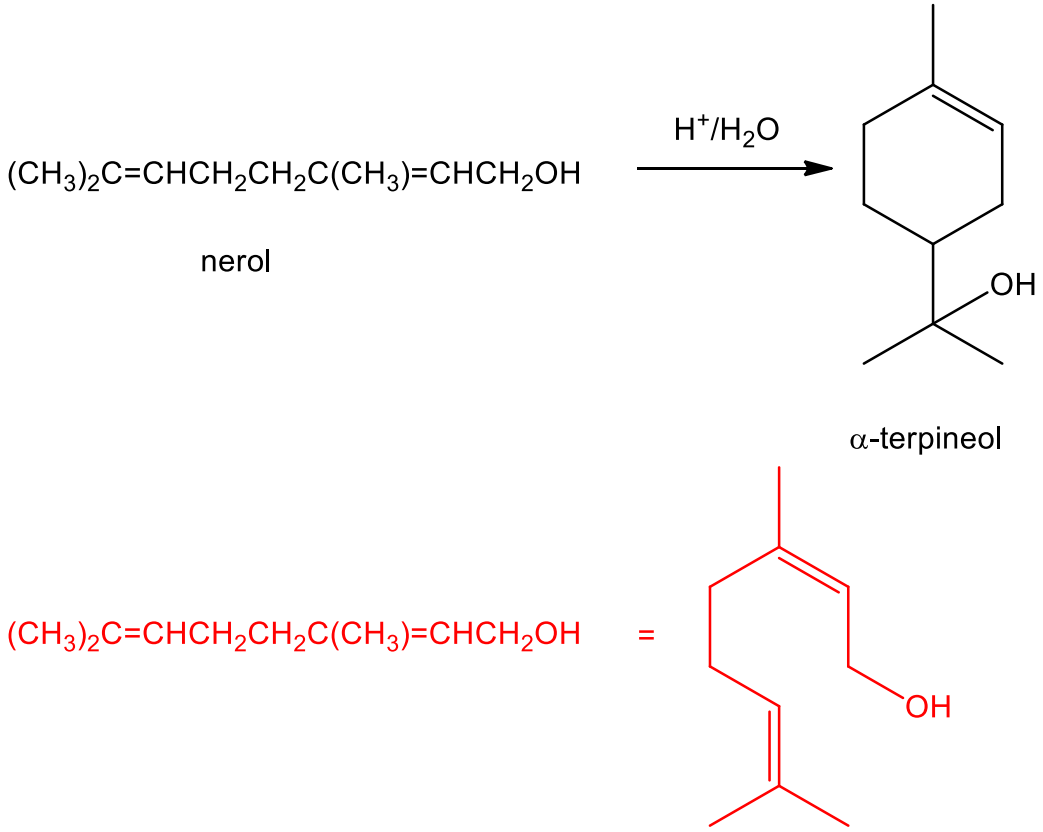
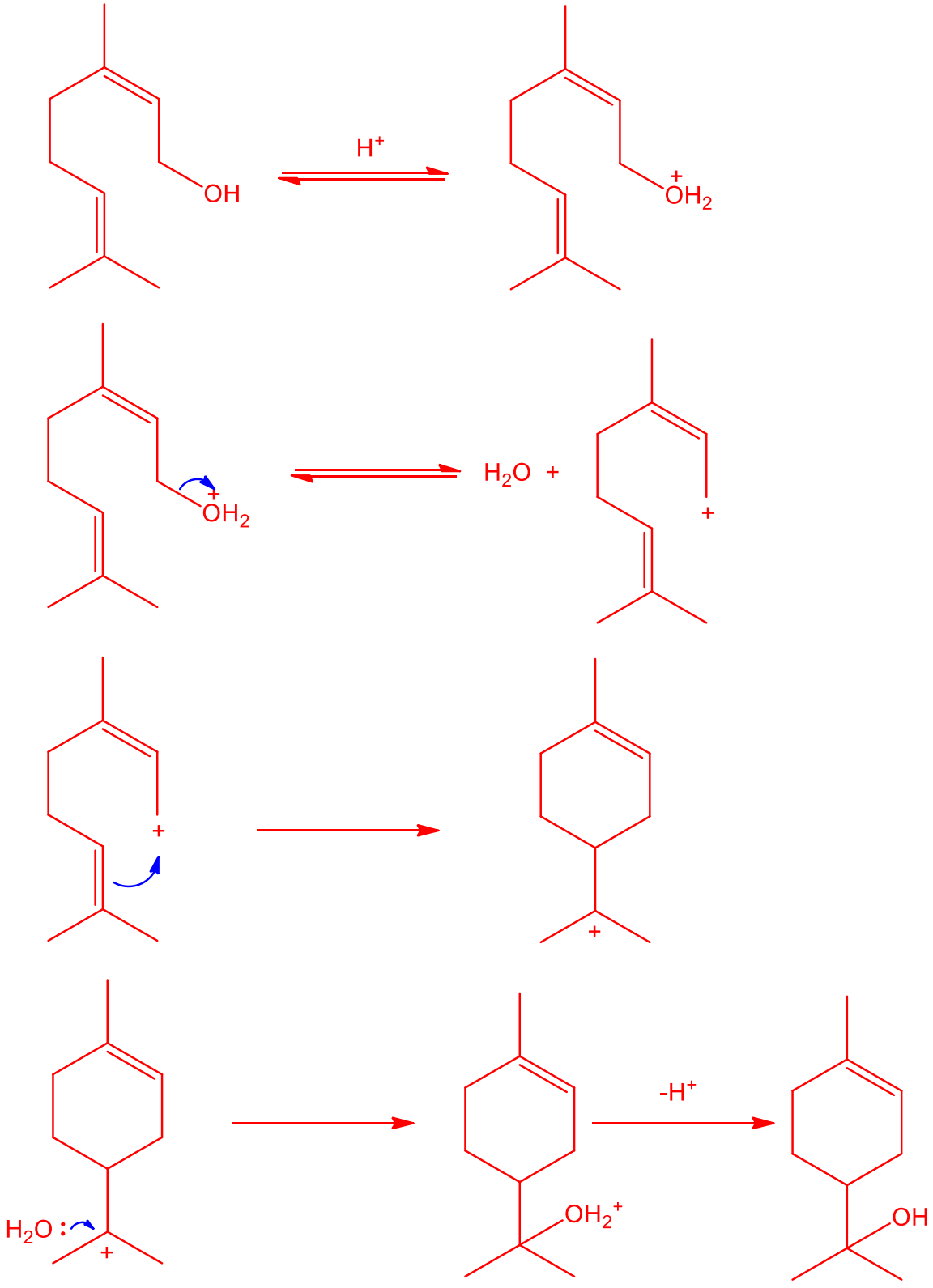
Problem Set 6 – Reactions of alcohols and ethers

