb. INST: CR 4062.
Isopropalin. INST: CR 4070.
Isopropylbenzene. INST: C-140H, C-140L, NSI 0669, VOB.
Isoproturon. INST: CR 4080.
Isosafrole. INST: NSI 0499.
Karbutilate. INST: CR 6420.
Kepone. INST: NSI 0573.
Lamprecide. INST: CR 4166.
Lead arsenate. INST: CR 4180.
Lenacil. INST: CR 4185.
Leptophos . INST: CR 4190.
Leptophos oxygen analog. INST: CR 4191.
Lethane 384. INST: CR 4220.
Linuron. INST: CR 4240, P14-04.
m-Cresol. INST: C-151, NSI 0251. OIL: * SRM 1580.
m-Nitroaniline. INST: C-075, NSI 0325.
m-Xylene. INST: C-027, C-133H, C-133L, C-140H, C-140L, NSI 0202.
Malathion. INST: CR 4260, P12-05.
Malononitrile. INST: C-142, NSI 0337.
Maneb. INST: CR 4300.
MCPA (2-ethylhexyl ester). INST: P13-14.
MCPA (acid). INST: CR 4340, P13-07.
MCPA (butoxyethyl ester). INST: P13-16.
MCPA, Isooctyl ester. INST: CR 4360.
MCPB (acid). INST: CR 4380, P13-08.
MCPP. INST: CR 4400.

MCPP, Isooctyl ester. INST: CR 4420.
Mecarbam. INST: CR 4441, P12-06.
Mecoprop (butoxyethyl ester). INST: P13-15.
Mecoprop (MCPP). INST: P13-09.
Mefluidide. INST: CR 4446.
Melphalan. INST: NSI 0568.
Mephosfolan. INST: CR 1630.
Merphos. INST: CR 3640.
Methacrylonitrile. INST: C-142, NSI 0686.
Metham. INST: CR 6620.
Methamidophos. INST: CR 4750.
Methane. GAS: GBW 08101, GBW 08102, GBW 08103, GBW 08104, GBW 08105, GBW 08119, GBW 08121, GBW 08123, GBW 08131, GBW 08132, SRM 1658a, SRM 1659a, SRM 1660a.
Methanearsonic acid. INST: CR 4490.
Methapyrilene hydrochloride. INST: NSI 0545.
Methazole. INST: CR 4496.
Methidathion. INST: CR 6340, P12-07.
Methiocarb. INST: C-147, CR 4500.
Methomyl. INST: C-147, CR 4520, NSI 0784.
Methoprene. INST: CR 4531.
Methoxychlor. INST: CL1, EPH.
Methoxychlor mixed isomers. INST: CR 4540.
Methyl ethyl ketone. INST: C-028, C-109H, C-109L, NSI 0311.
Methyl mercury chloride. INST: P15-02.
Methyl methacrylate. INST: NSI 0439.
Methyl methanesulfonate. INST: NSI 0431.
Methyl parathion. INST: CR 4580, NSI 0572.
Methyl stearate. INST: SRM 1543.
Methyl thiouracil. INST: NSI 0378.
Methylene chloride. INST: VOA-2.
Methylmercury chloride. INST: CR 4560.
Methylmercury iodide. INST: CR 4572.
Metobromuron. INST: CR 4612.
Metolachlor. INST: CR 4620.
Metoxuron. INST: CR 4631.
Metribuzin. INST: CR 4634.
Mevinphos. INST: CR 4640.
Mexacarbate. INST: CR 7080.
MH. INST: CR 4280.
Mirex. INST: CR 4720, NSI 0219, SRM 1492, SRM 2261. OIL: * CRM 349.
Molinate. INST: CR 4740.
Monalide. INST: CR 4747.
Monocrotophos. INST: CR 0360.
Monolinuron. INST: CR 4751.
Monuron. INST: CR 4760, P14-05.
Monuron TCA. INST: CR 4780.
MSMA. INST: CR 4820.
N,N-Dimethylformamide. INST: NSI 0548.
n-Butyl acetate. INST: NSI 0708.
n-Butylbenzene. INST: C-138H, C-138L, NSI 1105, VOB.
