



WELDED GRAPHITE—The line between the shiny and dull regions in this piece of graphite, barely visible in the photograph, is the place where two pieces were "welded" together at National Carbon Company's new research laboratories.

PHYSICS

Graphite Welded For First Time

► GRAPHITE PIECES have been "welded" together for the first time in history and the largest single crystals of cadmium sulfide so far known have been "grown," Dr. Robert G. Breckenridge, reported.

Dr. Breckenridge is director of the National Carbon Company's new laboratories at Parma, Ohio. National Carbon is a division of Union Carbide and Carbon Corporation.

Welded graphite allows scientists to fabricate sheets and panels for the assembly of nuclear reactor moderators that now must be built from graphite blocks.

Cadmium sulfide, used in solar batteries, photo cells, and as a light-producing phosphorescent material when properly activated, has been made in single crystals measuring three-eighths of an inch in diameter and several inches long.

These single crystals, Dr. Breckenridge said, have proved superior to those of a poly-crystalline film.

Key to the success of how to melt graphite together was the discovery that, when heated to a high temperature, high pressure can prevent vaporization.

This technique, Dr. Breckenridge said, has already led to the production of new forms of graphite that have a much higher degree of crystalline perfection than any artificial graphite attainable up to now.

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Seven or eight million Americans have hay fever.

PHYSICS

Expect New Anti-Particles

► DISCOVERY of the anti-neutron by scientists at the University of California does not exhaust the possible anti-particles physicists expect will be found.

In the strange world of atomic nuclei, there are still a large number of short-lived anti-fragments that will leave their tell-tale tracks in the supersaturated water vapor of a cloud chamber or be caught on photographic emulsions.

Both cosmic rays and the high energy atom smashing machines could yield these new anti-particles.

Most likely accelerator to produce one or more of the yet undiscovered anti-particles is the new ten billion electron volt (Bev) machine scheduled to start operation within six months in Russia. It has the necessary power to turn pure energy into matter, as was done in the six Bev bevatron at Berkeley to make both the anti-proton and the anti-neutron. (See SNL, Sept. 22, p. 183.)

Although pi mesons, the glue that keeps atomic cores from flying apart, have anti-particles physicists have known about, anti-particles for the very rare hyperons have not yet been found.

Hyperons are unstable particles having masses heavier than the neutron and proton. They live for only billionths of a second, but during that fleeting lifetime, their existence is just as real as that of the neutron, which lasts for about 15 minutes before decaying into a proton.

One puzzling question, therefore, is exactly what are fundamental particles. Neutrons and protons are, physicists agree, but they are still debating where to draw the line, since the number of strange fragments found in the debris of smash-ups between atoms keeps increasing.

The anti-particles of hyperons expected some day to be discovered include one for Lambda zero; one for each of the three kinds of Sigmas now known, and one for negative Xi.

Scientists are also searching for the anti-neutrino. The neutrino, first suggested by Dr. Wolfgang Pauli and the late Dr. Enrico Fermi in 1934, was only recently detected directly, although its existence had long been thought real on the basis of indirect evidence. (See SNL, June 30, p. 410.)

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PUBLIC HEALTH

Audible Nerve Gas Alarm

► THE ALARM for a nerve gas attack can now be given audibly and visibly by automatic devices that detect the deadly colorless, odorless gas in quantities "too small to affect human or animal life."

The devices, including a portable one for Army field use that can be dropped by parachute, were announced at the American Chemical Society meeting in Atlantic City.

Besides their value for protecting troops and civilians in case of war, the devices can be adapted for use in nerve gas arsenals and plants, in laboratories, to detect the new insecticides related to nerve gas, and to detect other dangerous gases such as "silo gas" that sometimes kills farmers.

For combat is the portable B21 developed jointly by the U. S. Army Chemical Corps and Radio Corporation of America. It is waterproof, about the size of a portable typewriter, weighs about 25 pounds, is highly sensitive yet tough enough to withstand parachute drops, John C. Young, physical chemist at the Army Chemical Center, Edgewood, Md., reported.

This device filters a sample of air to remove dust, then passes the air through a paper tape wetted with a solution of ortho dianisidine and sodium pyrophosphate peroxide, which turns red if nerve gas is present. Photocells react to the red color on the paper tape by triggering an audible and visible alarm.

The B21 will operate continuously for 12

hours on 24-volt direct current electricity. After 12 hours, it can be serviced and put into operation again in a matter of minutes.

The B21 is relatively cheap in cost and has been designed for mass production if required. By using different chemical reagents, it can be adapted to detect other gases and is believed to have broad applications to industrial air pollution.

A different chemical-electronic system, using "black light," works the gas alarm device reported by Harold R. Smith of the Chemical Warfare Laboratories and a team of chemists of Leeds and Northrup Company, Philadelphia.

This instrument, which is not portable, uses chemicals that fluoresce under "black light" to detect as little as one part of nerve gas in 10,000,000 parts of air. It is being used at the Army's Rocky Mountain Arsenal among other places.

Neither visible light nor fluorescent light is needed for the nerve gas alarm reported by Jerome Goldenson of the Chemical Warfare Laboratories.

This device operates on a chemiluminescence principle.

"The most promising potential use for the new chemiluminescence method (which produces light by reaction of the nerve gas with the chemical, luminol) is for continuous automatic sampling of the atmosphere," Mr. Goldenson said.

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