exposure to the atmosphere during hot, humid weather it soaked up too much moisture and drying treatments attempted so far have not been entirely successful.

The performance of the tube and charging belt indicate that they will be satisfactory for still higher voltage.

We are indebted to Dr. J. L. McKibben for many valuable suggestions and for much help in the design work. Results of his test work were utilized and contributed greatly toward the success of the generator. N. D. Crane and A. O. Hanson gave valuable help with construction work and the Wisconsin Alumni Research Foundation provided financial support.

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Internally Converted Gamma-Rays from Radioactive Gold

The electron spectrum of radioactive gold chemically separated from platinum bombarded with 9.5-Mev deuterons has been obtained with the magnetic spectrometer. A typical result with various peaks due to internally converted gamma-rays is shown in Fig. 1. It is evident that the spectrum of this element is very complex. The lower curve in this figure was taken 18 days after the upper one, and was obtained in order to evaluate the half-life of each electron group.

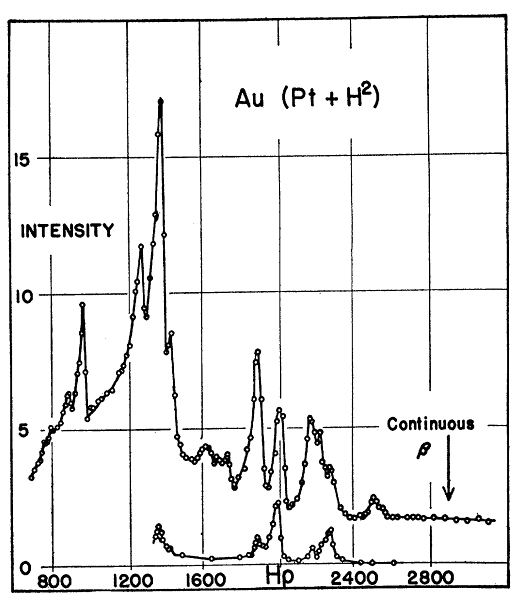

Fig. 1. Electron spectra of radioactive gold taken 18 days apart. The ordinates of the lower curve have been multiplied by 4 before plotting.

The results so far obtained may be summarized as follows: The activity of 164 days half-life shown[1] by absorption measurements to emit beta-particles of energy 0.45 Mev and gamma-radiation of energy 0.11 Mev is too weak for analysis in the spectrometer. The activity of half-life 5.6 days, which from absorption measurements was reported to emit beta-particles of energy 0.36 Mev and gamma-radiation of energy 0.41 Mev, is now shown to be due to a partially converted gamma-ray of energy 356±4 kev. The responsible isotope may be either Au^{196} or Au^{197*}. The other 4 peaks of $H\rho$ greater than 1800 oersted cm can be resolved into *K*- and *L*-conversion electron groups corresponding to gamma-ray energies of 331±3 and 410±4 kev, respectively. The half-life of these gamma-rays appears to be about 3 days which is somewhat longer than the value reported from an analysis of the decay curves taken with an ionization chamber. Early observations in the spectrometer confirm the existence of a positron emitter of short half-life. Further work with stronger samples must be carried out to analyze satisfactorily the electron groups of lower energy.

This investigation was made possible by a grant from the Horace H. Rackham Fund.

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The Photographic Registration of Heavy Particles Emitted During Bombardment

In order to observe the particles emitted from a target during its actual bombardment in the cyclotron, independent of the disturbing effects of the scattered primary particles and the neutron background, a magnetic spectrograph has been devised. The arrangement employed is shown in Fig. 1.

The primary beam of deuterons is incident upon a narrow strip of very thin foil of the element being studied, suspended at the center of a cavity in a cast lead block. Particles leaving the target at an angle of ninety degrees are collimated by a slit in the wall of the lead block. The strong field of the cyclotron together with an auxiliary field produced by a magnetic shunt on the gap of the large magnet, suffices to resolve the emergent particles. Their deflections are approximately proportional to $ne/(mE)^{\frac{1}{2}}$ where ne is the charge, m the mass and E the energy of the particle. The photographic plate is held in a light-tight carriage that can be set at any desired position on an accurately milled track. By placing immediately in contact with the plate during bombardment, a stepped aluminum foil it is possible to also observe the range of each group of particles. This gives sufficient information to determine the nature of the particle and its energy.

Preliminary observations have been made on aluminum, copper, palladium, gold and platinum, using foils about 0.00004 in. thick. Considering the geometry of the sample