N-Nitro-N-methyl ethylamine. INST: NSI 0974.
N-Nitrosodi-n-propylamine. INST: C-152, C-154, GBN-1, NSI 0061.
N-Nitrosodibutylamine. INST: NSI 0404.
N-Nitrosodiethylamine. INST: NSI 0334.
N-Nitrosodimethylamine. INST: C-152, C-154, NSI 0059.
N-Nitrosodiphenylamine. INST: C-152, C-154, NSI 0060.
N-Nitrosomorpholine. INST: NSI 0485.
N-Nitrosopyrrolidine. INST: NSI 0298.
n-Propylbenzene. INST: C-138H, C-138L, NSI 1112, VOB.
Naled. INST: CR 4860.
Naphthabenzothiophenes. OIL: SRS954.
Naphthalene. INST: C-098H, C-098L, C-133H, C-133L, GBN-2, NSI 0053, PNA-1, SRM 1491, SRM 1586, SRM 1647b, SRM 2260, VOB. SED: * EC-2, * EC-3, * EC-4, * EC-5, * EC-6, * EC-7, HS-3, HS-4, HS-5, HS-6, SES-1, * SRM 1941. SLUD: SRS101-100. SOIL: SRS103-100, SRS103-100.
Naphthalene acetamide. INST: CR 4880.
Naphthalene acetic acid. INST: CR 4900.
Naphthalene-d_8. INST: SRM 1586.
Naphthalenes. OIL: SRS954.
Naphthenebenzenes. OIL: SRS954.
Napropamide. INST: CR 2010.
Naptalam sodium salt. INST: CR 4920.
Neburon. INST: CR 4940.
Niclosamide. INST: CR 4970.
Nicotine. INST: NSI 0519, P18-01.
Nitrapyrin. INST: CR 5031.
Nitrobenzene. INST: C-152, C-153, C-155, GBN-2, NAI, NSI 0054, SRM 1586.
Nitrobenzene-d_5. INST: SRM 1586.
Nitrofen. INST: CR 5040.
Nitrolin. INST: CR 5020.
o,p'-DDD. INST: CR 1760. SED: IAEA-357.
o,p'-DDE. INST: P11-09.
o,p'-DDT. INST: GBW 06406, P11-11.
o,p'-TDE. INST: P11-26.
o-Cresol. INST: C-151, NSI 0250. OIL: SRM 1580, * SRM 1582.
o-Nitroaniline. INST: C-075, NSI 0324.
o-Toluidine hydrochlorine. INST: NSI 0294.
o-Xylene. GAS: SRM 1804, C-027, C-092, NSI 0201, VOC-2.
Octachlorostyrene. SED: * EC-2, * EC-3, * EC-4, * EC-5, * EC-6, * EC-7.

Oryzalin. INST: CR 5148.
Oryzalin, dimethyl. INST: CR 5149.
Oxadiazon. INST: CR 5176.
Oxamino methomyl. INST: CR 4521.
Oxamino oxamyl. INST: CR 5187.
Oxamyl. INST: C-147, NSI 0716.
Oxychlordane. INST: CR 5200. TISS: SRS903.
Oxydemeton methyl. INST: CR 5220.
Oxyfluorfen. INST: CR 5230.
Oxythioquinox. INST: CR 4800.
p,p'-DDA. INST: CR 1740.
p,p'-DDD olefin. INST: CR 1800.
p,p'-Methoxychlor. INST: C-093, C-143, CR 4541, NSI 0952.
p,p'-TDE. INST: P11-27.
p,p'-TDE (olefin). INST: P11-29.
p-Benzoquininone. INST: NSI 0674.
p-Cresol. INST: C-151, NSI 0252. OIL: * SRM 1580.
p-Dioxane. INST: NSI 0480.
p-Isopropyltoluene. INST: VOB.
p-Nitroaniline. INST: C-075, NSI 0342.
p-Xylene. INST: C-027, C-138H, C-138L, NSI 0203, VOC-1.
Paraquat chloride. INST: P16-22.
Paraquat dichloride. INST: CR 5240.
