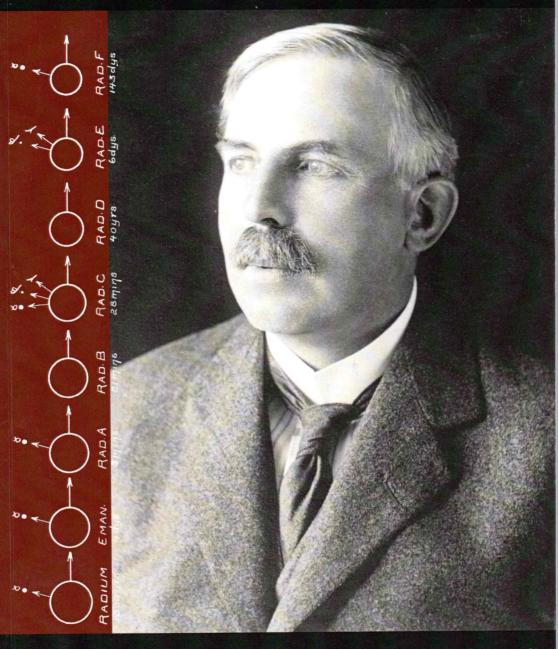
Radio-activity



Ernest Rutherford

RADIO-ACTIVITY

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E. RUTHERFORD, D.Sc., F.R.S., F.R.S.C. MACDONALD PROFESSOR OF PHYSICS, M°GILL UNIVERSITY, MONTREAL

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since the intensity of the radiation is always proportional to the number of particles present.

134. Influence of conditions on the rate of decay. Since the activity of any product, at any time, may be taken as a measure of the rate at which chemical change takes place, it may be used as a means of determining the effect of conditions on the changes occurring in radio-active matter. If the rate of change should be accelerated or retarded, it is to be expected that the value of the radio-active constant λ will be increased or decreased, i.e. that the decay curve will be different under different conditions.

No such effect, however, has yet been observed in any case of radio-active change, where none of the active products produced are allowed to escape from the system. The rate of decay is unaltered by any chemical or physical agency, and in this respect the changes in radio-active matter are sharply distinguished from ordinary chemical changes. For example, the rate of decay of activity from any product takes place at the same rate when the substance is exposed to light as when it is kept in the dark, and at the same rate in a vacuum as in air or any other gas at atmospheric pressure. Its rate of decay is unaltered by surrounding the active matter by a thick layer of lead under conditions where no ordinary radiation from outside can affect it. The activity of the matter is unaffected by ignition or chemical treatment. The material giving rise to the activity can be dissolved in acid and re-obtained by evaporation of the solution without altering the activity. The rate of decay is the same whether the active matter is retained in the solid state or kept in solution. When a product has lost its activity, resolution or heat does not regenerate it, and as we shall see later, the rate of decay of the active products, so far examined, is the same at a red heat as at the temperature of liquid air. In fact, no variation of physical or chemical conditions has led to any observable difference in the decay of activity of any of the numerous types of active matter which have been examined.

135. Effect of conditions on the rate of recovery of activity. The recovery of the activity of a radio-element with

time, when an the rate of produce activity of that activity of the rate of recovery the rate of produce ments have gone, the independent of chemical certain cases which example, the escape and radium is real A more thorough tion is only apparent more in detail in the differences observed of the emanations into in the rate of production question at issue in in most cases readily escape into the air.

CONTINUOUS

In order to show to of molecular state, tendered case to undertake a over the whole time of rate relative comparison conversion of one comparison such a case, when material uniformly on a conditions of the precipitom pounds may be the

The following methor of studying whether the influenced by molecular verted into any compour products are recovered duthen spread on a metal profuranium for several designation.

^{*} Rutherford a