CHEMISTRY

Heat-Glowing Crystals

Practical radiation dosimeter may result from discovery that glow given off by minerals when heated is due to electrons escaping from "traps."

➤ AN OLD chemical mystery, why crystals glow in the dark when heated, has been solved by University of Wisconsin scientists.

The discovery has opened up entirely new fields of research and application in chemistry, geology, mineral prospecting, and in the development of a practical radiation dosimeter that can be used as a dog tag to measure the amount of radiation to which individuals are exposed during an atomic bomb blast.

The study under an AEC grant was conducted by Dr. Farrington Daniels, professor of chemistry, Donald F. Saunders, project assistant, and other Wisconsin scientists.

They found that the glow given off by certain mineral crystals when heated is caused by electrons escaping from "traps" in the lattice-like structure of the crystal. The electrons are driven into the traps by radioactivity either from very small amounts of natural radioactive substances or by man-made radiation in the laboratory. When the chemical crystal is heated slightly, the electrons escape the traps and fall back to their normal positions, emitting light in the process.

The phenomenon is much more common than had previously been realized. Practically all limestone and granites will emit light when heated—as anyone can learn by grinding a small piece of limestone into powder, placing it in a frying pan, and heating almost red hot in the dark.

A few prospectors have known for years that some minerals will glow for a moment when heated, but it was not known that small amounts of uranium and thorium furnished the radioactivity necessary for the trick. Because of the small amounts of these elements present in most minerals, centuries are required for the trapping of enough electrons to give a few seconds' glow.

During an atomic bomb blast, however, the radioactivity would be so intense that crystals of lithium fluoride, for example, would trap sufficient electrons in a few seconds to glow when heated.

The amount of radiation to which a lithium fluoride dog tag was exposed would determine the intensity of the glow. The Wisconsin scientists have designed a thermoluminescent apparatus to heat the crystals and record the amount of light emitted.

Use of such a device could enable authorities quickly to divide a population exposed to radiation into groups of individuals requiring similar medical treatment.

Another use for the thermoluminescent capacity of minerals may be in the field of oil exploration. Limestone samples taken from various depths of one drilling can be compared with samples from other wells to aid in predicting whether or not the same oil-bearing strata are present.

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ENTOMOLOGY

Tiny Wasps Conquer Red Scale of Citrus

➤ RED SCALE, a tiny insect that damages orange, grapefruit and lemon trees at an annual cost to growers of millions of dollars, can be controlled by two gnat-sized wasps that feed on the pests, a University of California entomologist in Riverside has found.

Until now orchard growers have had to rely mainly on insecticide sprays to stop the red scale that attacks the leaves, bark and fruit of citrus trees. Paul DeBach of the University's Citrus Experiment Station termed the two tiny wasp parasites the "first examples of satisfactory control of the red scale by any means other than chemical."

One of the parasitic wasps, commonly called the golden chalcid, has been known in California for over 50 years, but only recently has it been used for control of red scale. The other wasp was imported from China four years ago.

Insecticides sprayed on the trees and ants in the orchard seem to hinder the work of the wasps in cleaning orchards of red scale. Preliminary tests show that for best results the parasite wasps should be released periodically throughout the year.

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INVENTION

Gas Discharge Device For Safes Foils Burglars

➤ SAFER SAFES for money and valuables are promised with a device to attach to the inner panel of the door which contains a noxious gas powerful enough to overcome a robber. Other devices of this sort are in use but they are built-in affairs. This improved type can be attached in most any safe.

The gas is in a container that is easily broken whenever impact or pressure is applied to the tumblers of the safe combination tending to drive them inward. The most frequent attempts against safes are made by "knob knockers" whose method is to knock off the knob or dial of the combination lock, and then drive the tumblers far enough inward so that the latch bolts can be released and the door opened.

Inventor is Harry W. Srygley, Abilene, Texas. Patent 2,566,587 was his award. The invention does not save the lock from injury but it does save the contents of the safe.

Science News Letter, September 22, 1951