PCB 1. INST: CPCB 006, PCG.
PCB 10. INST: CPCB 015.
PCB 100. INST: CPCB 042.
PCB 101. INST: CLB-1, CPCB 039, CRM 294, CRM 365, PCG, SRM 1585. OIL: CRM 349, CRM 350, SRM 1588. SED: HS-1, HS-2, IAEA-357, * SRM 1939, * SRM 1941. SLUD: CRM 176. TISS: IAEA-351, MA-B-3/OC, * SRM 1974.
PCB 103. INST: CLB-1, CPCB 040.
PCB 104. INST: CPCB 043, PCG.
PCB 105. INST: CLB-1, CPCB 098, PCG. SED: * IAEA-357, * SRM 1941. TISS: * SRM 1974.
PCB 11. INST: CPCB 010.
PCB 110. INST: CPCB 133.
PCB 112. INST: CPCB 070.
PCB 114. INST: CLB-1, CPCB 108.
PCB 115. INST: CPCB 071.
PCB 116. INST: CPCB 037.
PCB 118. INST: CLB-1, CPCB 106, CRM 295, CRM 365, PCG. OIL: CRM 349, CRM 350. SED: * IAEA-357, * SRM 1939, * SRM 1941. SLUD: CRM 176. TISS: IAEA-351, * SRM 1974.
PCB 119. INST: CPCB 044.
PCB 12. INST: CPCB 016, NSI 0107.
PCB 121. INST: CLB-1, CPCB 045.
PCB 122. INST: CPCB 117.
PCB 124. INST: CPCB 134.
PCB 126. INST: CPCB 102. INST: PCG.
PCB 127. INST: CPCB 132.
PCB 128. INST: CLB-1, CPCB 049, PCG. OIL: * CRM 349, * CRM 350. SED: * IAEA-357, * SRM 1939. TISS: * SRM 1974.
PCB 129. INST: CLB-1, CPCB 052.
PCB 13. INST: CPCB 112.
PCB 133. INST: CPCB 114.
PCB 136. INST: CPCB 067.
PCB 137. INST: CLB-1.
PCB 138. INST: CLB-1, CPCB 053, CPCB 088, CRM 296, CRM 365, PCG, SRM 1585. OIL: CRM 350, SRM 1588. SED: HS-1, HS-2, * SRM 1939, * SRM 1941. TISS: IAEA-351, * SRM 1974.
PCB 138+163. OIL: * CRM 349, * CRM 350. SED: IAEA-357. SLUD: * CRM 176.
PCB 139. INST: CPCB 056.
PCB 14. INST: CPCB 017.
PCB 141. INST: CLB-1, CPCB 050.
PCB 143. INST: CLB-1, CPCB 054.
PCB 15. INST: CLB-1, SRM 1585.
PCB 151. INST: CLB-1, CPCB 051. SED: HS-1, HS-2.
PCB 153. INST: CLB-1, CLB-2, CPCB 047, CRM 297, CRM 365, PCG, SRM 1585. OIL: CRM 349, CRM 350, SRM 1588. SED: HS-1, HS-2, * IAEA-357, * SRM 1941. SLUD: CRM 176. TISS: IAEA-351, MA-B-3/OC, * SRM 1974.
PCB 154. INST: CLB-1.
PCB 155. INST: CPCB 046.
PCB 156. INST: CLB-1. SED: * IAEA-357.
PCB 158. INST: CPCB 109.
PCB 159. INST: CLB-1, CPCB 055, CPCB 113.
PCB 16. INST: CPCB 092.
PCB 163. TISS: * SRM 1974.
PCB 164. TISS: * SRM 1974.
PCB 166. INST: CPCB 115.
PCB 167. INST: CPCB 100.
PCB 169. INST: CPCB 490.
PCB 170. INST: CLB-1, CPCB 110, PCG. OIL: SRM 1588. SED: HS-1, HS-2, IAEA-357, * SRM 1939, * SRM 1941.
PCB 171. INST: CLB-1, CPCB 072.
PCB 173. INST: CLB-1.
PCB 18. INST: CLB-1, CPCB 021, PCG. SED: * SRM 1939, * SRM 1941. TISS: * SRM 1974.
