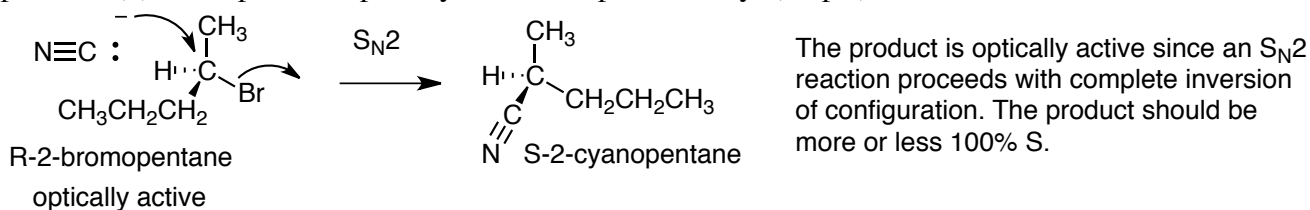
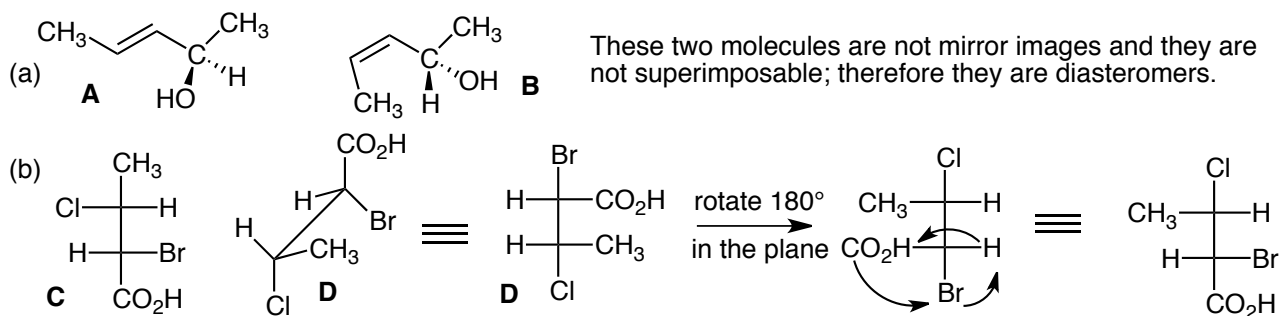


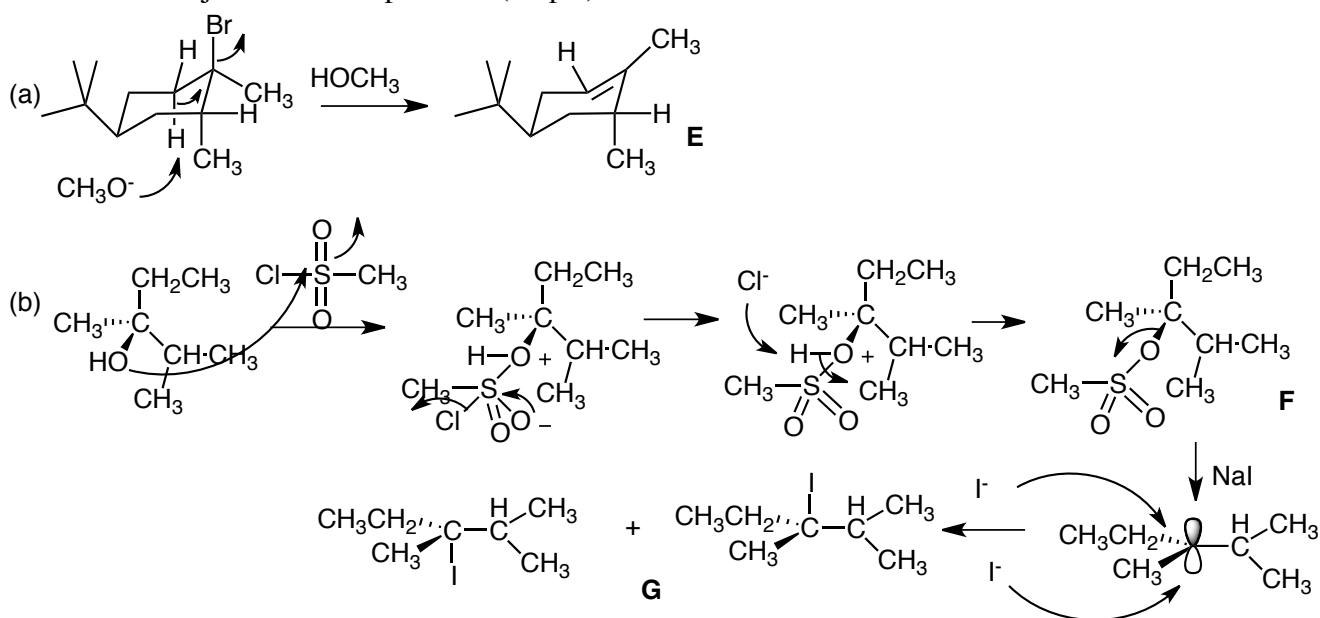
1. (a) Give the product that is formed when optically active R-2-bromopentane reacts with potassium cyanide (KCN) in ethanol as the solvent. Show the reaction mechanism and assign R or S to the product. (b) Is the product optically active? Explain briefly. (15 pts)

