$$x=2y$$

$$\frac{\text{New volume}}{\text{Old volume}}=\frac{298+x}{298}$$

91 = initial grams per cubic meter.

$$\frac{91-\frac{x}{2}}{\frac{298+x}{298}}=\text{final grams of vapor per cubic meter.}$$

We can assume any value we like for x and compute from the last equation the corresponding vapor density. If this value is too great for normal saturation at the absolute temperature $298+x$ then x is too small; and conversely, when the computed value is less than that required for saturation. In this way an approximately correct value of x is readily determined.

It turns out that, under the assumed conditions, namely, fourfold supersaturation at 25° C. $x=22°.5$.

Vapor condensed, $y=\frac{x}{2}=11.25$ grams per initial cubic meter, leaving 79.75 grams per initial cubic meter uncondensed.

Violent convection will occur, owing to the great heating, and continue until very little vapor is left. As a rough approximation let all the water vapor be condensed. The heating would be $x=2y$, but y is 91, the initial grams per cubic meter. Hence $x=182°$ C., and the temperature would be 207° C. This would cause the air to ascend into the stratosphere, and to reach the temperature of this region, say −53° C., the cooling would need to be 260° C., and the ascent, if along the dry adiabat, 26 kilometers. Actually the condensation and resulting cumulus cloud would be all along the route of ascent.

But cumulus clouds of such great heights have never been observed.

The conclusions are:

1. It does not appear possible for any appreciable supersaturation to occur in the atmosphere, much less a fourfold supersaturation that would be necessary to condensation on negative ions.

2. The inevitable consequences of such a supersaturation are not known to occur.

Presumably, therefore, such supersaturation does not and cannot occur in the free air. Presumably also the unwarranted assumption that it does so occur still has a long lease of life in our scientific literature and even immortality in popular writings.

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SOLAR OBSERVATIONS

By IRVING F. HAND, Assistant in Solar Radiation Investigations

For a description of instruments employed and their exposures, the reader is referred to the January 1932, REVIEW, page 26.

Table 1 shows that solar radiation intensities averaged above normal for October at all three Weather Bureau stations.

Table 2 shows an excess in the total solar radiation received on a horizontal surface at all stations for which normals have been computed, with the exception of Twin Falls and Miami.

Since the installation of a new blast furance by the Research Corporation on the campus of the American University, smoke and gases have at times so vitiated the atmosphere as seriously to interfere with normal-incidence measurements, as shown in table 3.

Polarization measurements made on 5 days at Washington give a mean of 59 percent with a maximum of 63 percent on the 10th. At Madison, measurements made on 6 days give a mean of 69 percent with a mximum of 76 percent on the 2d. These values are slightly higher than the October normals at both stations.

TABLE 1.—*Solar radiation intensities during October, 1933*

[Gram-calories per minute per square centimeter of normal surface]

WASHINGTON, D.C.

Date	Sun's zenith distance										
	8 a.m.	78.7°	75.7°	70.7°	60.0°	0.0°	60.0°	70.7°	75.7°	78.7°	Noon
	75th mer. time	Air mass									Local mean solar time
		A.M.					P.M.				
	e.	5.0	4.0	3.0	2.0	1.0[1]	2.0	3.0	4.0	5.0	e.
	mm	*cal*	*cal*	*cal*	*cal*	*cal*	*cal*	*cal*	*cal*	*cal*	*mm*
Oct. 2	8.48	0.75	1.00	1.15	1.27		1.26				7.57
Oct. 5	10.59		.44								9.83
Oct. 6	7.57	.91	1.03	1.16	1.31	1.49	1.33	1.11	1.00	0.87	6.76
Oct. 7	6.76	.73	.94	1.02	1.18	1.44					8.18
Oct. 10	7.87	.68	.83	.99	1.10						6.02
Oct. 12	8.18				1.04						10.59
Oct. 14	6.02		.96	.99							4.17
Oct. 19	6.02			1.10							4.95
Oct. 20	6.27				1.06						8.18
Oct. 26	2.74	.94	1.05	1.12	1.30		1.16	1.02			3.30
Oct. 27	4.75						1.12	.98			6.27
Oct. 30	6.27	.44	.66	.85							9.73
Oct. 31	8.48	.56	.64	.82	1.04						10.97
Means		.72	.84	1.02	1.16	(1.46)	1.22	1.04	(1.00)	(.87)	
Departures		−.03	±.00	+.06	+.04	+.05	+.09	+.10	+.19	+.15	

MADISON WIS.

