

*The Distribution of Recoil Tritium
in Benzoic Acid*

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Recently, so-called "Recoil labeling" by tritium has been developed in various organic compounds^{1,2}. It is an interesting problem to study replacement of hydrogen at various positions of an aromatic ring by recoil tritium. However this has not been reported by far. Therefore, the author investigated the distribution of recoil tritium produced by ${}^6\text{Li}(n, \alpha){}^3\text{H}$ reaction in benzoic acid and found the interesting facts as follows. The mixture of benzoic acid and lithium carbonate as tritium source was sealed in a quartz ampoule, in the presence of air. The irradiation was carried out in No. 15 hole of JRR-I for 15 hr. at 2×10^{11} n/cm² sec. The irradiated material was dissolved in 150 ml. of pure benzene, then 10 g. of pure benzoic acid was added into the solution as carrier. This solution was refluxed for one hour and was immediately filtered to separate insoluble material from the solution, and then benzene solution was evaporated in vacuo and the crystal was dissolved in hot water to remove the labile tritium of the carboxyl group. A liquid scintillation detector (Tracerlab Model CE-1) was used to assay tritium. High voltage of the instrument was chosen at 1700 V. and temperature was kept at -10°C .

An outline of the procedures are shown in Fig. 1. The specific activities of the various

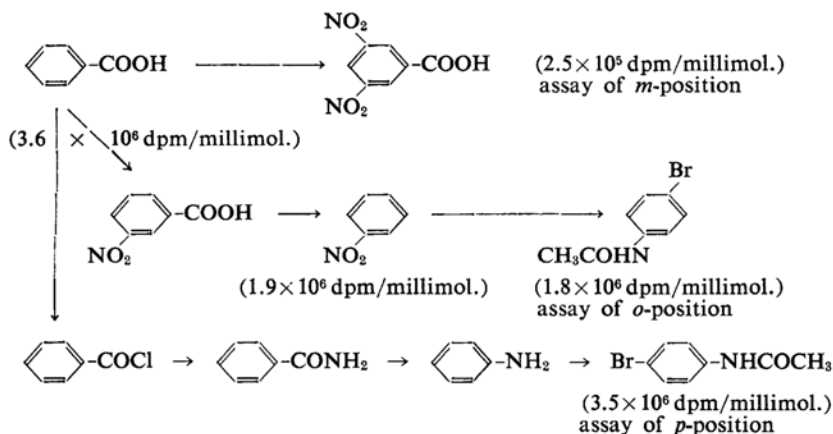


Fig. 1. Derivative and specific activities.

1) F. S. Rowland, A/CONF. 15/P/798.

2) F. S. Rowland and R. Wolfgang, *Nucleonics*, **14**, (8) 58 (1956).

compounds which were derived from the irradiated benzoic acid are also shown in Fig. 1. From these results, the percentage of ortho-, meta- and para-positions were determined. In Fig. 2, the values are shown. As is seen in Fig. 2, the replacement of hydrogen at meta-position by recoil tritium is dominant. Therefore, from the replacement process of recoil tritium in the solid phase in this experiment, it is inferred that tritium reacts after being thermalized. Ivanoff³⁾ stated that in the

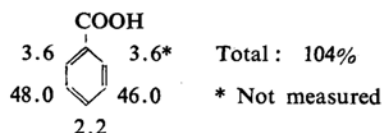


Fig. 2. Distribution of tritium in benzoic acid.

liquid phase, recoil bromine reacts with an aromatic ring after being thermalized. This result may support the present author's opinion on the mechanism of replacement reaction of recoil tritium in the solid phase. The furthermore details are to be published later.

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3) M. Ivanoff, *Bull. soc. chim. France*, 1953, 266 (1953).