

PROCEEDINGS
OF THE
AMERICAN PHYSICAL SOCIETY.

MINUTES OF THE CHICAGO MEETING, NOVEMBER 25 AND 26, 1921.

THE 111th regular meeting of the American Physical Society was held at the University of Chicago on November 25 and 26, 1921. President Lyman of the American Physical Society presided.

At a meeting of the Council held on November 26 sixty-three persons were elected to *Membership* and two were transferred from *Membership* to *Fellowship*, as follows: *Elected to Membership*: Hilda Begeman, Victor H. Benioff, Lester I. Bockstahler, Robert B. Brode, Detler V. Bronk, James W. Broxon, Walter A. Buchheim, R. R. Chappell, Chien Cha, Tobias O. Chew, H. T. Clifton, J. Fenton Daugherty, Ward F. Davidson, Elmer R. Drew, Arthur R. Duane, Jesse Wm. DuMond, J. W. Ellis, Kenneth V. Glentzer, Philip F. Gottling, E. T. Hoch, Paul L. Hoover, R. J. Hopkins, Harold O. Holte, Haidee H. Hoover, B. A. Howlett, Roy J. Kennedy, Freda Kergor, Arthur D. Kinsman, Arthur L. Klein, V. O. Knudsen, Israel Koral, Harold R. Laird, Claude J. Lapp, Marcella Lindeman, Edward M. Little, Elsie J. McFarland, Robert C. Matlock, Edna L. Meacham, Yi-Ch'i Mei, Charles F. Mercer, L. G. Morell, Larrance Page, Wellington A. Parlin, Thomas J. Parmley, Donald MacLean Purdy, P. S. Olmstead, Carl A. Richmond, F. L. Robeson, Glenn F. Rouse, Harvey C. Roys, Arthur E. Ruark, C. Arthur Smith, John E. Smith, William O. Smith, William G. Spandon, Ralph B. Spence, W. W. Steffey, Elbridge Z. Stowell, Philip Subkow, L. W. Taylor, Irving Wolff, Raymond F. Yates, Charles T. Zahn; transferred to *Fellowship*: G. M. Moffit and John K. Robertson.

The following program of forty-four papers was presented, eight being read by title.

Molecular Models: Benzene. JARED KIRTLAND MORSE.

The Mobilities of Electrons in Pure N₂. LEONARD B. LOEB.

On the Pressure Increase in the Corona Discharge. JAKOB KUNZ.

The Vibration of Wires in the Corona. CHARLES S. FAZEL.

The Path of a Rigid Electron Moving in a Magnetic Field of Constant Strength Rotating with Constant Angular Velocity. E. O. HULBURT.

The Effect of Ageing on the Secondary Electron Emission from Copper Surfaces. L. E. MCALLISTER.

Carbon Dioxide Band Spectra in the Near Infra-red. E. F. BARKER.

Recent Determinations of the Susceptibilities of Oxygen and Nitric Oxide and the Magneton. E. C. FRITTS.

The Growth and Decay of Photo-Thermionic Currents from Oxide Coated Filaments. H. D. ARNOLD and HERBERT E. IVES.

The Absolute Sizes of Certain Monovalent and Bivalent Ions. WHEELER P. DAVEY.

On the Universal Distance of the Order of 10^{-8} centimeters, between the Centers of the Nearest Atoms in Solids. ALBERT C. CREHORE.

The Classification and the Prediction of Isotopes. WILLIAM D. HARKINS.

The Nature of Charcoal "Sorption." H. HORTON SHELDON.

The Scattering of Electrons by Nickel. C. DAVISSON and C. H. KUNSMAN.

Width of Spectral Lines of Helium as a Function of Pressure in the Source. LLOYD W. TAYLOR.

On the Vacuum Spark Spectrum of Silicon. R. A. SAWYER and R. F. PATON.

The Sparking Potential in Argon at Reduced Pressures. E. R. STOECKLE.

The Action of Light on a Photographic Film. JAY W. WOODROW.

The Instructional Value of Certain Types of Motion Pictures. HARVEY B. LEMON.

Sensibility of the Ear to Small Differences in Intensity and Frequency. V. O. KNUDSEN.

The Efficiency of Artificial Aids to Hearing. PAUL E. SABINE.

