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## THE PHYSICIST'S PRESENT CONCEPTION OF AN ATOM<sup>1</sup>

### CONTENTS

<i>The Physicist's Present Conception of an Atom:</i>	
DR. R. A. MILLIKAN .....	473
<i>Remarks on the Scientific Attitude:</i> DR. A. S. HITCHCOCK .....	476
<i>Universities and Learned Societies:</i> PROFESSOR LAWRENCE J. HENDERSON .....	477
<i>The British Association and the Toronto Meeting</i> .....	478
<i>Scientific Events:</i>	
<i>The Biochemical Laboratories of the University of Cambridge; The Rush Medical College and the University of Chicago; The Semi-centennial of Purdue University; Fellowships in Medicine of the National Research Council; The Alabama Academy of Science</i> .....	479
<i>Scientific Notes and News</i> .....	481
<i>University and Educational Notes</i> .....	484
<i>Discussion and Correspondence:</i>	
<i>Effect of Dry Storage on the Antirachitic Potency of Cod Liver Oil:</i> DR. L. C. DUNN. <i>A New Locality for a Species of Diaptomus:</i> DR. C. DWIGHT MARSH. <i>The Use of a Tool:</i> GEORGE C. WHEELER and ESTHER HALL WHEELER. <i>The Addresses of Authors:</i> HARRY S. SMITH. <i>A Correction:</i> PROFESSOR MARSTON T. BOGERT .....	485
<i>Scientific Books:</i>	
<i>Price on the New Geology:</i> PROFESSOR CHARLES SCHUCHERT .....	486
<i>Special Articles:</i>	
<i>The Origin of Ectopic Menstruating Müllerian Tissue:</i> DR. VICTOR C. JACOBSON .....	487
<i>The American Chemical Society:</i>	
<i>Division of Inorganic and Physical Chemistry:</i> PROFESSOR GRAHAM EDGAR .....	488
<i>Science News</i> .....	x

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ALL scientists agree upon an atom which has a very minute positively charged nucleus surrounded in its outer regions by a number of negative electrons just sufficient to neutralize the free positive charge upon the nucleus.

We all agree that the number of these positive charges upon the nucleus varies from one, in the case of hydrogen, by unit steps up to 92 in the case of uranium, and hence that the number of negatives held in the outer regions also varies from one to 92.

We all agree that the chemical properties of all atoms, and most of the physical properties, too, mass being the chief exception, are determined simply by the number of these electrons; primarily by the number of them which are found in the outermost shell and which we call the valence electrons.

We all agree, too, that the nucleus is extraordinarily minute, so that if all the dimensions of an atom were magnified ten billion times—a magnification which would make a bird shot swell to the size of the earth and would make the diameter of the atom about a meter—the nucleus, on this huge scale of magnification, would not be more than a tenth of a millimeter in diameter—that is, not larger than a mere pin point.

We all agree, too, that in the case of uranium there are packed into that infinitesimal nucleus 238 positive and 146 negative electrons, the exact number of positives being determined simply by the atomic weight, while the number of negatives which bind the positives is the atomic weight minus the atomic number. This obviously means that both positive and negative electrons are so infinitesimally small that for practical purposes we may ignore their dimensions altogether and think of them as mere point charges.

We all agree that so far as physical science has now gone there have appeared but these two fundamental entities, namely, positive and negative electrons<sup>2</sup> which seem to be the building stones of the

<sup>1</sup> An address delivered before the sixty-seventh convention of the American Chemical Society, Washington, D. C., April 22, 1924.

<sup>2</sup> It is highly to be desired that this historically correct, etymologically most suitable, and authoritatively recognized nomenclature (See Rutherford's B.A. address 1923, Nernst's Physical Chemistry, last edition etc., etc.) be retained. When used without a prefix, or qualifying

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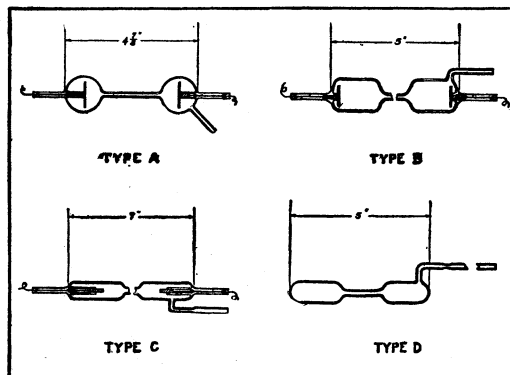
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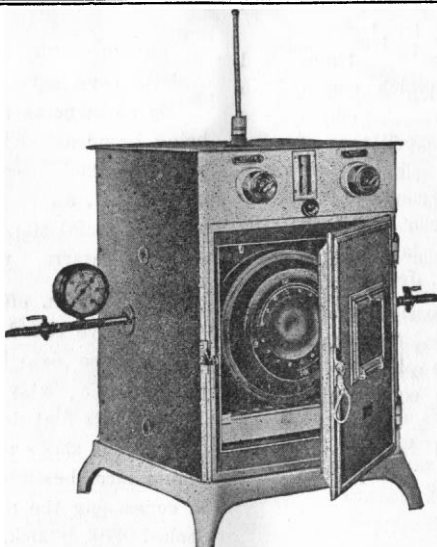
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