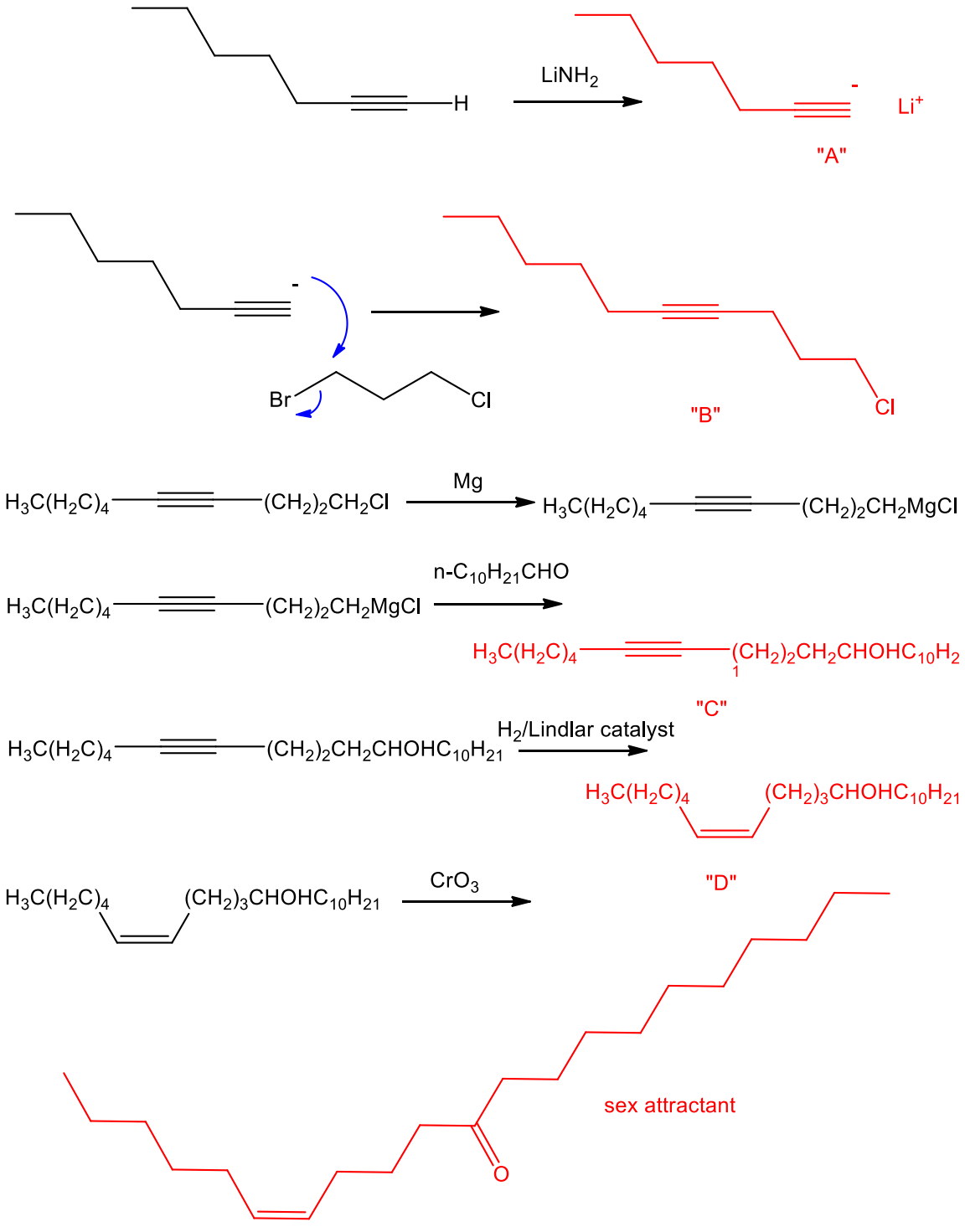
1. Propose a mechanism for the transformation of nerol into α-terpineol:



