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FURTHER NOTE ON MINERALS OCCURRING IN AUSTRALIAN BAT GUANO.

By R. W. EMERSON MACIVOR, F.I.C., &c.

MR. L. FLETCHER, F.R.S., the distinguished head of the Mineralogical Department of the British Museum, writes me a courteous letter, in which he points out that the name Müllerite which I proposed to give to the new ammonium-magnesium phosphate, $Mg(NH_4)_2H_2(PO_4)_2 \cdot 4H_2O$, described in my recent paper in the CHEMICAL NEWS (vol. lxxxv., p. 182), has been used lately by Zambonini (*Zeit. Kryst. Min.*, 1899, vol. xxxii., p. 157) for a mineral having the composition $Fe_2O_3SiO_2 \cdot 2H_2O$; and also that it had previously been used for a "Krennerite-like mineral."

"I am afraid," says Mr. Fletcher, "that Zambonini's description has the priority as regards this assignation to a species with determined character (specific). The confusion is regrettable, and perhaps the best and simplest plan would be for you to give a new name in substitution for the one given so long ago."

In compliance with this suggestion, and to prevent all future confusion, I have now decided to call this interesting mineral Schertalite, in honour of an old master, Prof. Arnulf Schertal, late of Freiberg, Saxony.

The Laboratory,
29, Fenchurch Street, E.C.

AN INFRA-GASEOUS STATE OF MATTER.

By H. STANLEY.

It is now about a quarter of a century since Sir William Crookes enunciated his theory of the ultra-gaseous state of existence of matter, and what he then termed "radiant matter" now poses as "electrons."

Suppose we have a gas confined in a cylinder fitted with a piston which will enable us to keep the pressure constant as we cool down the gas. Let this pressure be less than the critical pressure and greater than zero. Then let the temperature be speedily reduced to absolute zero.

Considering this in the light of Van der Waals's well known theorem, we have—

$$\left(p + \frac{a}{v^2}\right)(v - b) = 0.$$

Since, by hypothesis, the pressure is not zero, we must have—

$$v = b.$$

Now, at absolute zero, the molecules of a gas will be dormant as far as energy of translation is concerned, but there will still remain an attractive force between the molecules, viz.,—

$$\frac{a}{b^2}.$$

This force will be proportional to the product of atomic masses or some similar quantity, independent of temperature.

According to Van der Waals, b is four times, and according to O. E. Meyer $4\sqrt{2}$ times, the space occupied by the molecules. Now the heat developed by this attractive force will be measured by—

$$b_2 \int \frac{a}{b^3} db = a \left(\frac{1}{b_1} - \frac{1}{b_2} \right);$$

where b_1 is the quantity defined as above (i.e., a constant

times the volume of the molecules), and b_2 is the absolute volume of the molecules.

If we define the molecule as a cluster of quasi-Boscovich atoms of non-spherical shape (see Kelvin, *Phil. Mag.*, 1901), by their mutual attraction they will agglomerate irregularly, and in so doing will yield up heat according to the above expression. If, now, the pressure is increased till we reach a critical value, the molecules will assume a regular and definite position with respect to each other (i.e., condense). There is thus an intermediate or "infra-gaseous" state between the gas and liquid.

NOTE.—Since writing the above, I have read with interest Brinkworth and Martin's paper on a somewhat similar question ("The Heatless Condition of Matter," CHEMICAL NEWS, vol. lxxxv., p. 194). Is their "heat-point" the temperature at which the "infra-gaseous" state exists? as the heat developed, according to the foregoing equation, if not allowed to escape, would raise the temperature of the gas by a definite amount, which would vary with the nature of the gas.

Merchant Venturers' College,
Bristol, April, 1902.

THE ACTION OF SOME REAGENTS ON AMORPHOUS SILICON.

By P. LEBEAU.

WITH the object of deciding whether free silicon would be likely to be present in the products resulting from the attack of siliceous cast-iron by different compounds, we were led to examine the action of certain reagents on amorphous silicon.

Having only been able to find very scanty information on this subject, we thought it would be of interest to publish the results of our experiments.

As it seemed reasonable to admit that the free silicon existing in metallurgical products containing only a very small proportion of this metalloid would be in a very fine state of division, we made our experiments on the most finely-divided silicon we were able to prepare. For this purpose we separated, by means of levigation, the lightest portions of an amorphous silicon obtained by M. Vigouroux's method. The action of each reagent was examined in the following manner:—

A certain quantity of the thoroughly dried amorphous silicon was weighed out, and it was acted on by the liquids usually used for the attack of cast-iron, operating either in free air in a porcelain crucible, or in a conical Bohemian flask fitted with a cork and two glass tubes to allow the passage of a current of carbonic acid.

The duration of each experiment was about six hours, and the temperature was maintained at about 100°. At the end of this time the solution was poured on to a tared filter to collect the silicon, which was washed successively with hydrochloric acid at one-tenth per cent, then cold water, and finally with boiling water. The desiccation was effected in an oven at 80°. The following are the results obtained:—

Nature of the reagent.	Weight of silicon used.	Weight of silicon found	
		In free air.	In the current of CO_2 .
Grm.	Grm.	Grm.	Grm.
Solution of cupric chloride at 10 per cent	0.200	0.203	0.2004
Solution of cupric sulphate at 10 per cent	0.200	0.2002	0.2012
Solution of $CuCl_2 + NH_4Cl$ at 10 per cent	0.200	0.1996	0.2008
Solution of $CuCl_2 + KCl$ at 10 per cent	0.200	0.2015	0.1998
Nitric acid with its own volume of H_2O	0.302	0.3015	—