LETTERS TO THE EDITOR

Prompt publication of brief reports of important discoveries in physics may be secured by addressing them to this department. Closing dates for this department are, for the first issue of the month, the eighteenth of the preceding month, for the second issue, the third of the month. Because of the late closing dates for the section no proof can be shown to authors. The Board of Editors does not hold itself responsible for the opinions expressed by the correspondents.

Communications should not in general exceed 600 words in length.

Artificial Radioactivity Produced by Alpha-Particles

We have found that Co, Cu, and Ni become strongly radioactive whem bombarded with about 0.05 microamperes of 7 Mev alpha-particles. The relative initial intensities of the activities, corrected to infinite bombarding time, are in the ratio Co : Cu : Ni = 100 : 15 : 22. The following identifications are suggested for the radioelements formed.

Co: The half-life of the activity has been measured with some care (Fig. 1) by means of a Lauritsen type electroscope; it is 9.65 ± 0.07 minutes. The emitted particles have been found to be positrons by deflection in a magnetic field. Since Co has only one abundant isotope, Co^{59}, it is suggested that this radioelement is Cu^{62}, formed in the reaction Co^{59} (α, n) Cu^{62}. Heyn[1] and Pool, Cork and Thornton[2] have attributed an activity found by them to be induced in Cu by fast neutrons to Cu^{62}, the reaction being Cu^{63} $(n, 2n)$ Cu^{62}. The half-lives given are 10.5 ± 0.5 min.[1] and 10 min.[2] Bothe and Gentner[3] have found an activity of half-life about 11 minutes produced in Cu by bombardment with 17 Mev gamma-radiation; this they have attributed to Cu^{62}, formed by the reaction Cu^{63} (γ, n) Cu^{62}. The present result provides independent confirmation of the assignment of the radioactivity made by the above-mentioned authors, the difference in half-lives probably being too small to be significant.

Cu: The half-life of the positron emitting radioelement formed in the alpha-particle bombardment of Cu is 59 ± 1 minutes. The possible radioelements formed are Ga^{66} and Ga^{68}. Since Bothe and Gentner[3] have found that an activity of 60 minutes is produced in Ga by gamma-ray bombardment, which they have attributed to Ga^{68} formed by Ga^{69} (γ, n) Ga^{68}, it seems reasonable to suppose that the activity we observe is due to Ga^{68}. The reaction involved here is then Cu^{65} (α, n) Ga^{68}.

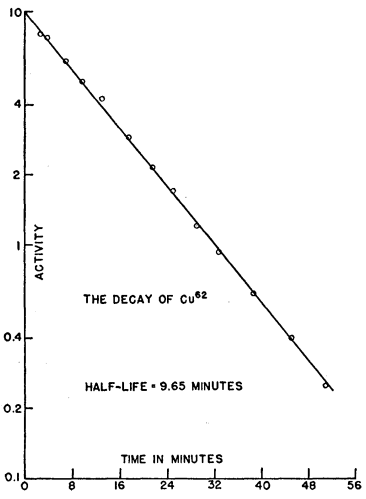

FIG. 1. The decay of Cu^{62}.

Ni: While one would expect, in analogy with the two foregoing reactions, that the 38 minute radioelement attributed by Bothe and Gentner[3] to Zn^{63} would be formed in the bombardment of Ni with alpha-particles, this activity, if present, is so weak as to have escaped detection. The strong activity found decays with the hitherto unknown period (Fig. 2) of 3.25 ± 0.05 hours, positrons being

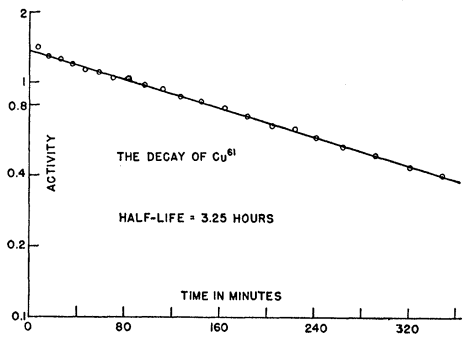

FIG. 2. The decay of Cu^{61}.

emitted. Chemical experiments identify the activity as due to an isotope of Cu. Since isotopes of Cu, stable and radioactive, are known for all mass numbers from 62 to 66, inclusive, we assign this activity to Cu^{61}, formed from Ni by the reaction Ni^{58} (α, p) Cu^{61}. Ni is believed to be the heaviest element in which the (α, p) reaction has been so far observed.

We are indebted to our colleagues, Drs. M. G. White and M. C. Henderson, who have been chiefly responsible for the construction of the cyclotron with which these results were obtained.

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[1] Heyn, Nature **138**, 723 (1936) and Physica **4**, 160 (1937).
[2] Pool, Cork, and Thornton, Phys. Rev. **51**, 890 (1937).
[3] Bothe and Gentner, Naturwiss. **25**, 90 (1937) and **25**, 191 (1937).