quenching counter. The two counters were prepared with break-off seals and their vapors were examined by a mass spectrometer. Table I indicates the results obtained:

TABLE I. Relative abundance as a function of mass number in used and unused counters. R = Peak height for mass number M/peak height for A^{40}.

Mass Number	R for unused counter	R for used counter
88	0.13×10^{-2}	0.00×10^{-2}
87	1.76×10^{-2}	0.00×10^{-2}
86	0.10×10^{-2}	0.00×10^{-2}
73	1.57×10^{-2}	0.00×10^{-2}
70	3.37×10^{-2}	0.00×10^{-2}
62	0.17×10^{-2}	0.00×10^{-2}
61	5.24×10^{-2}	0.00×10
46	0.18×10^{-2}	0.09×10^{-2}
45	5.49×10^{-2}	0.54×10^{-2}
44	2.52×10^{-2}	34.80×10^{-2}
43	35.30×10^{-2}	2.08×10^{-2}
42	1.79×10^{-2}	0.29×10^{-2}
40	1	1
39	0.08×10^{-2}	0.21×10^{-2}
36	0.34×10^{-2}	0.36×10^{-2}
32	4.84×10^{-2}	0.07×10^{-2}
31	0.43×10^{-2}	0.30×10^{-2}
29	5.35×10^{-2}	1.95×10^{-2}
28	32.00×10^{-2}	63.40×10^{-2}
27	2.47×10^{-2}	0.93×10^{-2}
26	0.69×10^{-2}	1.59×10^{-2}
25	0.08×10^{-2}	0.22×10^{-2}
22	0.03×10^{-2}	0.22×10^{-2}
20	10.70×10^{-2}	15.37×10^{-2}
18	0.90×10^{-2}	3.51×10^{-2}
16	0.23×10^{-2}	5.74×10^{-2}
15	2.25×10^{-2}	4.47×10^{-2}
14	1.54×10^{-2}	1.93×10^{-2}

The complete disappearance of mass numbers above 46 and the increases at smaller mass numbers for the used counter is in agreement with the theory. The large peaks that appear at mass numbers 44, 28, and 16, would indicate that the final vapors present in the counter after use are carbon dioxide, carbon monoxide, and some methane. In this test, the spectrometer was not operated below mass 14.

A further study of various gases and a determination of disintegration as a function of the number of counts is now in progress.

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[1] S. A. Korff and R. D. Present, Phys. Rev. **65**, 274 (1944).

Evidence[1] for a $\gamma-p$ Reaction in Be^9

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SEVERAL activities have been observed in elements irradiated by 20-Mev gamma-rays from the betatron that could be explained by $\gamma-p$ process. However, the γ-rays from the betatron have associated with them an appreciable number of fast neutrons, so that it is not clear whether these activities were the results of a $\gamma-p$ or an $n-p$ process. Accordingly, a search was made for an element such that a fast neutron reaction would cause no confusion.

Be^9 seemed to be such a substance. A $\gamma-n$ process produces Be^8 which decays to two alpha-particles immediately. An $n-\gamma$ process produces Be^{10} which has a half-life at 10^5 years, and hence would cause no confusion. An $n-p$ reaction, producing Li^9, is not known. The $\gamma-p$ process would produce Li^8 which decays with the emission of betas with a maximum energy of 12 Mev, and a half-life of 0.88 sec. The only confusing process is a $n-\alpha$ on Be^9 producing He^6 which decays with the emission of betas of maximum energy of 3.7 Mev, and a half-life of 0.88 sec.

Irradiation of Be^9 with 20-Mev gammas produced a beta-activity of half-life 0.88 ± 0.03 sec., indicating the formation of either Li^8 or He^6. A simple absorption experiment showed the presence of betas of energies up to 12 Mev, and a recheck of the half-life with $\frac{9}{32}$ inch of aluminum between the beryllium and the counter tube, again indicated a half-life of about 0.9 sec. $\frac{9}{32}$ inch of aluminum should remove all betas of energy less than 3.9 Mev, thus eliminating the possibility of the observed half-life being caused by the decay of He^6. Thus it seems clear that Li^8 is formed.

A rough threshold experiment was run, again with $\frac{9}{32}$ inch of aluminum between the beryllium and the counter tube, which indicated that the $\gamma-p$ process has an energy threshold of 18 ± 1 Mev. A similar experiment with no absorber shows some activity remaining when the gamma-rays have an energy as low as 7 Mev, which would indicate that He^6 is also formed, since the threshold for this process is expected to be 2.6 Mev, i.e., 1.6 Mev for the $\gamma-n$ process in Be^9, and 1 Mev for the $n-\alpha$ process. Mass values taken from Segrè's isotope chart of May 1945 indicate a $\gamma-p$ threshold of 16.8 Mev, where no account is taken of the Coulomb barrier seen by the proton.

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Nuclear Properties of U^{233}: A New Fissionable Isotope of Uranium*

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THE bombardment of thorium with slow neutrons produces Th^{233} (by the reaction $Th^{232}(n,\gamma)Th^{233}$), which emits beta-particles and has a half-life of 23.5 minutes. The daughter of Th^{233} is the 27.4-day beta-emitting Pa^{233} which in turn decays to U^{233}. We have measured the radioactive and the fission properties of U^{233}. Our measurements on a sample of U^{233} weighing 3.8 micrograms show that this isotope undergoes fission with neutrons. The same result was obtained in a check experiment with another sample of U^{233} weighing 0.8 microgram.

* This paper was mailed from Berkeley, California, to the "Uranium Committee" in Washington, D. C. on April 14, 1942. The experimental work was done during 1941 and the early part of 1942. It is being published in the open literature now for historical purposes, with the original text somewhat changed, by omissions, in order to conform to present declassification standards. The information covered in this document will appear in Division IV of the MPTS, as part of a contribution of the University of California.