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## Substances Dissolved in Rain and Snow

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## SUBSTANCES DISSOLVED IN RAIN AND SNOW

H. S. FRIES AND NICHOLAS KNIGHT

Considerable interest has been shown throughout the country on the determination of the character and quantity of substances dissolved in rain and snow. The accompanying article is a continuation of the record of the analyses of rain and snow which have been carried on at Cornell College for a number of years.

The samples that were analysed were collected in enamelware pans near the center of the town. The town of Mount Vernon is seventeen miles from Cedar Rapids, the nearest manufacturing center, and the town itself has no industries of its own.

Forty-one samples of rain and snow were collected and analysed. During the period from September 19, 1921, to June 2, 1922, there was a total precipitation of 17.46 inches of rain, including snows. Twelve inches of snow were taken to equal one inch of rain.

The total pounds of nitrogen in nitrates per acre were 1.074. In order to determine the number of pounds of each substance that fell per acre, we took 226,000 pounds to be the weight of one inch of rain on an acre. We found there were 0.183 pounds of nitrogen in nitrites per acre. The total pounds of free ammonia per acre were 1.843. The total pounds of albuminoid ammonia per acre were 1.327. The precipitation of sulphates as  $\text{SO}_4$  was 0.6919 pound per acre. The total pounds of chlorine as chlorides were 7.942 per acre.

These analyses were carried on under ordinary laboratory conditions, at the same time avoiding unnecessary contamination during processes. The samples were analysed as soon after their collection as possible.

It is interesting to note that the rainfall during the latter part of October and the latter part of February was approximately the same, and the highest point reached in each case was exactly the same. Also, the rainfall during December and April was approximately the same, again reaching the same high point in waterfall. This same phenomenon was again observed for the months of November and March. The high points for these two months were 0.50 and 0.52 respectively.

CORNELL COLLEGE,  
MOUNT VERNON, IOWA.

DATE	PRECIPITATION	NITRATES	NITRITES	FREE AMMONIA	ALBUMINOID AMMONIA	SULPHATES	CHLORINE
	Inches	Lb. Per Acre	Lb. Per Acre	Lb. Per Acre	Lb. Per Acre	Lb. Per Acre	Lb. Per Acre
1921							
September 19.....	1.00	.00904	.04520	.01808	.18080	.025538	.32092
September 20.....	.35	.01130	.00226	.07232	.03073	None	.32092
September 24.....	.55	.05650	.00226	.06328	.08588	X	.32092
September 29.....	.15	.03390	.00226	.06328	.05424	X	.32092
October 1.....	.40	.01130	.00226	.08136	.07232	X	.16046
October 6.....	.33	.03390	.00226	.07232	.08136	.023956	.16046
October 15.....	.25	.02260	.04520	.07232	.08136	.095824	.32092
October 17.....	.20	.07910	.02260	.06328	.07232	X	.16046
October 26.....	.15	.02260	X	X	.07232	X	X
October 29.....	1.00	.01130	.02260	.04520	.06328	X	.16046
October 30.....	.20	.01130	Trace	.07232	.08136	X	.16046
November 8.....	.25	.06780	None	.06328	.07232	X	.16046
November 11.....	.50	.05650	None	.05424	.07232	.025538	.16046
November 18.....	.16	X	X	.01130	.06328	X	.48138
December 2.....	1.00	.02260	.00226	.01130	X	X	.16046
December 17.....	1.00	.03390	Trace	.03616	.06328	.023052	.16046
December 24.....	.52	.03390	X	.01130	.03073	.020792	.16046
1922							
January 4.....	.75	.02260	X	.01130	.06328	.014012	.16046
February 1.....	.20	.04520	X	.03616	.04520	.009718	.32092

Fries and Knight: Substances Dissolved in Rain and Snow

February 22.....	1.00	.01130	X	.03616	.04520	.031188	.16046
February 26.....	.25	.01130	X	X	X	.029832	.32092
March 2.....	.52	.01130	X	.02938	.04524	.005198	.32092
March 18.....	.25	.01130	.02260	.02938	X	.047008	.32092
March 27.....	.25	.01130	X	.02938	.04520	.004746	.16046
March 30.....	.25	.02260	.01130	.05424	.08136	.003164	.16046
April 1.....	.12	.01130	X	.05424	.07232	.006780	.32092
April 5.....	.12	.01130	X	X	X	.005750	.16046
April 7.....	.12	None	X	.05424	.08136	.022826	.16046
April 9.....	1.00	.02260	X	.04520	.07232	.025764	None
April 11.....	1.00	.02260	X	.06328	.08136	.036160	.16046
April 17.....	.38	.01130	X	.05424	.07232	.225548	.16046
April 24.....	.38	.03390	X	.04520	.06328	.024860	None
May 5.....	.25	.02260	X	.05424	.08138	.020792	.32092
May 8.....	.20	.03390	X	.05424	.07232	.041810	.16046
May 8.....	.40	.01130	X	.05424	.07232	.046330	.16046
May 11.....	.10	.02260	X	.04520	.06328	.072998	.08023
May 14.....	.01	.03390	X	.05424	.07232	.022600	.16046
May 18.....	.20	.02260	X	.04520	X	X	.16046
May 24.....	1.15	.03390	X	.05424	X	X	.32092
May 31.....	.45	.01130	X	.06328	X	X	X
June 2.....	.10	.02260	X	.05424	X	X	X
Total.....	17.46	1.07410	.18276	1.84281	1.32714	.691884	7.94177

X Means not tested.

Diagram — Fluctuations of Rainfall from Sept. 19, 1921 to June 2, 1922.