PCB 180. INST: CLB-1, CPCB 094, CRM 298, CRM 365, PCG. OIL: CRM 349, CRM 350, SRM 1588. SED: HS-1, HS-2, * IAEA-357,

* SRM 1939, * SRM 1941. SLUD: CRM 176. TISS: IAEA-351, * SRM 1974.
PCB 181. INST: CPCB 103.
PCB 182. INST: CLB-1. TISS: * SRM 1974.
PCB 183. INST: CLB-1, CPCB 137.
PCB 185. INST: CLB-1, CPCB 135.
PCB 186. INST: CPCB 058.
PCB 187. INST: CLB-1, CPCB 074, PCG. SED: * SRM 1939, * SRM 1941. TISS: * SRM 1974.
PCB 188. INST: CPCB 077, PCG.
PCB 189. INST: CLB-1, CPCB 073.
PCB 19. INST: CPCB 139.
PCB 190. INST: CPCB 057.
PCB 191. INST: CLB-1.
PCB 194. INST: CLB-1, CPCB 116. OIL: * CRM 349, * CRM 350. SED: HS-1, HS-2, * IAEA-357.
PCB 195. INST: CLB-1, CPCB 111, PCG. SED: * SRM 1941.
PCB 196. INST: CLB-1. SED: HS-1, HS-2.
PCB 199. INST: CLB-1, CPCB 095. SED: HS-1, HS-2.
PCB 2. INST: CPCB 007.
PCB 20. INST: CPCB 104, CRM 290, CRM 365.
PCB 200. INST: CPCB 082, PCG.
PCB 201. INST: CLB-1, CPCB 075.
PCB 202. INST: CLB-1, CPCB 068.
PCB 203. INST: CLB-1.
PCB 204. INST: CPCB 078.
PCB 205. INST: CLB-1, CPCB 140.
PCB 206. INST: CLB-1, CPCB 059, PCG. SED: * SRM 1941.
PCB 207. INST: CLB-1, CPCB 080.
PCB 208. INST: CLB-1, CPCB 081.
PCB 209. INST: CLB-1, CPCB 060, PCG. SED: HS-1, HS-2, * SRM 1941.
PCB 21. INST: CPCB 018.
PCB 22. INST: CPCB 118.
PCB 24. INST: CPCB 083.
PCB 25. INST: CPCB 121.
PCB 26. INST: CPCB 022. SED: SRM 1939.
PCB 27. INST: CPCB 120.
PCB 28. INST: CPCB 084, CRM 291, CRM 365, PCG, SRM 1585. OIL: CRM 349, CRM 350. SED: * IAEA-357, SRM 1939, * SRM 1941. SLUD: CRM 176. TISS: * SRM 1974.
PCB 29. INST: CPCB 019, PCG.
PCB 3. INST: CPCB 008, SRM 1585.
PCB 30. INST: CPCB 020.
PCB 31. INST: CLB-1, CPCB 023. SED: * SRM 1939.
PCB 33. INST: CPCB 062.
PCB 34. INST: CPCB 123.
PCB 35. INST: CPCB 107, CRM 292, CRM 365.
PCB 36. INST: CPCB 122.
PCB 37. INST: CPCB 119.
PCB 38. INST: CPCB 124.
PCB 39. INST: CPCB 125.
PCB 4. INST: CPCB 009.
PCB 40. INST: CLB-1, CPCB 065.
PCB 42. INST: CPCB 105.
PCB 44. INST: CLB-1, CPCB 029, PCG. OIL: * CRM 349. SED: * IAEA-357, SRM 1939. TISS: * SRM 1974.
PCB 47. INST: CPCB 035.
PCB 48. INST: CPCB 136.
PCB 49. INST: CLB-1, CPCB 030. SED: * SRM 1939.
PCB 5. INST: CPCB 012.
PCB 50. INST: CPCB 024, PCG.
PCB 52. INST: CLB-1, CPCB 031, CRM 293, CRM 365, PCG, SRM 1585. OIL: CRM 349, CRM 350. SED: IAEA-357, * SRM 1939, * SRM 1941. SLUD: CRM 176. TISS: * SRM 1974.
