

# Physical Sciences Notes

## PHYSICS

### Overturning Accepted 'Fact'

One of the supposed "facts" accepted without question by many physicists for the last 30 years has been overturned as the result of basic research at the University of Texas.

The experiments by Dr. James C. Thompson also uphold the stand of Sir Nevill Mott of Britain's Cambridge Laboratories, who maintained that certain views of physicists regarding the electrical properties of metals "violate common sense."

Physicists had generally believed that metals changed gradually from non-conductors to conductors as the atoms were compressed from a gas to a liquid to a solid. The idea of gradual change struck Sir Nevill as absurd.

To prove that the change was an abrupt one, Dr. Thompson and three graduate students dissolved carefully controlled amounts of sodium metal in liquid ammonia. They noted a sharp dividing line in the capacity of the solution to conduct electric current according to the number of electrons present.

The ammonia served to keep the sodium atoms spread out so that spacings appropriate to a gas could be maintained. The scientists also found that the color of the sodium changed from blue to bronze as it changed from a conductor to a non-conductor.

## ISOTOPE PHYSICS

### Eight Isotopes of Nobelium

Eight isotopes of nobelium, element 102, have now been detected by a team of scientists at Lawrence Radiation Laboratory, University of California, Berkeley.

Element 102 was the tenth element beyond uranium to be produced and identified. A premature announcement of its discovery was made by a group working at the Nobel Institute of Physics in Stockholm in 1957. A team at the Radiation Laboratory showed that the Stockholm group had not seen element 102 and then proceeded to create it in their laboratory.

The eight isotopes now identified have atomic weights ranging from 251 to 258. Drs. Albert Ghiorso, Torbjorn Sikkeland and Matti J. Nurmi, outline the known properties of the eight isotopes in the March 13 *PHYSICAL REVIEW LETTERS*.

The scientists note in their report that the isotope with an atomic weight of 254 on which discovery of element 102 was based is now known to be the isotope with atomic weight of 252.

## MATERIALS RESEARCH

### Molybdates for Losers

The dielectric properties of two materials that may have potential value for such devices as lasers have been determined at the National Bureau of Standards.

In a study supported in part by the U.S. Atomic Energy Commission, single crystals of calcium molybdate and lead molybdate were prepared and values of the dielectric constants, not previously determined, were measured. This information is required by scientists and engineers who are studying new devices for applications in the communications and electronics fields.

W. S. Brower of Standards Institute for Materials Research and P. H. Fang of the National Aeronautics

and Space Administration collaborated in the study of the materials. The two molybdates they found have the same crystal structure as calcium tungstate, a compound used extensively as a host crystal for solid lasers.

The single crystals of the two molybdates were made by slowly withdrawing a seed crystal from a container filled with the molten material. As the seed crystal is pulled out, the compound solidified on it as a single crystal, which were made up to 10 centimeters long with the same orientation as the original. The crystals were then cut into disks for measurements of the dielectric properties.

## SPECTROSCOPIC ASTRONOMY

### Astronaut's Photos of Sirius

The ultraviolet spectrum of magnesium has been detected for the first time in Sirius, the sky's brightest star, in photographs taken from Gemini 11 when the satellite was more than 100 miles above earth.

Drs. Karl G. Henize, Lloyd R. Wackerling and Frederick G. O'Callaghan of Northwestern University's Lindheimer Astronomical Research Center, Evanston, Ill., analyzed the 36 time exposures taken by Astronaut Richard Gordon from the open right hand hatch of Gemini 11 during a period of extravehicular activity.

In addition to the discovery of magnesium in Sirius, the astronomers report in the March 17 *SCIENCE*, ultraviolet spectral lines of magnesium, iron and silicon were found in Canopus, second brightest star in the heavens.

## PHYSICS EDUCATION

### Innovations in Physics Education

Growth is forcing changes in physics education as well as in other branches of physics, and dissatisfaction with current introductory teaching methods has resulted in various attempts to improve them.

In a special March issue of *PHYSICS TODAY* some of the changes proposed and introduced to make physics teaching more lively and therefore, hopefully, of more interest to the student are outlined in detail for both pre-college and college courses. The impact of the innovations is reported as now being felt in physics teaching not only in the United States but in various other countries, especially Great Britain.

Besides describing a wide spectrum of new techniques and emphases, the special issue considers the growing concern that physicists are failing to communicate the essentials of physics to the generally educated man.

## RADIOLOGY

### X-Ray Goes to Sea

Radiographs of long core samples of ocean-bottom sediments can easily be made on board an oceanographic research ship and provide a permanent, revealing record of the core's inner structure.

The X-rays can be made right through almost any enclosure the cores are stored in, according to a report in Volume 14 of the British journal *DEEP SEA RESEARCH*.

Authors Daniel J. Stanley of the division of sedimentology, Smithsonian Institution, and Laurie R. Blanchard of Victoria General Hospital, Halifax, note that "the dominant features of an entire core . . . can be recorded without any reduction on one or more radiographs."