converted into non-radioactive lead. The time which elapses during each of these successive transformations varies greatly, from fractions of a second to thousands of years. The time which is needed by a radioactive element to give off half of its actinic energy by atomic disintegration is called the half-time of the particular substance, which is characteristic of the different radioactive elements. The members of the three radioactive series, the type of rays emitted by them, and their respective half-times are presented in the table on the following page, which shows at the same time the order in which the various disintegration products are formed.

The succession of various types of rays, emitted by the different kinds of disintegration products, is of significance for the proper understanding of the biologic effects produced by a radioactive substance which has entered the body and which is retained there for some time, or which remains as a deposit in certain tissues over a prolonged period. The elements of the uranium-radium series and thorium series as well as their various compounds possess industrial and medicinal importance. Those contained in the actinium series have so far mainly scientific interest, except when they occur as admixtures of the members of the radium series, as the actinium members are found in uranium pitchblende.

Uranium ores, which are mined on a commercial scale in Joachimsthal (Germany), Katanga (Congo), and Great Bear Lake (Canada), are pitchblende, autunite, camotite, betafite, and chalcolite containing various proportions of radium (2 mg. to 100 mg. per ton). For the extraction of the radioactive substances the minerals are crushed to a coarse powder. After repeated washings the powdered material is subjected to several chemical procedures, resulting in a concentration of the radium in the products obtained by an interaction of barium chloride with radium. When the product has become sufficiently rich in radioactive substances, it is transferred from the processing plant to the purification and crystallization laboratory, where the radium is separated from the barium by repeated fractionated crystallizations based on differences in solubility of the two substances, barium chloride being more soluble in water than radium chloride. By redissolving and recrystallizing the radium chloride precipitate in hot water, an increasingly pure radium product is obtained gradually. About a hundred such crystallizations, each one taking approximately a day, are necessary before a satisfactory end product is reached. In well-conducted laboratories all open treatments and heating processes are carried out under a hood with a forced draft. Ventilating fans are kept running during work and the windows are kept open as much as possible. During the final stages of the crystallization process the evaporation dishes are placed in thick lead shields, as the hazard increases with the concentration of the radioactive product. The active purified compound is placed into small glass tubes, which are sealed and kept in lead containers which provide the proper protective screening. The tubing of the active compounds is carried