PCB 53. INST: CPCB 032.
PCB 54. INST: CLB-1, CPCB 066.
PCB 55. INST: CPCB 126.
PCB 58. INST: CPCB 128.
PCB 6. INST: CPCB 101.
PCB 60. INST: CLB-1, CPCB 093.
PCB 61. INST: CPCB 027.
PCB 65. INST: CPCB 028.
PCB 66. INST: CPCB 086, PCG. SED: * SRM 1939, * SRM 1941. TISS: * SRM 1974.
PCB 69. INST: CPCB 025.
PCB 7. INST: CPCB 013.
PCB 70. INST: CPCB 033.
PCB 72. INST: CPCB 034.
PCB 74. INST: CPCB 138.
PCB 75. INST: CPCB 026.
PCB 77. INST: CLB-1, CPCB 036, PCG, SRM 1585.
PCB 78. INST: CPCB 127.
PCB 79. INST: CPCB 129.
PCB 8. INST: CPCB 089, CRM 289, CRM 365, PCG.
PCB 80. INST: CPCB 091.
PCB 81. INST: CPCB 096.
PCB 86. INST: CLB-1, CPCB 038.
PCB 87. INST: CLB-1, CPCB 099, PCG.
PCB 88. INST: CPCB 041, CPCB 097.
PCB 9. INST: CPCB 014.
PCB 90. TISS: * SRM 1974.
PCB 93. INST: CPCB 069.

PCB 95. INST: CPCB 130.
PCB 97. INST: CPCB 087.
PCB 98. INST: CPCB 141.
PCB 108. INST: CPCB 131.
PCBs. SED: EC-1, * EC-2, * EC-3, * EC-4, * EC-5, * EC-6, * EC-7.
Pebulate. INST: CR 5300.
Pendimethalin. INST: CR 5331.
Pentachlorobenzene. INST: NSI 0260. SED: EC-2, EC-3, * EC-4, * EC-5, * EC-6, * EC-7.
Pentachloroethane. INST: NSI 0300.
Pentachloronitrobenzene. INST: CR 5280, NSI 0159, P11-25.
Pentachlorophenol. INST: C-148, C-151, CR 5260, GAC, NSI 0062, P16-23, SRM 1584. SOIL: SRS103-100, SRS103-100.
Pentachlorophenol-$^{13}C_6$. INST: NSI 0191.
Perfluidone. INST: CR 5366.
Permethrin, mixed isomers. INST: CR 5373.
Perylene. ASH: * SRM 1649, * SRM 1650. INST: SRM 1491, SRM 2260. OIL: SRM 1580, SRM 1582. SED: * EC-1, * EC-2, * EC-3, * EC-4, * EC-5, SRM 1941. TISS: SRM 1974.
Phenacetin. INST: NSI 0295.
Phenanthrene. ASH: * SRM 1649, * SRM 1650. INST: C-098H, C-098L, GBN-1, NSI 0079, PNA-2, SRM 1491, SRM 1647b, SRM 2260. OIL: SRM 1582, SRS954. SED: EC-1, * EC-2, EC-3, * EC-4, * EC-5, * EC-6, * EC-7, HS-3, HS-4, HS-5, HS-6, IAEA-357, SES-1, SRM 1941. SLUD: SRS101-100. SOIL: SRS103-100, SRS103-100. TISS: SRM 1974.
Phenanthrene-d_{10}. INST: NSI 0188.
Phenanthridine. OIL: * SRM 1580.
Phenanthro[3,4-c]phenanthrene. INST: SRM 869, SRM 869.
Phenmedipham. INST: CR 5410.
Phenol. INST: C-148, GAC, NSI 0063, QCS-PHEN, SRM 1584, SRM 1586. OIL: SRM 1580, * SRM 1582.
Phenol-d_5. INST: C-131, NSI 0189, SRM 1586.
Phenothiazine. INST: CR 5420.
Phenylmercury acetate. INST: CR 5680.
Phenylmercury borate. INST: CR 5460.
