SCIENCE NEWS

Science Service, Washington, D. C.

X-RAYS

PRACTICAL applications of a new basic discovery, in which x-rays and other radiations are used to alter the elastic constants and chemical properties of quartz and other crystalline substances employed in radio and radar oscillator-plates to regulate wave-lengths, were demonstrated, on April 11, to a group of scientists at the Reeves-Ely Laboratories, New York City, by Dr. Clifford Frondel, head of the company's research division.

Another interesting application of x-rays found in the course of Dr. Frondel's work is its use in changing the color of many gem stones, and some colorless stones of little value may be given intense hues. Diamonds have been colored green and golden brown with deuterons, but the cost of the treatment is large and the results frequently unpredictable, so that the method is not yet of much commercial value.

Dr. Frondel discovered recently that x-rays, and certain other types of radiation cathode, or electronic, rays and deuteron beams from a cyclotron, when allowed to pass through plates cut from certain crystalline substances, alter the mechanical strength of the material. There are accompanying changes in the color of the crystals, and their chemical reactivity also may be altered.

The x-rays or other radiations cause an interchange of electrons, Dr. Frondel explained, between the atoms composing the crystal and, by thus altering the interatomic bonding forces, change the elastic constants of the material. The effect is similar to the action of visible light in blackening photographic emulsions.

The discovery is of great theoretical interest from the viewpoint of pure science, but has already been put to practical use in the war effort. Millions of tiny plates of crystalline quartz, the size and shape of postage stamps, are used by the armed services as oscillator-plates to control radio communications. The frequency at which the radio will transmit or receive is controlled, in common types of crystals, by the thickness of the plate. They are brought to proper thickness by mechanical means, and the process is an extremely delicate operation.

By using the new x-ray irradiation technique, oscillator-plates can now be adjusted rapidly and easily to a desired frequency with a precision hitherto impossible.

Irradiation with x-rays also has been found to greatly modify the rate of solution and the chemical reactivity of crystals, and a whole new field of x-ray photochemistry is being opened up by his research.

ITEMS

FIVE new white dwarf stars have been added to the list of known faint stars of high temperature and of a density so great as to be almost incredible, Dr. W. J. Luyten, of the University of Minnesota, and Dr. Martin Dartayet, of Cordoba Observatory, Argentina, have reported to Harvard College Observatory. This brings the number of known white dwarf stars to about seventy-five. The newly discovered white dwarfs are located in the southern constellation of Pavo, the peacock; Phoenix; Tucana, the toucan; and two are fairly close together in the constellation of Musca, the fly. The stars were discovered when photographs taken with plates which were particularly sensitive to yellow light and those which were especially sensitive to blue light were compared. The plates were taken with the 60-inch reflecting telescope of the Cordoba Observatory.

A NEW beacon light that will burn for a year without adjustment or refueling and that can be seen for about 12 miles has been developed by the Army Air Forces as a warning light for planes. It is to be placed on the peaks of high mountains and near other hazards located in isolated areas. It may be used as a civil airway marker after the war. Known by the code name Type C–3, the new light is an acteylene-burning lantern designed for installation where electricity through power lines is not available. In operation a 400 candlepower beam is flashed for two tenths of a second, 30 times a minute. Upper and lower lenses are fitted with red filters to throw the light in a complete 360-degree circle so that it can be observed by pilots from any direction. The main burner has a three-cluster flame ignited by two constant pilot lights. Tiny holes in the base of the apparatus permit enough air to get in to keep the flame going. A baffle system prevents the light from being blown out by high winds. The beacon is controlled by a sun-valve device which consists of four metal rods that are sensitive to light. These rods expand and contract when the outside light varies, and have a compensating device to take care of temperature changes. The expansion and contraction of the rods produces energy to operate the valve which governs the flow of fuel to the main burner.

MILITARY supplies and equipment can be salvaged without damage from sunken ships or lie for weeks on island beachheads or in jungle outposts without the slightest damage from the elements, as the result of corrosion control methods developed by the Air Technical Service Command at San Antonio, Texas. This corrosion control program, expected to save the government millions of dollars, preserves parts for airplanes from damage by the elements while *en route* to the war theaters. The program provides for applications of many kinds of rust-removing solvents and coatings with rust-preventives, in addition to paper and wax coatings. The treatment is designed to prevent all types of corrosion and fungus growth for at least eighteen months under any type of climatic condition. Even microscopic fingerprint moisture contains enough acid to cause corrosion of highly polished surfaces, such as engine and precision parts. Special solvents applied by pressure or with a small brush eliminate the acid that in the past has caused great losses by rendering valuable supplies useless.