

SCIENCE

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RADIATION AND MATTER¹

WE must congratulate ourselves upon the fact that we have been able to listen to such clear, concise and accurate presentations of the most fundamental problems that lie before pure science to-day. I would like, also, to extend to the speakers our sincere thanks for their efforts in giving us such interesting expositions of these abstruse theories.

It is my privilege to open the discussion on radiation and the structure of matter. Modern theories of radiation are largely concerned with Planck's conception of the radiation of energy in quanta, and with the extraordinary action constant usually denoted by the letter "*h*." I would like to present for your discussion some ideas on the relations between the high frequency vibrations which we observe in general *X*-radiation, and the forces holding the electrons and atoms together, including a physical conception of what this constant "*h*" really means.

Instead of basing the discussion on the conceptions of entropy, and thermodynamic probability, I shall start from our recent experiments on general *X*-radiation.

Before we learned from experiments that *X*-rays had definite wave-lengths, people supposed that they had, and that we could calculate their frequencies by the formula kinetic energy equals *hν*.

$$(1) \quad \frac{1}{2} m v^2 = h\nu.$$

¹ Presented at the symposium on "The Structure of Matter" at a joint meeting of the Sections of Physics and Chemistry of the American Association for the Advancement of Science, The American Physical Society and the American Chemical Society, New York, December 27, 1916.