Phenylmercury chloride. INST: CR 5480.
Phenylmercury hydroxide. INST: CR 5485.
Phenylmercury iodide. INST: CR 5487.
Phorate. INST: CR 5500.
Phorate sulfoxide. INST: CR 5502.
Phosalone. INST: CR 5520.
Phosfolan. INST: CR 1610.
Phosmet. INST: CR 4000.
Phosmet oxygen analog. INST: CR 4001.
Phosphamidon. INST: CR 5580.
Phthalic acid, dimethyl-d_6 ester. INST: NSI 0192.
Phthalic anhydride. INST: NSI 0293.
Phytane. SED: IAEA-357.
Picloram. INST: CR 5600, NSI 0713.
Piperalin. INST: CR 5640.
Piperonyl butoxide. INST: CR 5620, P16-25.
Pirimicarb. INST: CR 5632, P16-26.
Pirimiphos-ethyl. INST: CR 5642.
Pirimiphos-methyl. INST: CR 5643, P12-08.
Plantvax. INST: CR 5670.
Potassium azide. INST: CR 5728.
Potassium diethyl dithiophosphate. INST: CR 5731.
Potassium diethyl thiophosphate. INST: CR 5732.
Potassium dimethyl dithiophosphate. INST: CR 5733.
Potassium dimethyl thiophosphate. INST: CR 5734.
Procyazine. INST: CR 5739.
Profenophos. INST: CR 5742.
Profluralin. INST: CR 5746.
Promecarb. INST: CR 5752.
Prometon. INST: CR 5760.
Prometryn. INST: CR 5780, P16-27.
Pronamide. INST: CR 4090.
Propane. GAS: GBW 08129, GBW 08130, GBW 08131, GBW 08132, SRM 1660a, SRM 1665b, SRM 1666b, SRM 1667b, SRM 1668b, SRM 1669b, SRM 2645a, SRM 2646a, SRM 2647a, SRM 2648a, SRM 2649a, SRM 2650, SRM 2651, SRM 2652, SRM 2725, SRM 2726, SRM 2727, SRM 2728.
Propanil. INST: CR 5840.
Propargite. INST: CR 5160.
Propargyl alcohol. INST: C-142, NSI 0543.
Propazine. INST: CR 5800.
Propetamphos. INST: P12-09.
Propham. INST: CR 5860.
Propionic acid. INST: NSI 0673.
Propionitrile. INST: NSI 0338.
Propoxur. INST: C-147, CR 0440, P16-28.
Propylene. GAS: GBW 08132.
Protect. INST: CR 5882.
Pyracarbolid. INST: CR 5905.
Pyrazon. INST: CR 5925.
Pyrazophos. INST: CR 5932.

Pyrene. ASH: * SRM 1649, SRM 1650. INST: C-098H, C-098L, CRM 177, GBN-1, NSI 0082, PNA-1, SRM 1491, SRM 1647b, SRM 2260. OIL: SRM 1580. OIL: * SRM 1582. SED: EC-1, EC-2, EC-3, * EC-4, * EC-5, * EC-6, * EC-7, HS-3, HS-4, HS-5, HS-6, IAEA-357, SES-1, SRM 1941. SLUD: SRS101-100. SOIL: SRS103-100, SRS103-100. TISS: SRM 1974. OIL: SRS954.
Pyrethrins, mixed. INST: CR 5940.
Pyridine. INST: C-155, NSI 0271.
Quinalphos. INST: CR 5966.
Quinoline. INST: NSI 0660.
Release. INST: CR 6022.
Reserpine. INST: NSI 0559.
Resmethrin. INST: CR 6055.
Resorcinol. INST: NSI 0700.
Ronnel. INST: CR 5980.
Rotenone. INST: CR 6000.
S-Bioallethrin. INST: CR 0735.
Safrole. INST: NSI 0366.
Salithion. INST: CR 6050.
sec-Butylbenzene. INST: C-140H, C-140L, NSI 1104, VOB.
Sethoxydim. INST: CR 6068.
Siduron. INST: CR 6100.
Silvex, Propylene glycol butyl ester ether. INST: CR 6140.
