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SYNTHESIS OF (±)-LINALOOL AND (±)-HYDROXYLINALOOL FROM ISOPRENE

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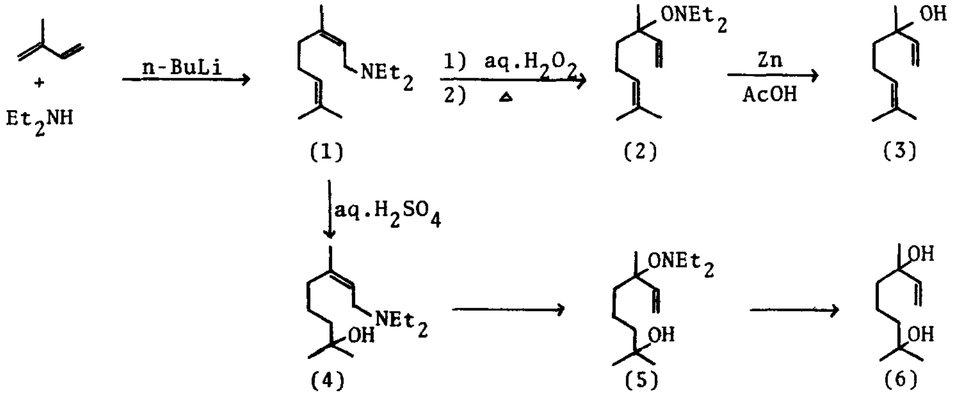
Much attention has been recently paid to the direct synthesis of the head-to-tail alicyclic terpenoids from isoprene1). However, the structures of the dimers in metal complex-catalyzed oligomerizations of isoprene2) were not in agreement with those of natural acyclic terpenes3). More recently, Hidai et al4) have reported that citronellol is synthesized starting from isoprene in an overall yield of ca. 45%.

In this communication we wish to report on a new and economically feasible method for the synthesis of (±)-linalool and (±)-2-hydroxy-dihydrolinalool5), which are not only naturally occurring terpenes but also serve as important intermediates for synthesis, starting from isoprene in three and four steps, respectively.

A key intermediate, N,N-diethylnerylamine (1)6), was prepared by the n-BuLi catalyzed telomerization of isoprene with diethylamine (5:1) in benzene-ether solution at 50°C for 24 hours in ca. 75% isolated yield. Oxidation of (1) with



30% aqueous hydrogen peroxide in methanol afforded the corresponding amine oxide On heating (combined with distillation), it rearranged[7] into O-linalyl-N,N-diethyl hydroxylamine (2)[8] (bp 89-90°C/2.0mmHg) in 96% isolated yield. Reductive N-O bond fission[9] with zinc dust in acetic acid at 35°C gave very pure linalool (3)[8] in 93% isolated yield (98% pure by glc).

2-Hydroxy-dihydrolinalool (6) was synthesized as follows; (1) was hydrated by aqueous sulfuric acid at 40°C for 5 hours to give N,N-diethyl(2-hydroxy-dihydroneryl)amine (4)[8] in 93% isolated yield. The subsequent treatments of (4) as mentioned above afforded pure hydroxylinalool (6) (95% pure by glc)[8] in an overall yield of 73% from (4) through the hydroxylinalyl hydroxylamine (5).

(6): pmr(ppm,CCl_4); 1.14(6H,s,2-Me), 1.20(3H,s,Me), 1.39(6H,b.s.,$-CH_2-$),
2.90(2H,s,2-OH) and 4.83-6.11(3H,m,$-CH=CH_2$).
ir(cm^{-1},neat); 3470, 3075, 1155, 995 and 910.

References and Footnotes

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4) M.Hidai, M.Ishiwatari, H.Yagi, E.Tanaka, K.Onozawa, Y.Uchida, *J. Chem. Soc., Chem. Commun.*, 170 (1975).

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8) All products were isolated by distillation and the structures were verified by compatible spectral data (ir, nmr and mass spectra).

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