Comments and Communications

Radioactive Needles Containing Cobalt 60

As a part of the broad program entailing applications of radioisotopes in fundamental research and therapy in progress at the Ohio State University College of Medicine during the past 8 years, studies planned in July 1946, following the announcement in this journal of the availability of radioisotopes generated in the pile at Oak Ridge, were begun in October 1947 with Co^{60}. Sufficient progress has been made to warrant a preliminary report of our studies, since they indicate that the gamma radiation emitted by the isotope will prove useful in a manner similar to the present application of radium in the treatment of radiosensitive neoplasms.

Because of difficulties encountered in machining pure cobalt rondels, we are using an alloy wire composed of 45% cobalt and 55% nickel. ("Cobanic" wire was kindly furnished by the Wilbur B. Driver Company, Newark, New Jersey.) Radioautographs of needles fashioned from the wire demonstrated uniform radioactivity per unit length after they had been irradiated in the pile at Oak Ridge, and measurements made with a Geiger-Müller counter proved that the amount of radioactivity present was in proportion to the mass. Chemical separation of the components of the alloy, carried out by Harmon L. Finston, of the Department of Chemistry, The Ohio State University, showed that the radionickel generated during exposure of the needles in the pile is very slight in amount and does not contribute significantly to the total radioactivity of the needles. A needle 3 cm long, 1 mm in diameter, and weighing 0.193 gm was measured soon after irradiation and showed 2.97 milliroentgens/hr at 1 m and gamma radiation equivalent to that from 4.08 mg of radium when the gold leaf electroscope was surrounded by 1 cm of lead. (These values were determined by L. F. Curtiss at the National Bureau of Standards.) This specific activity is suitable for many purposes; if desired, it should be possible to increase it several fold simply by longer irradiation in the pile.

Animal studies support radioautographic evidence that the soft beta radiation present should be removed by filtration to minimize periacicular necrosis in applications where only the effects of the gamma radiation are desired. This can be accomplished easily by enclosing in thin, strong, and inexpensive casings of stainless steel or Monel metal.

The alloy is strongly magnetic, and we find it convenient to handle it with a small, long electromagnet (suggested by Paul C. Aebersold) instead of the forceps commonly employed in handling needles containing radium. We have found the half-value thickness of the gamma radiation in lead to be 0.41″. The emission of gamma rays having such high energy, together with the ease of handling and availability, indicate that Co^{60} should prove especially useful in telecobalt installations. The alloy is quite malleable and can easily be machined to any desired shape before it is made radioactive. Another advantage over radium is that the radioactive wire can be bent to fit lesions such as tumors in bone. In addition, there is no danger of loss by leaks or breakage.

Clinical evaluation will be undertaken soon in collaboration with Dr. Joseph L. Morton, of the Radiology Department of The Ohio State University, after completion of animal studies now in progress. A more detailed description of the radioactive alloy needles and their properties will be presented at the American Radium Society Meeting in Chicago, June 20–22.

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Influence of Butyl Alcohol on Shape of Snow Crystals Formed in the Laboratory

In the course of laboratory measurements on the number of ice-forming nuclei contained in various smokes, a microscope was set up in a refrigerated box for the purpose of counting snowflakes. A supercooled cloud was formed in the refrigerated box at −20° C by the Schaefer technique (*Science*, November 15, 1946, pp. 457–459). Smoke containing silver iodide nuclei was introduced into the cloud, and the snow crystals which formed were allowed to fall on a slide, where they were examined under a microscope. The crystals thus produced were predominantly in the form of flat hexagonal plates.

Without any intentional change in the experimental setup, it was noticed that the type of snowflakes produced had changed from the hexagonal plates to hexagonal prisms having a length of the order of 5 times their diameter. It was found that hexagonal prisms were produced until the air in the box had been cleaned out by displacing it with air from the compressed air line. When this was done, the flakes formed were once more hexagonal plates. The cause for this change in the shape of the crystals was finally traced to the presence of a small amount of normal butyl alcohol vapor in the laboratory atmosphere which had resulted from accidentally spilling some of this liquid.

The modification of crystal shape caused by traces of butyl alcohol vapor was found to vary considerably with its concentration in the air in the cold chamber. When the partial pressure of the butyl alcohol was of the order of 10^{-6} atm or less, no effect was noticeable. At a partial pressure of the order of 10^{-5} atm, the long prisms were formed. At still higher partial pressures, the effect diminished, and hexagonal plates formed once more. The effect of the butyl alcohol vapor on the crystals was found to be similar whether the cloud was seeded by silver iodide smoke or by passing a piece of solid carbon dioxide through it.

The modification of habit produced in the presence of butyl alcohol is similar to the changes which have been reported in the habit of crystals grown from solutions to which various substances have been added. For example, sodium chloride, which usually crystallizes as cubes from