The same was observed in the case of cadmium for directions nearly perpendicular to the axis (Fig. 1*b*).

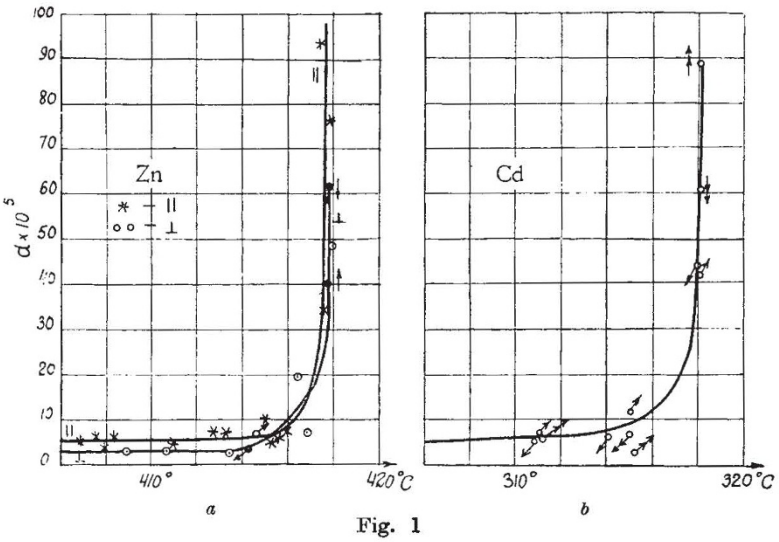

Fig. 1

CHANGE OF COEFFICIENT OF EXPANSION WITH TEMPERATURE FOR ZINC AND CADMIUM. ⇄, FIRST HEATING AND COOLING; ⇉, SECOND HEATING AND COOLING.

It is clear therefore that zinc and cadmium exhibit anomalous expansion near the melting point and that the sign of the anomaly coincides with that of the change of volume in melting.

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[1] Roberts, J. K., *Proc. Roy. Soc.*, A, **106**, 385 (1924).

Induced Radioactivity with Neutrons from Slow Deuterons

IT is of interest, not least from the point of view of possible practical applications, to search for the lower limit of voltages, with which artificial radioactivity can still be produced of intensity sufficient for utilization. We have begun an investigation, in which the induced activity is produced by neutrons, which are produced by slow deuterons. This procedure has the advantage that the small number of neutrons that can be expected will be compensated, at least partly, by the greater efficiency of slow neutrons, due to the slow primary particles.

In our experiments, a beam of positive rays of deuterons was directed on to a mica foil covered with a thin layer of beryllium. The origin of the neutrons is probably the process:

$$^{9}_{4}\mathrm{Be} + {}^{2}_{1}\mathrm{H} \rightarrow {}^{10}_{5}\mathrm{B} + {}^{1}_{0}n;$$

but the reaction

$$^{2}_{1}\mathrm{H} + {}^{2}_{1}\mathrm{H} \rightarrow {}^{3}_{2}\mathrm{He} + {}^{1}_{0}n$$

cannot yet be excluded as a possible source of the neutrons. Outside the tube a Geiger-Müller counter of silver was placed at about 10 cm. from the source. It was screened by lead, in order to reduce the number of counts due to the background to 2–3 per minute. The mica foil was irradiated for five minutes with a total current of about 1mA., which was discontinued and the counter set in work. Thus we could measure the activity produced by the neutrons in silver alone.

As regards the half-value periods, the results of our preliminary measurements agree with those of earlier work in other laboratories. We have obtained two active components with periods of 22 ± 3 sec. and 100 ± 15 sec. respectively. The ratio of their intensities is about 1. However, the relatively considerable number of decay electrons is very remarkable. We have obtained, for example, in the first and second minute, 5·1, 1·8 counts as a mean value from 100 measurements, the background counts being deducted. We can state, therefore, that it is indeed not hopeless to search for nuclear reactions of this kind with such a low voltage. By comparison with a preparation of radium-beryllium with known content of radium, we can say that the artificial activity produced by our process is equivalent to that of the unslowed neutrons of such a preparation containing about 6·8 mgm. of radium element. Of course, that does not mean that the number of the neutrons emitted will be the same in both processes; we cannot yet state anything on this point because of the difference of the velocities of the neutrons in the two cases, and we know nothing about the velocities of our neutrons.

The experiments are being continued and will be completed from this point of view.

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A Photo-electric Method for the Measurement of the Optical Constants of Metals

THE optical constants of a metal are measured by allowing a beam of parallel light, plane-polarized at an azimuth of 45°, to fall on the plane polished surface of the metallic specimen, and then analysing the reflected elliptically polarized light. From the constants of the ellipse, and the angle of incidence of the light, the optical constants may be calculated.

The methods hitherto adopted for the analysis of the elliptically polarized light fall into three groups: (i) photographic methods for the ultra-violet; (ii) visual methods for the visible region; (iii) bolometric methods for the infra-red. Of these the most accurate are the visual methods.

In essentials the present method is similar to the visual methods, but since the eye is replaced by a photo-electric cell, the range of application is extended to include the ultra-violet and infra-red portions of the spectrum. The method in principle is as follows: The elliptically polarized light is analysed by transmission through a Soleil-Babinet compensator and a Nicol prism. The photo-electric cell in conjunction with a Lindemann electrometer becomes the objective indicator for the determination of the correct settings of compensator and analyser to produce extinction of the light.