Doppler's Principle Illustrated by Ripple Waves. F. R. WATSON and W. B. WORSHAM.

Einstein's Relativity and Gravitation. JOHN MILLIS.

Some Aspects of the Theory of Relativity. A. C. LUNN,

Atomic Constants and Dimensional Invariants. A. C. LUNN.

Measurements of the Amount of Scattered Homogeneous X-Rays of Wavelength 0.712\AA . per Gram of Carbon. C. W. HEWLETT.

The Spectrum of Secondary X-Rays. ARTHUR H. COMPTON.

Oscillations of Temperature of an Incandescent Filament, and the Specific Heat of Tungsten. K. K. SMITH and P. W. BIGLER.

Effect of Tension on Thermoelectromotive Forces by Magnetization. ALPHEUS W. SMITH.

Positive Ray Analysis of Lithium and Zinc. A. J. DEMPSTER.

A Convenient Contactor for Small Currents. FREDERICK J. SCHLINK.

The Dielectric Constant of Mica. J. R. WEEKS, JR.

A Photomicrographic Study of a Series of Drawn Tungsten Wires. L. P. SIEG.

A Simplified Method of Correcting for the Decrement of a Decrometer. R. R. RAMSEY.

A New Visual Null Method for Conductivity Determination. FABIAN M. KANNENSTINE and ESME E. ROSAIRE.

Phase Relations in Coupled Circuits. N. H. WILLIAMS.

The Change of Mobility of the Positive Ion with Age in Oxygen and Nitrogen.

HENRY A. ERICKSON.

Spherical Aberration in Thin Lenses. T. TOWNSEND SMITH.

A Low Resistance Connection with a Revolving Shaft. A. P. CARMAN.

The Effect of Pressure and Gas Content on the Action of Vacuum Tube Detectors. H. A. BROWN and CHAS. T. KNIPP.

Some Remarks on Electromagnetic Induction. S. J. BARNETT.

The Existence of Small Ions of Very High Mobilities. OSWALD BLACKWOOD.

Effect of Lunar Gravity upon a Quartz Thread Balance. R. C. HARTSOUGH.

On the Electrical Properties of Illium. CHAS. T. KNIPP and J. L. HALL.

HENRY CREW,

Secretary, pro tem.

MOLECULAR MODELS: BENZENE.

BY JARED KIRTLAND MORSE.

It has been found possible to construct a three-dimensional model for a molecule of benzene which is based on its chemical properties, by arranging the carbon nuclei at the corners of a regular octahedron and by placing the hydrogen nuclei along the axes of this geometrical form; three of the hydrogen nuclei being placed at a distance (y) and the remaining three nuclei at a distance (z) from their respective corners of the octahedron whose edge is denoted by (x).

Such a model has three distinctive axes given by the expressions: $2x \cos 45^\circ + 2y$; $2x \cos 45^\circ + 2z$; $2x \cos 45^\circ + y + z$.

It can be shown that the lengths of these axes also are given by the formulæ

$$\sqrt[3]{\frac{na^2\mu}{\rho cN}}; \sqrt[3]{\frac{n\mu}{acN\rho}}; \sqrt[3]{\frac{n\mu c}{\rho aN}},$$

where n denotes the number of molecules common to the elementary space lattice, μ the molecular weight, a and c the crystallographic axial ratios, ρ the density, and N Avrogrado's number. Putting the vaules computed from these formulæ equal to our expressions in x , y , and z , we obtain the equations:

$$\begin{aligned} 2x \cos 45^\circ + 2y &= 7.983 \times 10^{-8} \text{ cm.} \\ 2x \cos 45^\circ + 2z &= 9.979 \times 10^{-8} \text{ cm.} \\ 2x \cos 45^\circ + y + z &= 8.981 \times 10^{-8} \text{ cm.} \end{aligned}$$

By taking $x = 2.514 \times 10^{-8}$ cm. as determined from Bragg's work on the structure of diamond and solving $x = 2.514 \times 10^{-8}$; $y = 2.214 \times 10^{-8}$; $z = 3.212 \times 10^{-8}$ cm.

By constructing models for naphthalene and anthracene and substituting these values in the expressions for their distinctive axes, axial ratios can be predicted which agree within the limits of experimental with the crystallographic measurements of these compounds.

UNIVERSITY OF CHICAGO,

November 7, 1921.