

AN ATTEMPT TOWARDS A CHEMICAL CONCEPTION OF THE ETHER. BY PROFESSOR D. MENDELÉEFF. London : Longmans, Green and Co.

The author believes that a real conception of the ether cannot be obtained without recognizing its chemical nature as an elementary substance, and that no elementary substance is conceivable which is not subject to the periodic law. The idea of the division of atoms into electrons seems to him to proceed from a lack of definite notions about the chemism of the ether. The phenomena of radio-activity have given him courage to speak while clearly seeing the risk incurred in so doing.

Since the ether pervades all matter, its atoms must have less mass and greater velocity than those of hydrogen. What is even more important, they must have less capacity than even those of hydrogen, to form compounds with the bodies which they permeate. The author therefore supposes that the ether is a very light gas belonging to the argon group, the group having zero affinity. Since the ether pervades all space without being imprisoned in the atmosphere of stars which may perhaps have masses fifty times as large as that of our sun, he thinks its molecular velocity not less than 2,250 kilometers a second. With this velocity, the atomic mass is some such quantity as one millionth that of hydrogen.

While the atoms of the ether do not *combine* with others, they may nevertheless accumulate around large centers of attraction, such as the sun, among heavenly bodies, or such as the atoms of uranium, thorium, or radium, in the world of atoms. The entrance or exit of such atoms of ether would exhibit peculiar phenomena ; such conceptions of the ether give means, if not of analyzing these phenomena, at least of understanding their possibility.

To the opinions just cited, Mendeléeff adds the declaration that he makes no attempt to solve the numerous problems suggested, the majority of which he characterizes as unfathomable. The pamphlet is a dignified attempt to secure that certain conceptions, which were suggested to him by facts, shall not pass away without a chance for their elaboration and correction, if they contain truth ; without saving others from repeating them, if they are proved to be false in their basis. Since we cannot deny the substantiality of the ether, a search for its chemical nature seems to Mendeléeff to

be required, and the object of his tentative answer is, to bring this primary question to the fore. EDWARD W. MORLEY.

THE STUDY OF THE ATOM. BY F. P. VENABLE. Easton, Pa.: The Chemical Publishing Company, 1904. vi + 290 pp. Cloth. Price, \$2.00, net.

This book appears to be an attempt to give a semi-popular account of the history, nature, and behavior of atoms. The opening chapters (75 pp.) deal with: "Ancient Views as to the Nature of Matter" and the atomic theory "from the Greek Philosophers to Dalton," and contain a résumé of the speculations on this subject. Then follows an account of the employment of the atomic theory by Dalton (34 pp.) and the advances which culminated in the adoption, at the suggestion of Cannizzaro (1858), of the criteria still used for determining atomic weights (43 pp.). On the ground that "The discovery of this Natural System has done so much to make clearer the nature of the atom * * *," the next chapter deals with the Periodic System (30 pp.). In Chapter VI, "Affinity, the Atomic Binding Force," the various views as to the nature of "the attraction between atom and atom" and the various methods of measuring it are discussed. The author has doubts about accepting the "theory of ions," but suggests no substitute. Apparently he does not think that the recent study of solutions has added to our knowledge of the atom. He likewise (Chap. VIII) questions the views of J. J. Thomson in regard to electrons and leaves unmentioned the most remarkable contribution that has recently been made to our knowledge of the atom.¹ In the chapter on "Valence," Werner's hypothesis is disposed of in a page and a half, and Richards' work in fifteen lines. Speaking of the changes in valence by light, heat, and other agencies, the following is the whole account of the effect of electricity: "Changes of valence due to electricity are not unusual. Thus we have the production of carbon monoxide from carbon dioxide by the passage of the electric spark, $\text{CO}_2 = \text{CO} + \text{O}$. In general such changes may be attributed to chemical action induced by the electricity serving as the direct agent. The change may be the result of changed vibration or to changes of electrical state." Surely the electrolytic oxidations and reductions would have offered far more instructive, not to say convincing, illustrations. Much of the book seems to lack force in the same

¹ J. J. Thomson: *Phil. Mag.*, March, 1904.