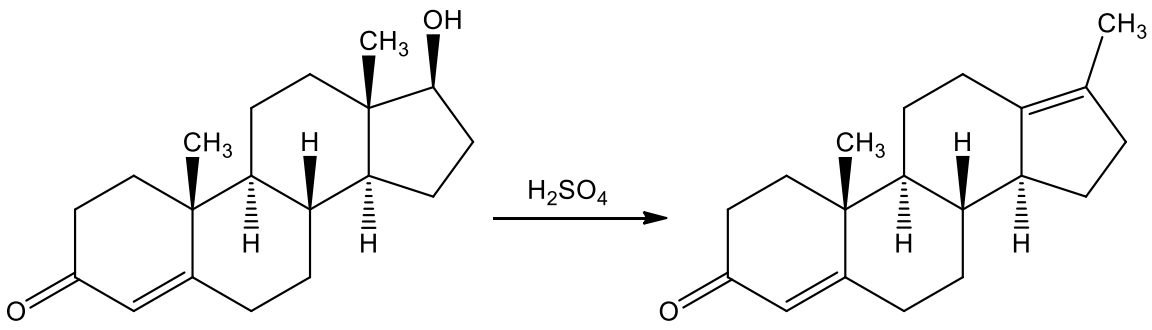


2. The sex attractant of the Douglas fir tussock moth has been synthesized via the following route:

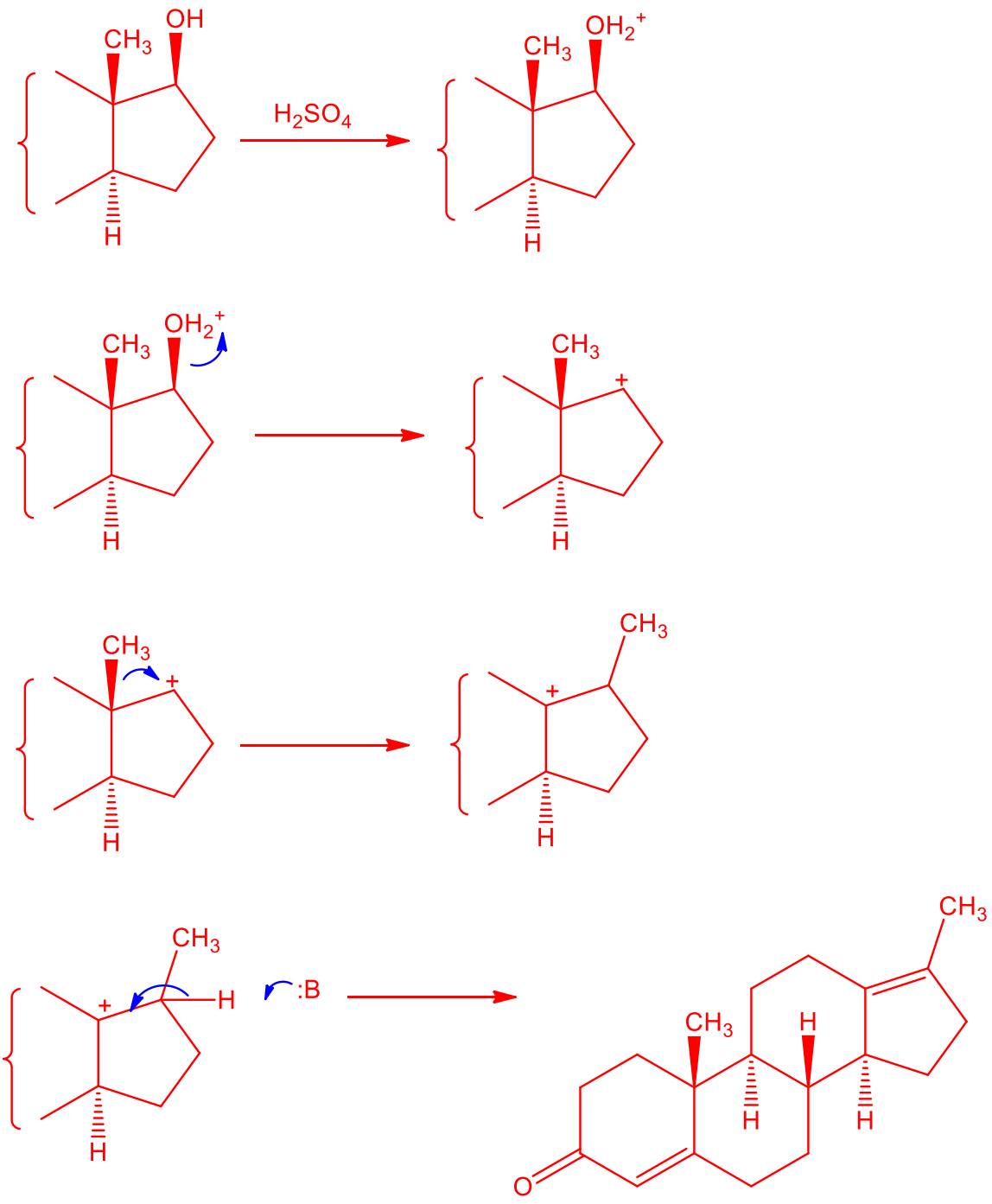
1-heptyne + $LiNH_2$ $\rightarrow$ “A” ($C_7H_{11}Li$)
“A” + 1-chloro-3-bromopropane $\rightarrow$ “B” ($C_{10}H_{17}Cl$)
“B” + i) Mg ii) *n*-$C_{10}H_{21}CHO$ iii) H^+ $\rightarrow$ “C” ($C_{21}H_{40}O$)
“C” + H_2/Lindlar catalyst $\rightarrow$ “D” ($C_{21}H_{42}O$)
“D” + CrO_3 $\rightarrow$ sex attractant ($C_{21}H_{40}O$)



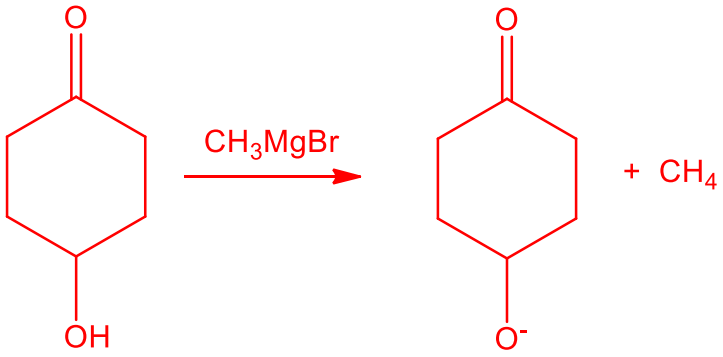
3. Testosterone undergoes dehydration as shown below. Propose a mechanism.

