

1. Predict the major products of the following reactions.

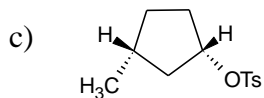
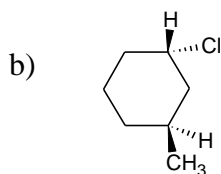
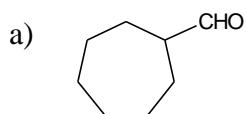
a) Cyclopentanol + $\text{H}_2\text{SO}_4/\text{heat}$

b) Product from above + $\text{OsO}_4/\text{H}_2\text{O}_2$ (optional: followed by HIO_4)

c) (R) – 2- butanol + TsCl in pyridine

d) (R) – 2-butyl tosylate + NaBr

2. Show how you will make each of the following compounds from an alcohol of your choice.

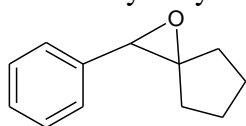


3. What simple chemical test can you use to distinguish between the following pairs of compounds? Write the test and the observation.
- a) 1-butanol and 2-butanol

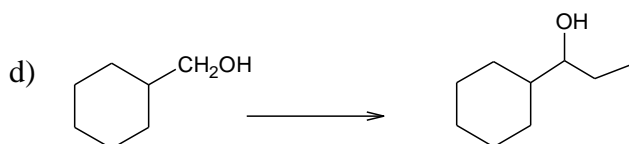
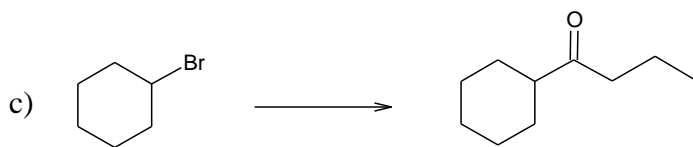
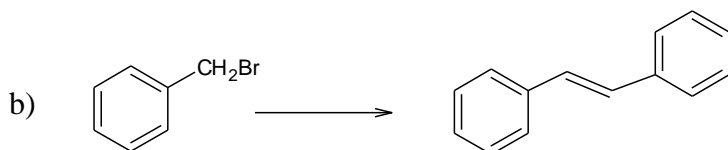
b) 2-butanol and 2-methyl-2-butanol

c) Cyclohexanol and cyclohexene

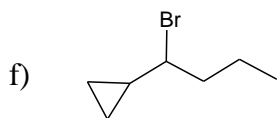
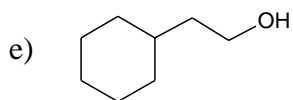
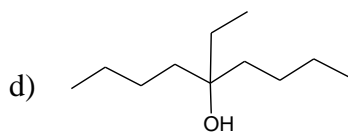
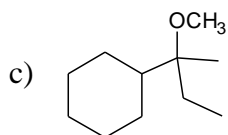
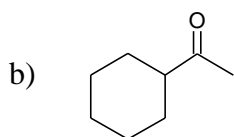
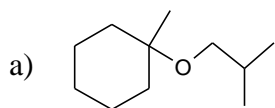
4. How will you synthesize the following compound from compounds of 6 carbons or less?



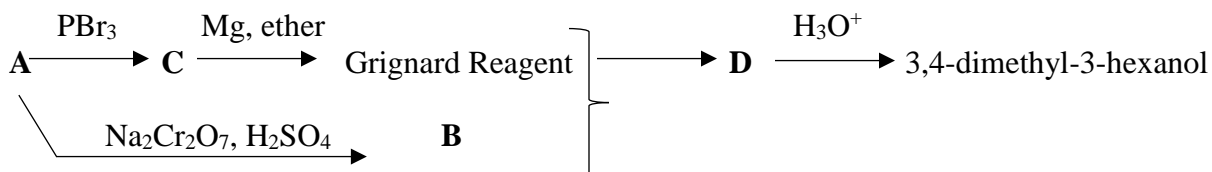
5. Show how you would carry out the following conversions.



6. Show how you would synthesize the following compounds using alcohols of 4 or less carbons and any other reagents of your choice.



7. Compound **A** is an optically active alcohol. Treatment with chromic acid converts **A** to a ketone **B**. In a separate reaction **A** is treated with PBr_3 , converting **A** to **C**. Compound **D** is purified and reacted with magnesium and ether. Compound **B** is added to the resulting solution of the Grignard reagent. After hydrolysis, this solution is found to have **3,4-dimethyl-3-hexanol**. Propose the structures for **A**, **B**, **C** and **D**.



8. Determine the structures **A** through **G** in the following scheme.

