SHORT COMMUNICATIONS

Reaction of DL-*Threonine with Recoil Tritium Atoms*

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Using recoil tritium atoms from the ^{6}Li(n, α) ^{3}H reaction, the studies on preparation of tritium labeled organic compounds have been carried out by Wolfgang[1], Rowland[2,3] and other investigators. In 1959, Kay, Malson and Rowland[4] investigated recoil tritium reaction with L-alanine having asymmetric carbon atom. They described that the tritium activity which is found on the α-carbon is, within error, all in the L(+) form—the substitution reaction proceeds with retention of configuration, and no racemization or inversion occurs. This result is in accord with the essential absence of labeled galactose in irradiated crystalline glucose[5]. We have carried out the same experiments using DL-threonine and found the isomer (allo form) of it. The procedure is as follows.

A mixture of 2 g. DL-threonine and 1 g. lithium carbonate was irradiated with thermal neutron for 17 hr. at flux 2.5×10^{11} n/cm^2 sec. After irradiation the mixture was somewhat brownish. It was dissolved in water. To the aqueous solution was added basic copper carbonate. After filtering off the unchanged basic copper carbonate, the filtrate was concentrated in vacuo. Alcohol was added and thus crystals of amino acid copper salt were obtained. This amino acid copper salt was dissolved in water and to the solution an aqueous solution of hydrogen sulfide was added until the blue color disappeared. The precipitated cupric sulfide was removed by filtration, and the filtrate was concentrated. By the addition of alcohol to the concentrated solution, white crystals were obtained with yield of 800 mg. (sp. act. 0.113 μc/mg.).

Paper chromatography of the crystal using *n*-butanol-acetone-concentrated ammonium hydroxide-water (50 : 6.3 : 6.2 : 37.5, upper phase) as developing solvent showed three spots on spraying with ninhydrine. R_f values of three spots were identical with those obtained by pure DL-threonine (0.24), allo-threonine (0.17) and glycine (0.05), respectively. The product (120 μg.) was employed as sample of paper chromatography, and DL-threonine, allo-threonine and glycine were obtained in the amounts and with activity values as shown in Table I.

TABLE I. SPECIFIC ACTIVITY OF VARIOUS AMINO ACIDS SEPARATED FROM IRRADIATED DL-THREONINE

	Activity (cpm)	Amount (μg.)*	Sp. act. μc/mg.
DL-Threonine	961	65	0.082
allo-Threonine	138	7	0.108
Glycine	80	40	0.011

* Paper chromatographic yield from 120 μg. of the irradiated product.
** Approximate calculation.

In order to determine whether or not the inversion occurs at neutron irradiation, the blank test of the chemical purification described above was carried out, but allo-threonine was not detected. Under the consideration that DL-threonine is heated in the atomic reactor, the mixture of DL-threonine and lithium carbonate was heated at about 70°C for 17 hr. in an electric oven. However, in this experiment, allo-threonine could not be discovered.

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