

# SCIENCE

VOL. LIX

JUNE 6, 1924

No. 1536

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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.

## THE ATOMIC THEORY FROM THE STANDPOINT OF MAGNETISM<sup>1</sup>

WHEN any substance is exposed to the influence of a magnetic field it behaves in various ways, depending upon the physical and chemical properties of the material examined. Oxygen is attracted to the poles of a magnet, while carbon dioxide is repelled. Bismuth shows a marked change in resistance when magnetized and copper only slightly. Varying degrees of hardness in steel are accompanied by corresponding changes in length due to a magnetic field. Each substance discloses its own peculiar temperament in a magnetic field, whether it be a gas, a liquid or a solid.

Magnetic phenomena are classified as effects according to the form of behavior which matter is observed to undergo when magnetized. If a magnetic field changes the optical properties of a substance it is called a magneto-optical effect, which is a very suggestive term. Unfortunately, corresponding terms to designate those effects which are produced when a magnetic field changes the mechanical, acoustical, electrical, magnetical and thermal properties of matter have not been adopted to any great extent, and while it may be unorthodox, nevertheless, such a division gives an excellent bird's-eye view of magnetic phenomena. Introducing these terms which would correspond to the term magneto-optical, the following outline of magnetic phenomena is herewith given.

### OUTLINE OF MAGNETIC PHENOMENA

- |                       |  |
|-----------------------|--|
| (1) Magneto-Magnetics | The magnetic field, forces in dia, para and ferromagnetism. Magnetic induction, intensity, hysteresis, permeability, susceptibility, coercive force, retentivity, reluctance and leakage.  |
| (2) Magneto-Mechanics | Joule effect—Villari effect—Wiedemann effect—2nd. and 3d. Wiedemann effect—Barrett effect—converse effect—Wertheim effect—Piezo effect. Change in moduli. Volume change on solidification. |
| (3) Magneto-Acoustics | Production of sound by magnetization "magnetic tick."  |

<sup>1</sup> Read before the chemistry and physics section of the Mid-year Educational Conference held at the Michigan State Normal College, Ypsilanti, January 18 and 19, 1924.

# Science

**59 (1536)**

*Science* **59** (1536), x-516.

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