PHYSICS

New Radium-Like Carbon May Have Medical Uses

Unusually Long Half Life of Thousand Years Makes C-14 Valuable as Tracer Element for Research Use

MODERN alchemy, which turns one element into another, has now made from nitrogen a form of carbon which promises to have important uses in medicine and other sciences, announce two researchers at the University of California.

This kind, or isotope, of carbon is of mass 14, somewhat heavier than normal carbon, principally composed of the isotope of mass twelve. Unlike ordinary carbon, the new kind, C-14, gives off beta rays, one kind of radiation emitted by radium. It consists of atomic fragments called electrons. C-14 does not, however, give off gamma rays, which resemble X-rays, and are responsible for the medical effects of radium.

Dr. Samuel Ruben and M. D. Kamen, of the University of California, reveal their success in preparing appreciable quantities of C-14 with the cyclotron, or "atom-smasher," of the University. (*Physical Review,* Feb. 15)

For six months two five-gallon carboys of a concentrated solution of ammonium nitrate, in which no carbon is present, were exposed to a constant rain of neutrons from the atom-smasher. Some nitrogen atoms, which have the same mass as C-14, were converted into the carbon isotope. These were extracted in the form of various carbon compounds. Their radioactivity was tested by means of a Geiger counter, which detects the beta rays. The samples showed considerable activity, far more than any of the materials used originally, before the bombardment with neutrons.

It is expected that C-14 will prove important as a tracer element, in medical and botanical research, and it may be prepared commercially in large quantities for such use. Carbon is the most widespread element in living organisms. Ordinarily it is not possible to distinguish one carbon atom from another, but radioactivity forms a tag for identification. If C-14 atoms are introduced at one part of a living organism, they can be located elsewhere by their effect on a Geiger counter.

Another advantage of C-14 is that it has a long life. Continually giving off energy, radioactive elements are gradually used up. C-14 disintegrates so slowly that after 1000 years there will still be at least half of the original quantity remaining.

Dr. Ruben and Mr. Kamen point out that in some ways the long life of C-14 is unfortunate, since it requires a long time to prepare it. They point out, however, that there are methods for concentrating it from the other isotopes. In addition, they suggest, end products of a reaction in which it is used can be collected, the C-14 reconcentrated, and used over again.

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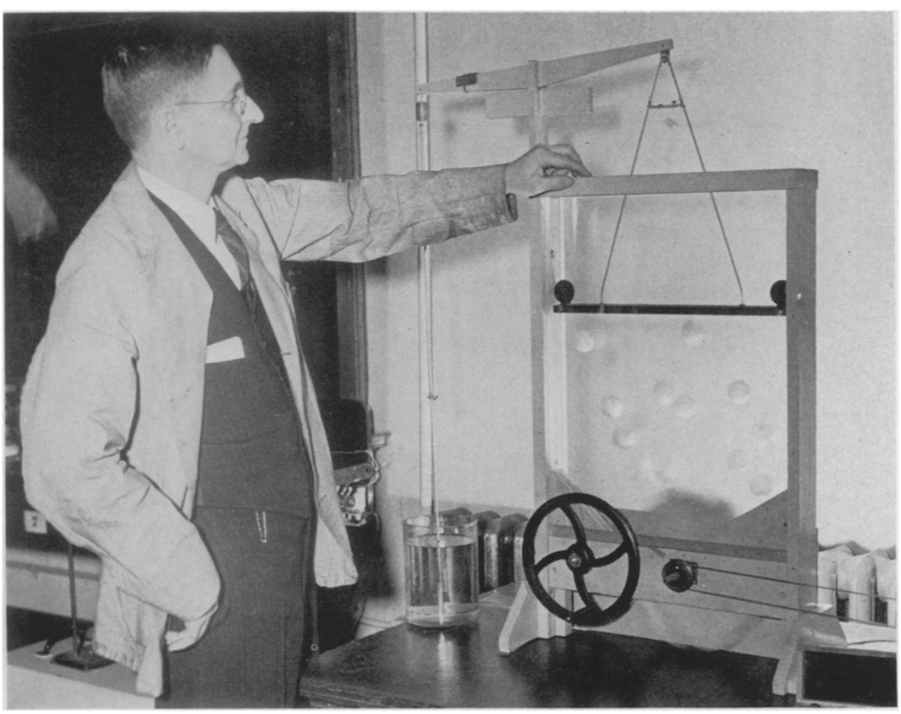

PING PONG BALLS GO TO SCHOOL

Dr. Thomas B. Brown of George Washington University devised this apparatus in which ping pong balls moving at high speed in all directions within the glass enclosure represent molecules in a heated solution. The balance over the apparatus measures the pressure on the top of the glass enclosure. By replacing the top piece the apparatus can be made to represent other physical aspects of solutions such as Brownian movement and osmosis.

BACTERIOLOGY

Nitrogen-Capturing Germs Best on Oxygen Shortage

WET, soggy soils are more likely to build up a nitrogen supply through the activity of bacteria living in them than are well-drained, well-tilled soils with free access of air. This is the conclusion of Dr. H. L. Jensen and Dr. R. J. Swaby of the University of Sydney, Australia, based on experiments reported in *Nature.* (Feb. 1)

Nitrogen-fixing bacteria that live free in the soil cannot work alone, Drs. Jensen and Swaby explain. They must obtain energy for their work from the breakdown products of carbohydrates, and for these they are dependent on the work of other bacteria, carbohydrate-digesters, with which they are associated in nature. If there is plenty of oxygen, the two Australian scientists discovered in the course of their experiments, these "assistant bacteria" do their job too well, not leaving enough for the nitrogen-fixers to eat. Oxygen shortage thus becomes an actual advantage.

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