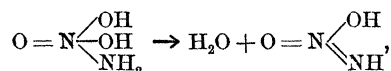


but this compound is unstable and it loses water to form $\text{H}_2\text{N}_2\text{O}$,



and finally this $\text{H}_2\text{N}_2\text{O}$ loses another molecule of water to form $\text{O}=\text{N} \equiv \text{N}$ in which one atom of nitrogen has a negative valence of three and the other a positive valence of five as in the original molecule of ammonium nitrate. In other words, neither atom of nitrogen has experienced any change with regard to its state of oxidation.

This hypothesis is certainly no more difficult to understand than many hypotheses which have been advocated in the past by chemists in both the so-called "organic" and "inorganic" fields. It is objectionable, however, because it assumes the formation of two very unstable, hypothetical, intermediate products. These intermediate compounds are certainly not very well known and there appears to be no proof of their formation during the progress of the reaction in question. Such a hypothesis is in line with the assumption of "nascent hydrogen" being formed when a chemical reduction is accomplished by a metal far above hydrogen in the electromotive series and it reminds one of the "primary products" which electro-chemists formerly believed to be formed as a result of electrolysis.

Such an explanation, moreover, is contrary to the evidence which can be deduced from the behavior of other ammonium salts upon ignition. It loses sight of the fact that nitrogen in its lowest state of oxidation is relatively unstable and easily oxidized and of the fact that nitrogen in its highest state of oxidation is easily reduced. In general, when an element is present in a compound in two states of oxidation, the decomposition of the compound is likely to result in the element assuming a state of oxidation intermediate between the two states in which it previously existed.

When ammonium dichromate is heated, nitrogen gas is evolved and chromic oxide is

left behind. Heating ammonia sulfate results in the formation of nitrogen and sulfur dioxide. When ammonium nitrate is heated one atom of nitrogen is oxidized to form free nitrogen and the other is reduced to form nitrogen. In this case, Noyes would assume that neither atom of nitrogen is affected by oxidation or reduction but does not all our information with regard to the stability of ammonia and of nitrous acid make it seem simpler to assume that the polarity of nitrogen is zero when in the free condition rather than to insist that one atom has a positive valence of three and the other a negative valence of three?

Finally, Noyes claims that his formula seems more in accord with the ease with which nitrous oxide gives up its oxygen. As one writes the formula on paper it seems very easy to take away the oxygen from the $\text{O}=\text{N} \equiv \text{N}$ molecule and "organic" chemists always love to get atoms on the blackboard where they can easily erase them to show students how new compounds are formed, but it isn't quite clear why ammonium nitrate should withstand strong ignition without any effect upon the state of oxidation of either atom of nitrogen and yet after undergoing all this severe treatment, with the nitrous oxide retaining one nitrogen like that of nitric acid and the other like that of ammonia, be very susceptible to reduction. It would seem far simpler to assume that nitrogen with a valence of one is easily reduced.

The writer has respect for the views of Professor Noyes and has been under obligation to him in the past for helpful advice. He rejoices to learn that Professor Noyes is willing to accept much of the modern theory of valence.

WILLIAM T. HALL

CAMBRIDGE

A SNOW EFFECT

TO THE EDITOR OF SCIENCE: On March 3 of the present year a very interesting snow effect occurred in Orono and vicinity, which is perhaps worth recording in the columns of SCIENCE. The writer has not been able to find any one who ever saw a similar effect, and it

would be interesting to know if others have observed anything like it in other localities.

About four inches of light dry snow fell during the afternoon and night of March 2. Towards the end of the storm the flakes were very large and the wind blew at a considerable velocity. This high wind continued most of the day of March 3. After the sun had been shining on the snow for three or four hours and had probably formed a thin layer of moist snow on top, the wind would catch up a portion of this moist snow and roll it over and over, forming a snowball of increasing size until the gust of wind had spent its energy, or the ball had become too large to be rolled any farther. Some people who saw this process taking place said that the fields were literally alive with moving snowballs. This peculiar phenomenon continued until about noon and the fields around Orono and Bangor were left with countless snowballs everywhere. Back of each snowball could be seen the triangular shaped path, from which the snow had been rolled up. In one instance this triangle was found to be approximately thirty-six feet in length, but that was for an unusually large snowball. The snowballs were of all sizes, from two or three inches in diameter up to nearly two feet. Of course the largest ones were formed where the ground sloped so that the ball rolled down hill, but even on the level some of the balls were a foot or more in diameter. One ball in particular, on which measurements were taken and recorded, was elliptical in shape, the horizontal diameter being twenty inches and the vertical diameter being fourteen inches. LEON ELMER WOODMAN

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ON MEASURING THE DENSITY OF THE "17-YEAR LOCUST" POPULATION

TO THE EDITOR OF SCIENCE: According to the Bulletin of the Department of Agriculture No. 127, on the "17-year locust" of 1919 there was to be expected a very dense population of locusts this summer in the eastern and southern states. Brood 10 of the "17-year locust" and brood 18 of the "13-year locusts" are coincident this year. One of the items of inter-

est in the periodicity of these insects is the number of individuals appearing from time to time.

I wish to suggest a means of measuring the numbers of them in a manner that will make it easy to compare the density of them from year to year.

Wherever these cicadæ are there is produced an incessant screech. The intensity of this "screechy" sound is dependent upon the density of "locust" population. A measurement of the intensity of this sound may be referred to the density of the population in the environment where the intensity of the sound is produced. This is applying "sound ranging." The proper environment would have to be chosen.

This means would at least afford an excellent way to record the activity of the cicada during any one season; and might be developed to give relative seasonal activity also.

ENOCH KARRER

BUREAU OF STANDARDS

SCIENTIFIC BOOKS

World-Power and Evolution. By ELLSWORTH HUNTINGTON. New Haven, Yale University Press, 287 pp., 30 figures. 1919.

This is a far-reaching book, written in an interesting style, and is suggestive of thought along new lines, not only to students of evolution (especially those interested in the accepted laws of heredity), but to biologists, paleontologists, physicians and statesmen as well. The underlying thesis of the study is organic change, largely brought about by the changing environment, chiefly climate, which affects the well being and health of organisms. "Training, heredity and physical environment are like food, drink and air." They are necessary materials and conditions that are at the basis of all life. Humanity "does not yet realize that the human species must be bred as carefully as race horses," and even when people inherit perfect constitutions their health must receive much care. That climate largely underlies human health, this book abundantly demonstrates, and that it is a *changing* climate that develops the strongest