Measurements of other radioactive isotopes are also planned. In the case of $(\beta + \gamma)$-emitters, the measured current would include fast electrons produced by internal conversion, and a knowledge of the internal conversion coefficient would then be required before the activity of the source could be determined.

Since this work was started, Gross and Failla[1] have described experiments along similar lines, in which a magnetic field was used to prevent the escape of secondary electrons.

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[1] Gross, W., and Failla, G., Bull. Amer. Phys. Soc., 25, No. 3, 18 (1950).

Thin-Target Yield of $O^{18}(p,\alpha)N^{15}$

THIN targets of oxygen-18, prepared by bombarding silver plates in an electromagnetic isotope separator at mass number 20 with water vapour in the ion source, were bombarded with protons (400–750 keV.) in a Cockcroft–Walton accelerator. The thin-target yield of α-particles within a cone of top angle $17°$ at $90°$ to the incident beam was studied with a proportional counter, the window thickness of which was such that only α-particles of range greater than $1\cdot5$ cm. in air could be detected. Gamma-rays had no influence upon the counter. The measured yield curve is given in the accompanying graph.

Five hours of proton bombardment did not change the yield beyond the limits of experimental accuracy. Range measurements showed that the energy of the α-particles corresponded to the Q-value of the reaction $O^{18}(p,\alpha)N^{15}$ reported in the literature[1,2].

As the yield curve shows a resonance at about 680 keV., the range of the α-particles at resonant proton energy was specially studied to make sure that the resonance did belong to the $O^{18}(p,\alpha)N^{15}$
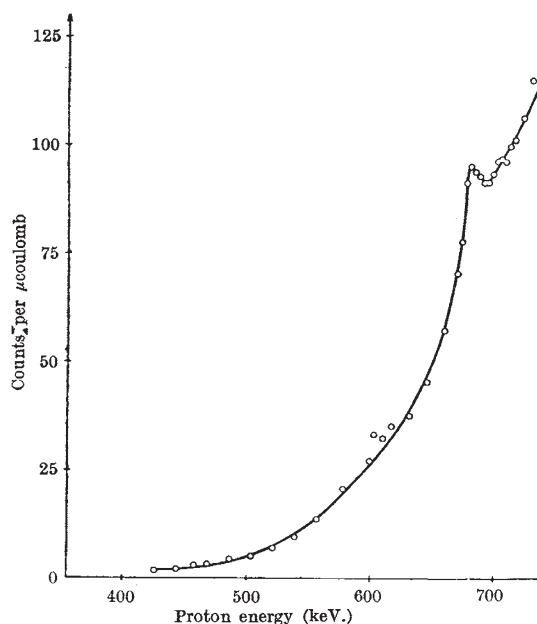
Thin-target yield curve for $O^{18}(p,\alpha)N^{15}$ at $90°$

reaction. The small irregularity at 600 keV. will be further investigated.

The voltage scale was calibrated at one point, 446 keV., with the $Li^7(p,\gamma)$ reaction on a separated lithium-7 target.

We wish to express our thanks to Messrs. S. Thulin and I. Bergström for preparing the targets in the isotope separator.

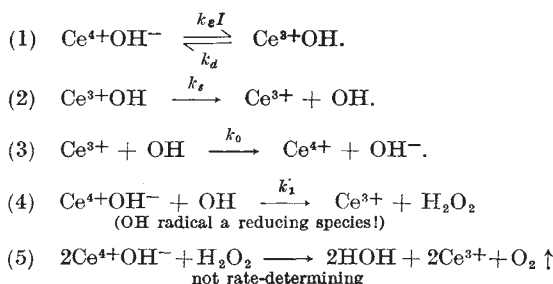<div align="right">C. MILEIKOWSKY
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        July 5.

[1] Burcham, W. E., and Smith, C. L., Nature, 143, 795 (1939).
[2] Freeman, J. M., Proc. Phys. Soc., A, 63, 668 (1950).

Photo-oxidation of Water by Ceric Ions

IN view of the importance which is attached to the photochemical oxidation of water in the understanding of the process of photosynthesis[1], we would like to submit a scheme, which, as we show, agrees well with the data reported in the literature and our own experience in this field of research. Weiss and Porret[2] were the first to investigate the photo-oxidation by ceric ions (a qualitative observation to this effect had been made by Baur[3] in 1908). A more detailed study was carried out by Heidt and Smith[4]. The latter assumed the formation of an active ceric dimer being deactivated by cerous ions to account for their otherwise inexplicable observations as to dependence of the quantum yield on the concentration of ceric and cerous ions in solution. Spectrophotometric measurements carried out by us (to be published later) show conclusively that there is no dimer formation, and that in ceric perchlorate solutions in normal perchloric acid approximately 92 per cent of the ceric ion is present as the ion-pair complex $Ce^{4+}OH^-$. On the other hand, Heidt and Smith's kinetic results can be accounted for qualitatively and quantitatively on the basis of the following reaction scheme, which makes it also possible to explain in quantitative terms why in the case of ferric ions the quantum yield should be much smaller, and therefore under normal laboratory conditions scarcely measurable ; as in our work on photo-initiated polymerization[5,6] and oxidation[7], we consider the primary step as an electron-transfer excitation with the ion-pair complex as the active species. This is the scheme we suggest :

(1) $Ce^{4+}OH^- \underset{k_d}{\overset{k_\varepsilon I}{\rightleftharpoons}} Ce^{3+}OH.$

(2) $Ce^{3+}OH \xrightarrow{k_s} Ce^{3+} + OH.$

(3) $Ce^{3+} + OH \xrightarrow{k_0} Ce^{4+} + OH^-.$

(4) $Ce^{4+}OH^- + OH \xrightarrow{k_1} Ce^{3+} + H_2O_2$
       (OH radical a reducing species!)

(5) $2Ce^{4+}OH^- + H_2O_2 \longrightarrow 2HOH + 2Ce^{3+} + O_2 \uparrow$
       not rate-determining

From stationary-state kinetics we obtain :

$$[Ce^{3+}OH] = \frac{k_\varepsilon I}{k_d + k_s}$$

$$[OH] = \frac{k_s k_\varepsilon I}{(k_d + k_s)(k_0[Ce^{3+}] + k_1[Ce^{4+}OH^-])}.$$