Oct. 2	5.16		0.99	1.18	1.33	1.52					4.95
Oct. 3	5.56		.88								6.27
Oct. 4	7.04				1.23						7.29
Oct. 5	6.50		.83		1.21	1.52					7.04
Oct. 11	7.29			1.07			1.27				7.29
Oct. 12	5.36	.98	1.08	1.20							4.17
Oct. 13	4.57	.86	.94								4.37
Oct. 18	4.57				1.34	1.54					3.30
Oct. 25	2.74	1.06	1.11	1.18							2.87
Oct. 30	9.47		.08	.89	1.08		1.10				11.38
Oct. 31	10.21	.66	.79	.87	1.12		1.13				11.81
Means		.89	.91	1.06	1.22	1.53	1.17				
Departures		+.11	−.01	+.02	+.03	+.09	−.02				

[1] Interpolated.

TABLE 1.—*Solar radiation intensities during October, 1933*—Con.

LINCOLN, NEBR.

Date	Sun's zenith distance										
	8 a.m.	78.7°	75.7°	70.7°	60.0°	0.0°	60.0°	70.7°	75.7°	78.7°	Noon
	75th mer. time	Air mass									Local mean solar time
		A.M.					P.M.				
	e.	5.0	4.0	3.0	2.0	1.0	2.0	3.0	4.0	5.0	e.
	mm	*cal*	*cal*	*cal*	*cal*	*cal*	*cal*	*cal*	*cal*	*cal*	*mm*
Oct. 1	5.79					1.54	1.32	1.14	1.03	0.93	4.17
Oct. 2	5.36		1.06	1.23	1.35	1.46					4.57
Oct. 4	7.57	0.87	.98	1.10	1.28	1.39	1.29	1.14	1.00	.88	6.76
Oct. 5	5.79	.76	.84	1.04	1.28	1.49	1.26	1.07	.92	.82	7.29
Oct. 6	6.50	.84	.98	1.10	1.29	1.54					4.75
Oct. 7	4.37	.98	1.06	1.20	1.36	1.59					4.17
Oct. 9	4.37	.67	.82	.87	1.19	1.52	1.34	1.16	1.07	.96	5.16
Oct. 10	5.16					1.51	1.23	1.00	.90	.82	6.76
Oct. 11	6.27	.71	.85	1.01	1.20	1.40					5.36
Oct. 12	4.17		.92	1.05	1.38						4.75
Oct. 13	4.17		.94		1.30	1.46	1.20	1.01	.85	.73	5.36
Oct. 16	5.36		1.11	1.24							4.57
Oct. 26	4.96								1.00	.90	5.16
Oct. 28	6.76	.70	.88	1.03	1.18						7.57
Oct. 29	4.75						1.18	1.01	.86	.75	10.21
Oct. 30	10.59	.70	.82	.98	1.14		1.15	.94	.80	.70	10.59
Oct. 31	11.35		.85	1.01	1.21						11.38
Means		.78	.93	1.08	1.26	1.49	1.25	1.06	.94	.83	
Departures		−.06	−.01	−.02	−.02	+.01	+.00	−.02	−.01	−.01	

BLUE HILL, MASS.

Oct. 2	9.8						1.15	1.02			9.0
Oct. 3	6.3				1.10						5.7
Oct. 6	9.5							.97			8.3
Oct. 8	7.9			1.24	1.40		1.26	1.14	1.00		7.1
Oct. 10	9.1			1.01	1.22		1.20			0.68	5.4
Oct. 11	7.3				1.27						6.9
Oct. 12	9.5			1.00	1.09		1.02	.83			9.5
Oct. 14	4.4				1.33		1.37	1.28	1.19		4.1
Oct. 15	4.4			1.19	1.29		1.26	1.05	.91	.79	4.0
Oct. 16	7.0						1.28	1.11	.97	.85	6.8
Oct. 18	5.8				1.23						3.3
Oct. 19	4.6				1.35		1.21	.74			3.0
Oct. 21	4.4				1.30						5.5
Oct. 25	5.0			1.16							2.9
Oct. 26	2.7				1.38		1.37	1.11	1.01		1.7
Oct. 29	3.7				1.37						1.7
Oct. 30	3.4			1.17	1.17			.94	.77		4.7
Oct. 31	5.0			.81	.89		.82	.49			7.5
Means				1.08	1.24		1.19	.97	.68	.77	

*Extrapolated.