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NOTE

ENZYMATIC SYNTHESIS OF LABELLED GERANIOL

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Summary: [1-^{14}C]Geraniol was conveniently prepared from [1-^{14}C]isopentenyl pyrophosphate and dimethylallyl pyrophosphate in 56 % yield.

Key words: geraniol; synthesis; prenyl transferase (EC 2.5.1.1); geranyl pyrophosphate synthase

Labelled geraniol is usually prepared by the reduction of geranial, introducing ^{2}H or ^{3}H at position 1 [1]. A disadvantage of this procedure is a possible contamination with the cis-isomer or the 2,3-dihydro compound [2]. An enzymatic preparation of [^{14}C]geraniol, using crude extracts from Rosa dilecta flowerheads, has been reported [3]. The procedure reported here is a refinement of that approach.

0.76 µmol [1-^{14}C]isopentenyl pyrophosphate (1.65 MBq; Amersham) were incubated with 2.25 µmol dimethylallyl pyrophosphate, 4.5 µmol $MgCl_2$, 60 µmol KP_i (pH 7.5) and 100 units of purified geranyl pyrophosphate synthase [4] in a total volume of 1620 µl. After 110 min at 30°C, pH was adjusted to 4.8 with acetic acid, and 4 mg (120 units) of acid phosphatase (from sweet potato; Sigma) in 200 µl sodium acetate buffer (0.7 M; pH 4.8) were added. The mixture was overlaid with 1 ml pentane and incubated for 60 min at 37°C. 3.5 ml

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EtOH were added to prevent extraction of any isopentenol [5], and the aqueous phase was extracted five times with 4 ml pentane. Pentane phases were combined and filtered through cotton. Yield 0.93 kBq (56 %) [1-^{14}C]geraniol. Acid hydrolysis [6] of the aqueous phase yields additional 0.39 kBq (23 %) [1-^{14}C]geraniol; this procedure, however, may give rise to the formation of isomers.
HPLC analysis [6] of the product of enzymatic hydrolysis showed >97 % radiochemical purity; neither nerol nor farnesol or isopentenol could be detected.
Since the stereochemical course of the prenyl transferase reaction is known, this procedure opens a simple route to different stereo- and regiospecifically labelled geraniol derivatives. Alternative sources for purified geranyl pyrophosphate synthase have been described [7, 8].

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