Cyclotron Group - Arthur H. Snell

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General

Most of the operating time of the cyklotron during the past month has been devoted to bombardments for the chemical and health groups. We have had to shut down twice for repairs.

Beta-ray Spectrometers

Mr. Brolley is making a good progress in the design of a magnetic lens spectrometer. Mr. Nedzel has been estimating resolving powers and computing line shapes for the semi-circular focussing spectrometer, with a view toward a good compromise between such parameters as source length and source width, and defining slit width. He has also started investigating the shimming required on the magnet poles to give a sufficiently uniform field at a radius of about 18 cm.

We have borrowed from the Ryerson Laboratory a set of precision Helmholz coils for use as a primary magnetic field standard.

Fission Product Decay Curves for Thorium

Mr. Wilkinson and Mr. Levinger have continued to follow the decay of the lumped fission products of a thorium sample and a uranium sample which were prepared simultaneously in a 120 microampere hour activation carried out on May 11. The thorium was activated with fast neutrons, and the uranium with slow neutrons. Small samples were used (60 mg) and no chemical separations of any kind were made: the natural activities were measured prior to activation and were considered as a constant background. The decay curve of thorium now looks very different from that of the uranium; in particular, the thorium has relatively more long-lived activity than does the uranium. In fact, if one equalizes the activities in the region up to 80 hours after activation (the decay curves are fairly parallel in that interval), then at 500 hours the thorium sample is twice as active as the uranium sample. The possibility that this may be largely due to the 27-day protoactinium 233 is being investigated. Absorption curve data indicate that there may be some difficulty in this explanation.

Neutron Capture Cross Section of argon 40

Mr. Kern has undertaken a measurement of this quality, using the following procedure: A few cc of argon gas (99.6% of which is A^{40}) an activated in a small metal cell buried in paraffin near the cyclotron target, together with some powdered manganese as a monitor. A known fraction of the activated gas is transferred to a thin-walled chamber for counting, and the decay of the 112-minute A^{41} is measured. The monitor is counted in similar geometry. Kern's present value for the capture cross section is $(1.0 \pm 0.3) \times 10^{-24}$ cm^2.