Abstracts of Papers

The following 22 papers are the second part out of 80 papers, read before the semi-annual meeting of the Institute on November 30 and December 1, 1951.

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1. On the Half Life of ThC'. (II)

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As reported previously this Bulletin **26**, we measured the half life of ThC' to be $(2.7\pm0.3\times10^{-7}$ sec. At that time, however, we assumed that the distribution curves of the time lags of the G-M and that of the proportional counters were the same, being rectangular with regard to the time axis.

Thereafter, we measured the half life of ThC' again by our own measurement of the relative time lags between the G-M and the proportional counters. The sample, deposited on the thin Al foil, was mounted on the inner surface of the cathode of the proportional counter. As the proportional counter was sensitive for α-rays, when the α-rays from the sample passed through the proportional counter into the G-M counter, the discharges of both counters coincided (α-α coincidence). Moreover, when the β-rays and α-rays were emitted from the sample within the resolving time of the coincidence circuits and the β-rays came into the G-M counter, both discharges coincided (β-α coincidence).

Therefore the counts of total coincidence discharges minus β-α coincidences, which were measured by holding the absorber of α-rays (Al foil of 7mg/cm^2) between the G-M and the proportional counters, were α-α coincidences.

Thus we could obtain the distribution of relative time lags between both counters. The data obtained are shown in the following table.

	I	II	III	IV	V	VI
Time interval(μsec.)	−0.15~ 0.25	0.25~ 0.41	0.41~ 0.57	0.57~ 0.67	0.67~ 0.78	0.78~ 0 89
α-α Coincidence	745	3282	2599	734	159	0
β-α Coincidence	739	1504	1685	1647	1246	1222

These data are corrected for β-γ, α-γ, and accidental coincidences and for the absorption of β-rays by the absorber for α-rays.

Thus by using the data shown in the table and by the application of the Newton's method (Phys. Rev. 78, 490(1950)) we could derive the accurate value of the half lite of ThC' as

$$\tau = 2.9 \times 10^{-7} \text{ sec.}$$

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2. The (γ, n) Reaction of Silver Produced by the Li-p γ-Rays

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The (γ, n) reaction of silver produced by the irradiation of Li-p γ-rays was observed. The metallic lithium target was bombarded by the proton beam of 460 Kv separated by a magnet. The number of γ-ray quanta was counted by a G-M counter with a lead wall of 6.5 mm in thickness. The silver samples of 218 mg/cm^2 and 110 mg/cm^2 in thickness, 21 mm in diameter were used. We used also similar silver monitors. For the measurement of β-activities induced in these samples and the monitors, we used two G-M counters of 2π-type, each of which had a mica window of about 3 mg/cm^2 in thickness and 24 mm in diameter.

In the present experiment, the sample and the monitor were irradiated for five minutes, and after half a minute their activities were counted for twenty minutes.

The silver has two isotopes Ag^{107} and Ag^{109}. The observed reactions were as follows:

$$Ag^{107}(\gamma, n)Ag^{106} \text{ and } Ag^{109}(\gamma, n)Ag^{108}.$$

The obtained half-lives were 25 46 min. and 2.36 min. for Ag^{106} and Ag^{108} respectively. And other lives were not observed.

In order to obtain the cross-section of the reaction, we considered the following correction factors: 1) geometrical factor of the counter, 2) β-ray absorption by the mica window, 3) solid angle subtended by the sample at the target and 4) self-absorption and self-backscattering in the samples. These were determined experimentally. Especially, in order to eliminate the self-absorption and self-backscattering effect in the samples, we used samples varied in thickness but equal in diameter. The thickness of the thinnest sample was 12 mg/cm^2. After plotting the curve of specific activity vs. thickness of sample, we extrapolated the curve to zero thickness. In this complementary experiment, the active silver samples irradiated by slow neutrons were used. Therefore, strictly speaking, this correction could be applied to Ag^{108} only.