

# THE ATOM

Published @ 2017 Trieste Publishing Pty Ltd

ISBN 9780649503940

The Atom by Albert C. Crehore

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Cover @ 2017

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**ALBERT C. CREHORE**

# **THE ATOM**



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*For Arthur E. Kennelly  
with sincere regards,  
Albert C. Crehore*

BY

ALBERT C. CREHORE, Ph.D.

ILLUSTRATED



NEW YORK  
D. VAN NOSTRAND COMPANY  
EIGHT WARREN STREET  
1920

Chem 3509.20.3

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1939

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TO  
MY MOTHER





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## *Preface*

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WHILE the present volume is in the main devoted to an exposition of a new theory of the atom, the results which are incident to this theory have assumed an unexpected importance. New theoretical values for Rydberg's constant and Planck's constant have been obtained, from which numerical values of all of the important constants connected with the electrons have been derived, namely Planck's constant, the electronic charge, the masses of the electron and hydrogen nucleus. These agree within the limits of error with the direct experimental determination of these constants.

These new theoretical expressions have supplied the missing equation by means of which the dimensions of the two aetherial constants, specific inductive capacity and magnetic permeability, become separately known, a matter the importance of which has recently been emphasized by Sir Oliver Lodge. Not only have the dimensions of the two aetherial constants been found in terms of length and of time, but those of ordinary mass as well, so that the dimensions of all kinds of quantities, — electrical, magnetic and mechanical, — are capable of expression in terms of length and of time alone. A table of dimensions has been prepared giving the dimensions of the more common units in terms of length and of time, referred to as the space-time system of units. New units of length and of time are considered in place of the centimeter and the second, as a result of which the im-

portance of expressing the specific inductive capacity or magnetic permeability in all electromagnetic equations is very apparent. The velocity of light with the new units becomes numerically unity, and so does twice the Rydberg constant. The specific inductive capacity becomes numerically equal to  $3 \times 10^{10}$ , the velocity of light on the C.G.S. system of units, and to omit to express it in all equations is evidently absurd. Had we always been accustomed to the new units instead of the centimeter and second, there would have been the same natural tendency to omit to express the velocity of light and twice the Rydberg constant as there is now to omit specific inductive capacity.

It is difficult to escape the conclusion that we are one step nearer to a more complete understanding of the real connection between matter and the aether of space, that is to say, an understanding of the properties of the aether itself.

It is not feasible to present this subject without a limited use of mathematical symbols, which were purposely avoided in my former book, "The Mystery of Matter and Energy." The chief purpose in view in that work was a statement of the aims and purposes that constitute a definition of the goal. Since its publication in 1917 much substantial progress has been made toward the attainment of the goal, and it is not now necessary to change the views expressed therein. The mathematical sections of this work are, however, of the simplest kind which students who have followed the common undergraduate courses in the colleges may read. Much may be obtained from the work without following the mathematical processes at all.

June 14, 1919.

## NOTE

SINCE writing the above preface the attention of the scientific world has been focused upon the recently announced results obtained during the total eclipse of the sun, May 29 of this year, a report of which has just been made to The Royal Society of London. These announced results support the so-called "Relativity Theory of Gravitation" due to Professor Einstein. Lest there may some confusion exist in the minds of those not familiar with Professor Einstein's theory because of the name which has been applied to it, some remarks upon this subject seem to be required, because the subject of gravitation is discussed within these pages.

In a report to The Physical Society of London on the "Relativity Theory of Gravitation," Professor A. S. Eddington has summed up the matter on the last page (91) in the following words, "In this discussion of the law of gravitation, we have not sought, and we have not reached, any ultimate explanation of its cause. A certain connection between the gravitational field and the measurement of space has been postulated, but this throws light rather on the nature of our measurements than on gravitation itself. The relativity theory is indifferent to hypotheses as to the nature of gravitation, just as it is indifferent to hypotheses as to matter and light."

The recent result from the eclipse may be regarded as one of the first, if not the first, experimental proof of the truth of the theory of relativity, but it seems to the author to be a misnomer to call the Einstein theory a theory of gravitation, because it deals with one phase only of a much larger general theory, which must assign a cause for the gravitational force. The Einstein theory