

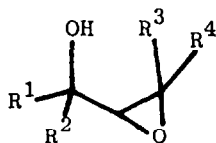
THE CINE O-ALKYLATION OF OXIRANYLCARBINOLS

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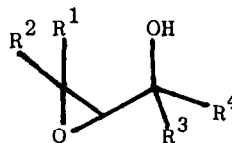
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Summary: The reaction of the alkoxides derived from some oxiranylcabinols with alkyl halides occurs by electrophilic attack on the oxiranyl oxygen rather than the alkoxide one leading to formation of the rearranged oxiranylcabinyl ether.

The introduction¹ of methods for the enantio- and diastereo-selective epoxidation of allyl alcohols has provided an important source of chiral synthons. The synthetic employment of the resulting oxiranylcabinols is frequently preceded by protective O-alkylation of the hydroxyl group. It is well established² that oxiranylcabinols are prone to undergo interconversion with their isomers, e.g. (1) \rightleftharpoons (2), in aqueous alkaline media, and such reactions are of some preparative value³.



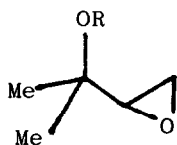
(1)



(2)

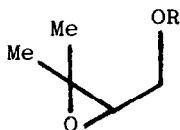
However, these problems are usually avoided⁴ by first converting the oxiranylcabinol to the alkoxide with sodium hydride in tetrahydrofuran and subsequent addition of the alkylating agent.

We now wish to report what appears to be the first recorded examples of cine O-alkylation of oxiranylcabinols using these reaction conditions. Thus conversion of (3a) to the corresponding alkoxide and its subsequent reaction with allyl or benzyl bromide at room temperature provided nearly quantitative yields of the ethers (4b) and (4c) respectively. Similarly, the oxiranylcabinol (5a) yielded the ethers (6b) and (6c) on treatment of its alkoxide with methyl iodide or allyl bromide. In contrast alkylation of the oxiranylcabinols (4a) and (6a) proceeded without rearrangement. As indicated previously², quenching the tetrahydrofuran solutions of the alkoxides derived from (3a) and (5a) with aqueous ammonium sulphate solution regenerated the original

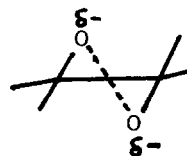


(3)

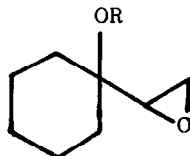
a: R = H

b: R = CH₂=CHCH₂-c: R = C₆H₅CH₂

(4)

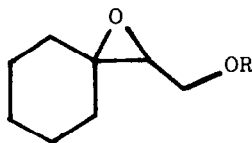


(7)

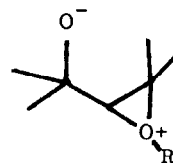


(5)

a: R = H

b: R = CH₃c: R = CH₂=CHCH₂-

(6)



(8)

oxiranylcarbinols.

The foregoing observations demonstrate that the rearrangements accompanying the O-alkylation of (3a) and (5a) are initiated by the reaction of the derived alkoxides with the alkyl halide, and preclude the intervention of an intermediate species such as (7). An attractive rationale is that as direct attack of the tertiary alkoxide anion on the alkyl halide will be sterically hindered the more accessible nucleophilic site is the oxiranyl oxygen generating the intermediate (8). While the reaction of oxiranes with alkyl halides⁵, leading to the formation of β -alkoxyalkyl halides, normally only occurs at much higher temperatures (150–160°C) the facility in the present situation may be ascribed to the anchimeric assistance of the neighbouring alkoxide oxygen.

In conclusion it seems very likely that the hitherto unsuspected facet of the chemistry of oxiranylcarbinols reported in this communication will have important consequences for the synthetic applications of these compounds.

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