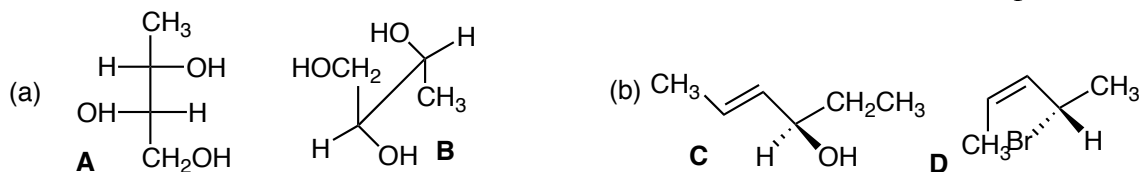
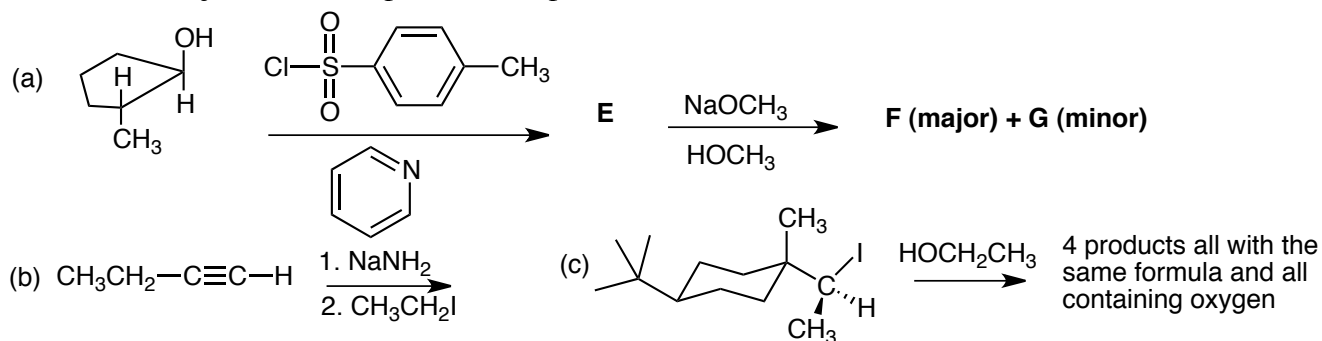


1. (a) Give the product that is formed when optically active (S)-3-bromohexane is heated with potassium cyanide and show the complete mechanism. (b) Assign the absolute configuration (R or S) to the product(s). (c) Is the reaction mixture optically active? Explain briefly. (15 pts)

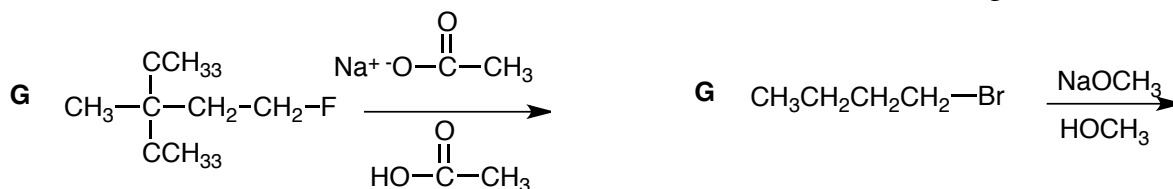
2. Give the relationship between the following pairs of molecules. They may be the same molecule, different molecules, constitutional isomers, diastereomers, or enantiomers. (10 pts)



3. Give the product for each of the following reactions and show the complete reaction mechanism by which it is formed. If there is more than one product formed, be sure to indicate this and specific which is the major and minor product. (40 pts)



4. (a) Give the product(s) of the following two reactions, showing the complete reaction mechanism in each case and (b) then indicate which reaction would proceed faster. Explain your answer considering **ALL** factors that would influence the relative rates of the two reactions. (15 pts)



5. Synthesize **TWO** of the following **THREE** molecules. Do all three for extra credit. (20 pts)