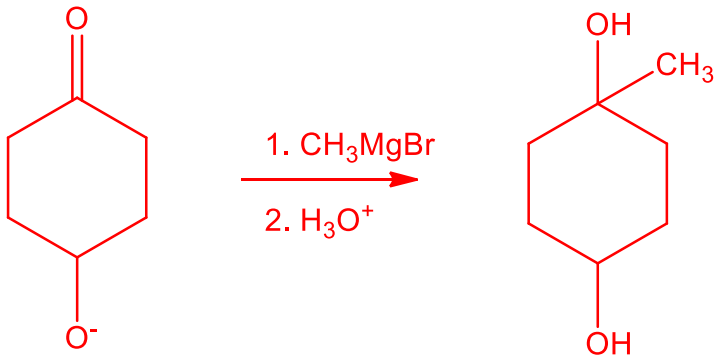


testosterone

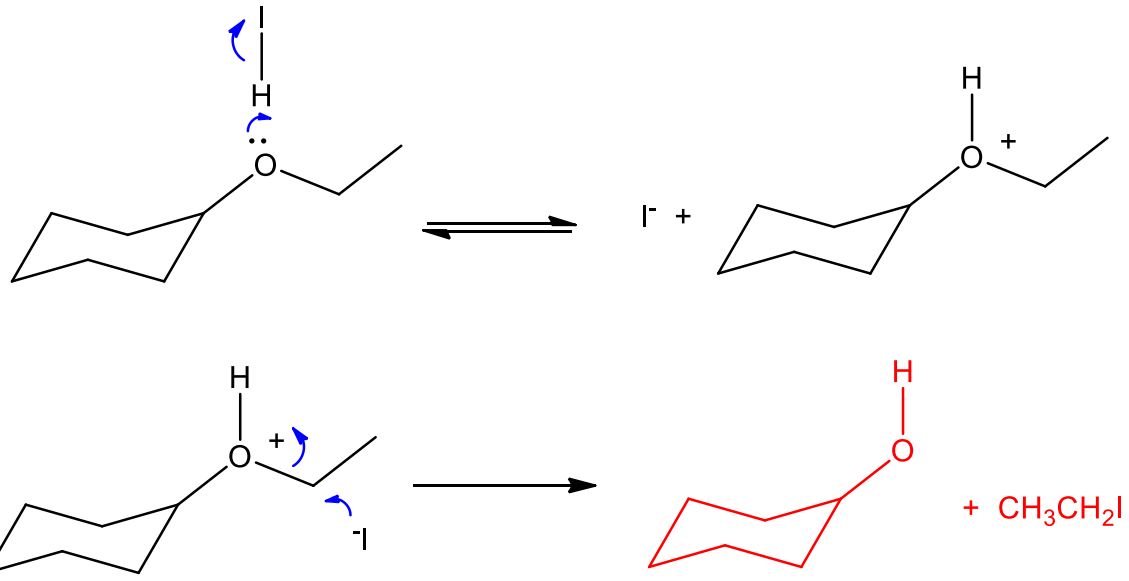


4. Treatment of 4-hydroxycyclohexanone with 1 equivalent of CH_3MgBr gives no alcohol. Treatment with an excess of CH_3MgBr gives a good yield of 1-methyl-1,4-cyclohexanediol. Why?

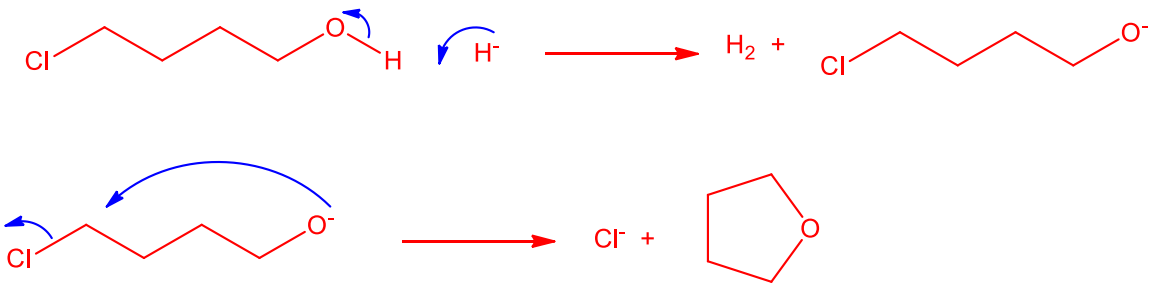




5. What are the products of the reaction of ethoxycyclohexane and aqueous HI?



6. When 4-chloro-1-butanol is treated with strong base (eg NaH), tetrahydrofuran (C_4H_8O) is formed. Propose a mechanism.


Cl
O
H
H-
H2 +
Cl
O-
Cl
O-
Cl- +
O