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THE CRYSTAL STRUCTURE OF XENON

OF the rare gases, argon is the only one of which the crystal structure is known (F. Simon and V. Simon, *Zeit. f. Phys.*, 25, 160; 1924). We have now been able to determine the crystal structure of xenon by a method allowing the use of a very small quantity of gas: it was condensed as a very thin layer upon the surface of a quartz capillary internally cooled by liquid air. The thickness of the condensed layer can be estimated to be about 0.004 cm.

We obtained very good photographs by the powder method, using a Philips tube fitted with iron anti-cathode in less than $2\frac{1}{2}$ hours exposure. From the photographs, consisting of sixteen lines, three of which correspond to the $K\beta$ radiation of iron, we have been able to establish that xenon, like argon, shows a face-centred cubic structure.

The lattice constant of the elementary cell, consisting of four atoms, is $a = 6.18 \pm 0.01$ A.: the volume is 236.03×10^{-24} c.c. and the calculated density, taking as the weight of the hydrogen atom 1.65×10^{-24} gm., is $d = 3.64$ gm./c.c. (The density of liquid xenon at the boiling-point is 3.06 (Ramsay and Travers).) From the previous data the atomic radius of xenon can be calculated as 2.18 A. The atomic radius calculated from gaseous viscosity measurements (A. G. Nasini and C. Rossi, *Gazzetta*, 58, 433; 1928) is 1.70 A., thus being smaller than the crystal structure datum: we may point out, however, that the two figures bear the same ratio as for argon. The radius calculated from the present measurements is very similar to those, calculated by Goldschmidt, of the positive ions monovalent iodine, divalent tellurium, and tetravalent tin, having the same number of external electrons (Geoch. *Verteilungsgesetz d. Elem.*, *Norske Vidensk. Akad.*, Oslo, 7, 54; 1926).

We are now examining the crystal structure of krypton, but a modification of the present apparatus will be necessary, since the vapour pressure of krypton, at the temperature reached as above, is somewhat too high. A more detailed account of the present research and of the work on krypton will appear elsewhere.

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