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TOTAL SYNTHESIS OF α-BISABOLOL-3-ONE AND DEODARONE

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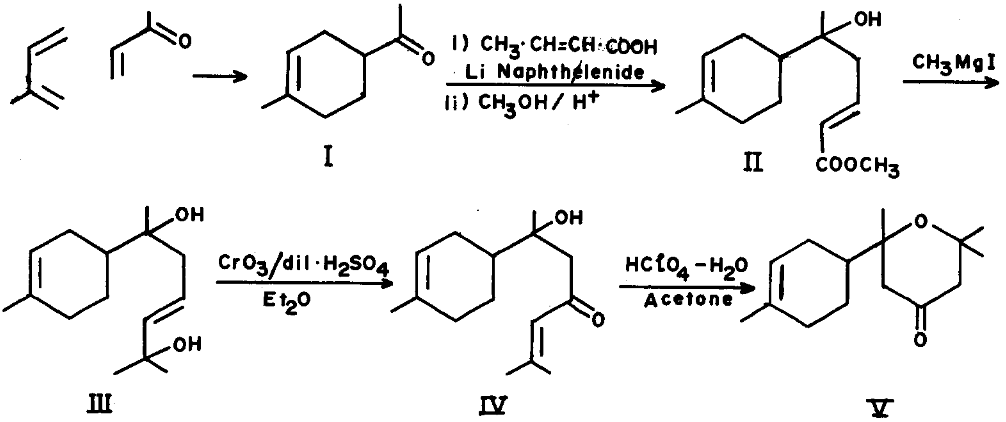
α-Bisabolol-3-one (IV) has been recently isolated[1] from Chrysanthemum flosculosum L. and the structure was established as IV on the basis of IR, NMR and mass spectral data. Later Sukh Dev *et al.*[2] have reported the isolation and characterization of deodarone (V), a sesquiterpene keto-ether, from the essential oil of Cedrus deodara Loud. The stereochemistry and synthesis of these compounds have not been reported. In the present communication we describe the total synthesis of both α-bisabolol-3-one (IV) and deodarone (V) to confirm the assigned structures.



The Diels-Alder reaction[3] of isoprene and methyl vinyl ketone gave the ketone I, which was purified through its semicarbazone. The next step is a new Reformatsky-like reaction of crotonic acid with ketones which was recently reported by Japanese workers[4] using lithium naphthalenide in presence of diethyl amine to afford the corresponding hydroxy-acids. The product obtained by reacting the ketone I with crotonic acid was esterified with methanol in the usual way to afford the hydroxy-ester II in 35% yield. b.p. 152°/0.8 mm, IR 3450, 1730, 1655 cm^{-1}, NMR δ (CCl_4) 1.13 (3H, s), 1.65 (3H,s), 2.36 (2H, d, J = 8 Hz), 2.5 (1H, s, exchanges with D_2O), 3.7 (3H, s), 5.37 (1H, bs),

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5.81 (1H, d, J = 16 Hz) and 7.03 (1H, m). Hydroxy ester II on treatment with MeMgI gave the diol III in 70% yield. b.p. 160°/0.8 mm, IR 3350, 1680 cm^{-1}, NMR δ ($CDCl_3$) 1.11 (3H, s), 1.33 (6H, s), 1.67 (3H, s), 2.7 (2H, exchanges with D_2O), 5.4 (1H, bs) and 5.75 (2H, m). The diol III was oxidized in ether by treating with CrO_3-dil. H_2SO_4 at 0° with stirring according to the method described by Büchi <u>et al.</u>[5] to afford α-bisabolol-3-one (IV) in 65% yield. b.p. 135-140°/0.8 mm, IR 3400, 1675, 1610 cm^{-1}, NMR[6] δ ($CDCl_3$) 1.17 (3H, s), 1.91 (3H, s), 2.18 (3H, s), 2.57 (2H, s), 5.4 (1H, bs), 6.07 (1H, s) and 3.85 (1H, exchanges with D_2O), MS: m/e 236 (M^+), 218, 203, 141, 138, 123, 95, 83, 67, 55. This data is in agreement with the reported spectral data of the natural product[1]. α-Bisabolol-3-one (IV) on treatment with 10% perchloric acid in acetone at 0° gave deodarone (V) as the major product along with two other products which are being characterized. The IR, NMR and mass spectra of synthetic deodarone were identical with those of the natural product[2].

The facile transformation of α-bisabolol-3-one to deodarone on contact with dilute acid in a homogeneous medium suggests that these compounds are likely to co-exist in both the species.

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