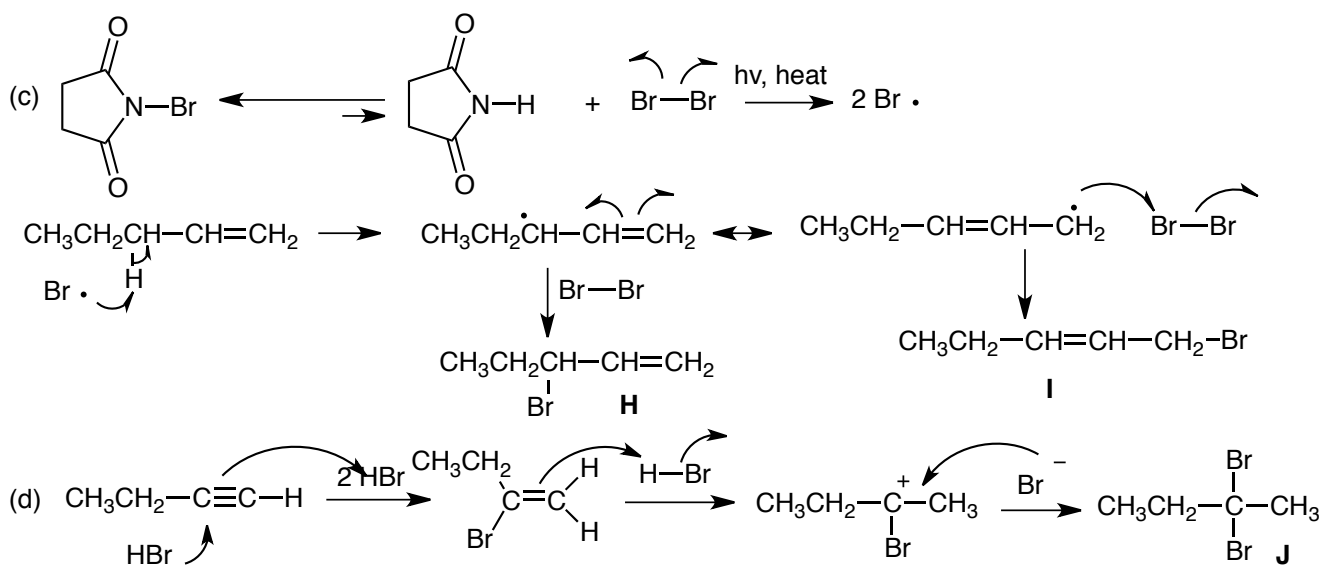


2. Give the relationship between the following pairs of molecules. They may be the same molecule, different molecules, constitutional isomers, diastereomers, or enantiomers. (15 pts)

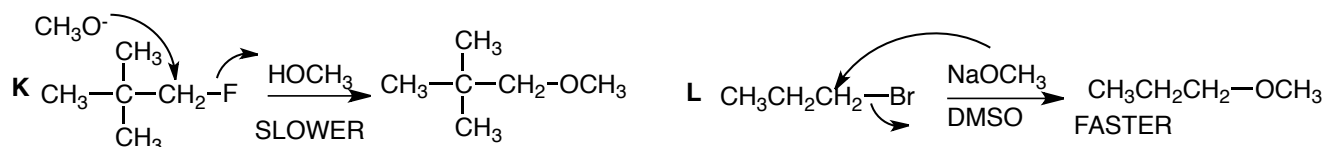


3. Give the product for each of the following reactions and show the complete reaction mechanism by which it is formed. If there is more than one product formed, be sure to indicate this and specific which is the major and minor product. (40 pts)





4. Which of the following reactions would proceed faster? You must examine the effect of the substrate, the nucleophile, the leaving group and the solvent. Briefly explain your answer in each case and give the product plus the reaction mechanism in each case. (10 pts)



L is faster because Br⁻ is a better leaving group than F⁻, the substrate in L is less hindered and finally, DMSO is a much better solvent for an S_N2 reaction than ethanol because DMSO is a polar aprotic solvent that will solvate the Na⁺ but not the anion, leaving it free to react.

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

