

SCIENCE

VOL. LXI

MAY 29, 1925

No. 1587

ATOMS AND ISOMORPHISM

CONTENTS

<i>Atoms and Isomorphism: PROFESSOR A. N. WINCHELL</i>	553
<i>The Award of the Franklin Medal to Professor Elihu Thomson: DR. E. W. RICE, JR.</i>	558
<i>William James Beal—an American Pioneer in Science: PROFESSOR ERNST A. BESSEY</i>	559
<i>Scientific Events:</i>	
<i>The Centenary of Huxley; The Reorganization of the Department of the Interior; The Douglas Smith Foundation for Medical Research; The Section of Social and Economic Sciences of the American Association; A Proposal for Summer Sessions of the American Association at Ithaca</i>	560
<i>Scientific Notes and News</i>	563
<i>University and Educational Notes</i>	565
<i>Discussion and Correspondence:</i>	
<i>Photographing Shadow Bands: DR. W. L. EIKENBERRY. The Germination of Barley under Late Spring Malting Conditions in India: H. V. HARLAN. A Fable: PROFESSOR BAILEY WILLIS. Amanita muscaria in Maine: PROFESSOR MAYNARD M. METCALF</i>	566
<i>Scientific Books:</i>	
<i>Brown's Text-book of General Botany: DR. RAYMOND KIENHOLZ</i>	567
<i>The Possible Origin of the Angiosperms: DR. F. H. KNOWLTON</i>	568
<i>Scientific Apparatus and Laboratory Methods:</i>	
<i>A Model of Muscular Contraction: DR. TORALD SOLLMANN</i>	570
<i>Special Articles:</i>	
<i>The Presence of Trehalose in Yeast: DR. ELIZABETH M. KOCH AND DR. F. C. KOCH. The Alkaline Reaction of the Dew on Cotton Plants: C. M. SMITH</i>	570
<i>The American Association for the Advancement of Science:</i>	
<i>The Spring Meeting of the Executive Committee: PROFESSOR BURTON E. LIVINGSTON</i>	573
<i>Science News</i>	x

SCIENCE: A Weekly Journal devoted to the Advancement of Science, edited by J. McKeen Cattell and published every Friday by

THE SCIENCE PRESS

Lancaster, Pa.

Garrison, N. Y.

New York City: Grand Central Terminal.

Annual Subscription, \$6.00. Single Copies, 15 Cts.

SCIENCE is the official organ of the American Association for the Advancement of Science. Information regarding membership in the association may be secured from the office of the permanent secretary, in the Smithsonian Institution Building, Washington, D. C.

Entered as second-class matter July 18, 1923, at the Post Office at Lancaster, Pa., under the Act of March 3, 1879.

OUR knowledge of the nature of atoms has recently been enlarged in a remarkable way with many important results, some of which were quite unforeseen.

Atoms were formerly known only by their weights and chemical properties. They are now believed to consist of a nucleus and one or more electrons, which together occupy a measurable portion of space. Formerly the properties of atoms were held to be related to the atomic weights. I shall try to show that one of the properties of atoms depends upon their sizes rather than their weights.

The measurement of the sizes of atoms is one of the important results of recent studies of crystals by the new method with X-rays. W. H. and W. L. Bragg¹ reflected X-rays from crystal faces and found that the angle at which reflection became evident bore a simple relation to the wave-length of the X-rays used and to the distance between adjacent layers of atoms in the crystal. The validity of the equation: $\lambda = 2d \sin \alpha$ is easily demonstrated by means of Fig. 1, if it be remembered that the intensity of reflection from a single layer of atoms is extremely small, and the reflected ray only becomes appreciable in case reflections from many parallel planes of atoms are in phase and therefore reenforce each other.

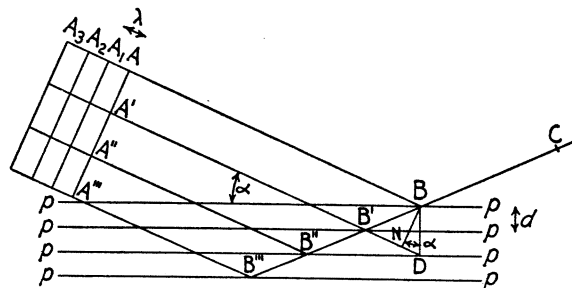


FIG. 1. Reflection of X-rays from a crystal space lattice (after Bragg).

Accordingly, the distance (d) between adjacent planes of atoms is equal to the wave-length (λ) of the X-rays divided by twice the sine of the angle of incidence (α). The wave-lengths of X-rays from various sources are now quite accurately known. Therefore it is only necessary to measure the angle of incidence at which reflection occurs in order to be able to calculate the distance between adjacent planes of atoms in any crystal.

¹ "X-Rays and Crystal Structure."

Science

61 (1587)

Science 61 (1587), xii-574.

ARTICLE TOOLS

<http://science.sciencemag.org/content/61/1587.citation>

PERMISSIONS

<http://www.sciencemag.org/help/reprints-and-permissions>

Use of this article is subject to the [Terms of Service](#)

Science (print ISSN 0036-8075; online ISSN 1095-9203) is published by the American Association for the Advancement of Science, 1200 New York Avenue NW, Washington, DC 20005. The title *Science* is a registered trademark of AAAS.

Copyright © 1925 The Authors, some rights reserved; exclusive licensee American Association for the Advancement of Science. No claim to original U.S. Government Works.