Simazine. INST: CR 6160, NSI 1094, P16-29.
Sodium azide. INST: CR 6172.
Sodium o-phenylphenate. INST: CR 2800.
Sodium pentachlorophenate. INST: CR 2820.
Strobane. INST: CR 6240.
Strychnine. INST: NSI 0570.
Styrene. INST: C-092, C-133H, C-133L, NSI 0257, VOC-1.
Sulprophos. INST: CR 6350.
Tecnazene. INST: CR 6435, P11-30.
Temephos. INST: CR 0020.
Terbacil. INST: CR 6560.
Terbufos. INST: CR 6573.
Terbutryn. INST: CR 3980, P16-30.
Terbutylazine. INST: CR 6589.
tert-Butylbenzene. INST: C-138H, C-138L, NSI 1106, VOB.
Tetrachloroethylene. GAS: SRM 1804, SRM 1808, SRM 1809, SRM 1813, SRM 1814. INST: C-028, C-134H, C-134L, NSI 0083, SRM 1639, VOA-1.
Tetrachlorvinphos. INST: CR 3740.
Tetradifon. INST: CR 6600.
Tetrahydrofuran. INST: NSI 0685.
Tetramethrin. INST: CR 6608.
Tetramethylthiuram disulfude. INST: NSI 0379.
Tetrasul. INST: CR 6630.
Thanite. INST: CR 6640.
Thiabendazole. INST: CR 6660, P12-10.
Thidiazuron. INST: CR 6661.
Thioacetamide. INST: NSI 0513.
Thiobencarb. INST: CR 0570.
Thiofanox. INST: CR 6663.
Thiometon. INST: CR 6665.
Thiophanate. INST: CR 6670.
Thiophanate methyl. INST: CR 6671.
Thiosemicarbazole. INST: NSI 0341.
Thiourea. INST: NSI 0294.
Thiram. INST: CR 6680.
Toluene. GAS: SRM 1804, SRM 1811, SRM 1812. INST: C-027, C-092, C-134H, C-134L, NSI 0084, VOA-2.
Toluene-d_8. INST: C-158.
Tolylfluanid. INST: CR 6700.
Toxaphene. INST: CL2, CR 6740, NSI 0111.
trans-1,2-Dichloroethylene. INST: C-139H, C-139L, NSI 0028, VOA-1.
trans-1,3-Dichloro-1-propene. INST: C-139H. INST: C-139L.
trans-Chlordane. OIL: SRM 1588. TISS: SRS903.
trans-Nonachlor. INST: SRM 1492, SRM 2261. OIL: SRM 1588. SED: * SRM 1941. TISS: * SRM 1974, SRS903.
trans-Permethrin. INST: P17-02.
Triallate. INST: CR 6770.
Triazophos. INST: CR 6777.
Trichlorfon. INST: CR 6780.
Trichloroacetic acid. INST: CR 6438.
Trichlorodibenzo-p-dioxin. INST: SRM 1614.
Trichlorodibenzo-p-dioxin-$^{13}C_{12}$. INST: SRM 1614.
Trichloroethylene. GAS: SRM 1804. INST: C-028, C-134H, C-134L, NSI 0085, SRM 1639, VOA-2.
Trichlorofluoromethane. GAS: SRM 1804. INST: C-137, NSI 0047.
Triclopyr. INST: CR 6786.
Tridemorph. INST: CR 6792.
Trietazine. INST: CR 6796. INST: P16-31.
Triethylamine. INST: NSI 0702.
Trifluralin. INST: CR 6800.
Triforine. INST: CR 6822.
Triphenylene. ASH: * SRM 1649. INST: CRM 270.
Triphenylene. SED: * SRM 1941. TISS: * SRM 1974.

Urethane. INST: NSI 0306.
Vernolate. INST: CR 7020.
Vinyl acetate. INST: NSI 0327.
Vinyl chloride. GAS: SRM 1804, SRM 1813, SRM 1814. INST: C-135, NSI 0536.
Warfarin. INST: CR 7060.
Xylenes. INST: C-027.
Zineb. INST: CR 7120.
Ziram. INST: CR 7100.