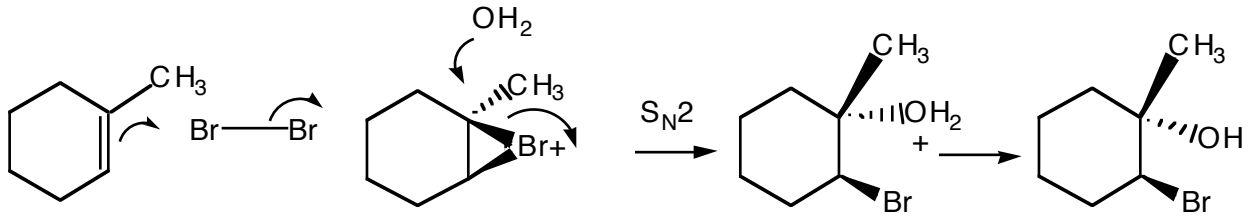
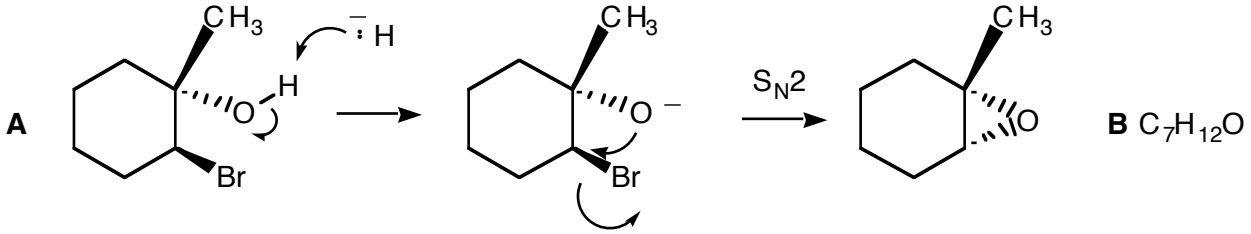
Answer to Problem 93. Chemistry 301X, 2006

Addition of bromine in the presence of water gives the bromohydrin. Opening of the bromonium ion by an S_N2 reaction of water ensures the stereochemistry shown:



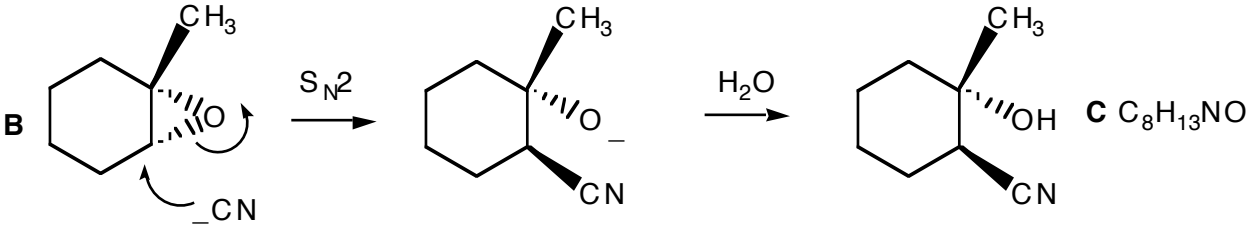
A $C_7H_{13}BrO$

Treatment of this alcohol with base generates the alkoxide which is in perfect position to displace bromide from the rear (S_N2 again) to give the epoxide:



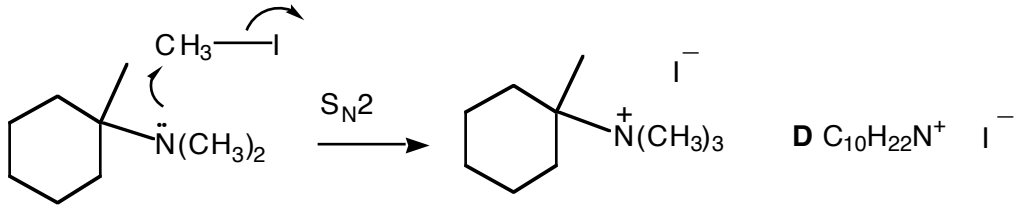
B $C_7H_{12}O$

Finally, cyanide ion opens the epoxide through another S_N2 reaction to give the final product. Of course the S_N2 opening must occur with inversion; this ensures the stereochemistry shown. The regiochemistry is also as shown but we will accept the other with a good explanation.



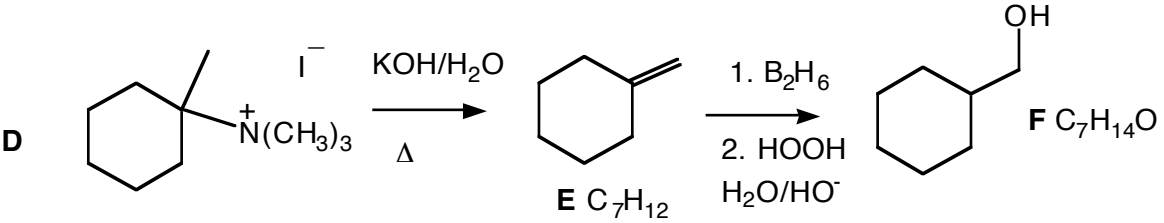
C $C_8H_{13}NO$

(b) The first step is an S_N2 displacement to make the quaternary ammonium iodide:



D $C_{10}H_{22}N^+$ I^-

Hofmann elimination leads to the less substituted alkene, and hydroboration gives the "anti-Markownikoff" alcohol.



E C_7H_{12}

F $C_7H_{14}O$