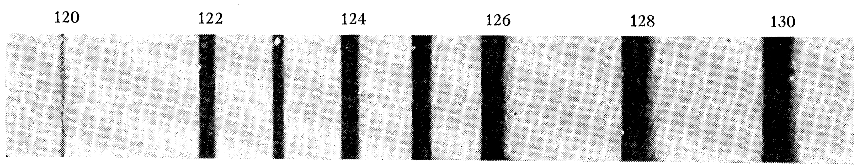

FIG. 1. Mass spectrum of tellurium.

The Isotopic Constitution of Strontium and Tellurium

In the *Physical Review* for May 15, J. P. Blewett and M. B. Sampson report the observation of a new isotope at mass 84 in strontium. I have recently confirmed this observation, the mass spectrum of the ions from a spark between a palladium and a strontium electrode showing the mass at 84 in addition to the much stronger lines at 86, 87, and 88.

Mass spectra of the charged atoms from a spark between tellurium and palladium electrodes showed a new faint isotope at mass 120. A reproduction is shown in Fig. 1. Only the four heaviest isotopes at 130, 128, 126, 125 were observed by Aston. Later Bainbridge[1] found three additional isotopes at 124, 123, and 122, and indications of an extremely faint one at 127. The present photographs show no trace of this line at 127, and it may have been due to iodine present as an impurity. The new isotope at 120 cannot be ascribed to tin as the other strong tin isotopes are not present. In a chart of the elements it extends the limit of stability of the tellurium nucleus to make it more in line with the lightest isotopes of tin, xenon, and barium.

A. J. DEMPSTER

University of Chicago,
June 23, 1936.

[1] K. T. Bainbridge, Phys. Rev. 39, 1021 (1932).

Evidence from Efficiency Curves for the Nature of the Disintegration Process for Boron

The existence of a continuous distribution and a homogeneous group of α-particles resulting from bombarding boron with protons has been definitely established,[1, 2] and confirmed by integrated numbers-*vs.*-range curves in this laboratory.

This letter reports an investigation of the efficiency of production of α-particles from this reaction as a function of the voltage accelerating the protons. A transformer-kenetron-condenser source of high potential up to 275,000 volts with voltage measured by a high resistance voltmeter was used. The energy of the magnetically resolved proton beam could be controlled to within three kilovolts and except for collision energy losses after resolution was highly monochromatic. The α-particles emitted from the fused B_2O_3 *thick* target were observed by an ionization chamber and amplifier of the Dunning[3] type and a thyratron counter adjusted to count all α-particles reaching the ionization chamber. The apparatus gave absolute yields from a thick target of LiCl to within 10 percent of the results of the Wisconsin laboratory.[4]

The observed efficiency curves for production of all α-particles having a range greater than a given range are shown in Fig. 1. It is seen that the main group of range greater than 18 mm follows the ordinary efficiency curve with no evidence for any peculiarities of excitation. This is also true for the Li efficiency curve shown by the dotted line. However, when the majority of α-particles recorded are of the long range type, >38 mm, it is seen that the curve is not exponential but shows a decided break with the maximum of the differentiated curve (i.e., thin target) at 180 kv. The feet of these curves are of a quite different character from those of the shorter range curves, and the intermediate sections show a more rapid rise in yield with increasing voltage.

These curves suggest that the disintegration which has been proposed[1]

$$_1H^1 + {}_5B^{11} \rightarrow {}_4Be^8 + {}_2He^4$$

or any further reaction postulated to account for this long range group, is a case of resonance disintegration.

Reasons for the non-constancy of the yield from thick targets at higher voltages are: (a) the onset of further modes of disintegration; (b) the change of shape of the numbers-*vs.*-range curve so that the continuous distribution extends to greater range and is observed with increasing abundance at higher voltages. From this point of view the short range continuous distribution efficiency curve is not "regular." There is evidence for the latter suggestion from the differential curve, Fig. 5 of Cockcroft and Lewis.[2]

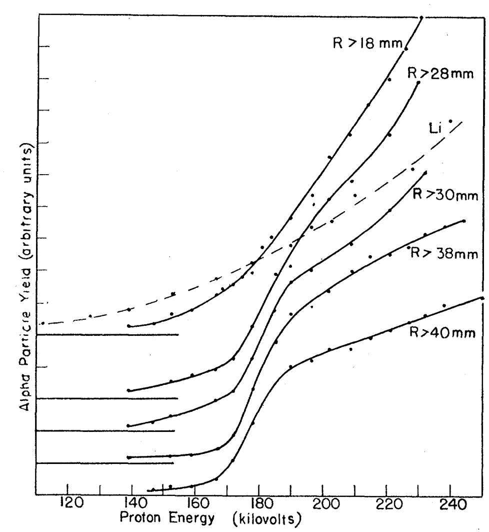

FIG. 1. Yield curves for α-particles from the disintegration of boron by protons. The yields are in arbitrary units and the zeros for the various curves are shifted vertically as indicated. For comparison purposes the yield curve for the α-particles from lithium bombarded with protons is also given.

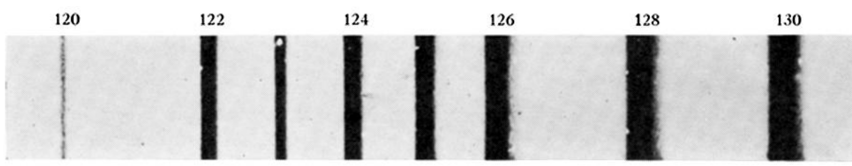

FIG. 1. Mass spectrum of tellurium.