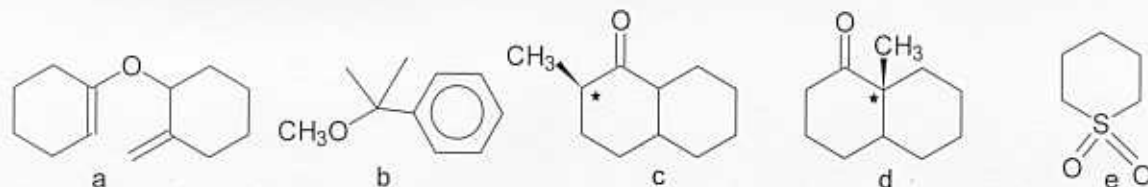


Chem 304 Problem Set 5

1. Commercially, tert-butylmethylether is prepared from 2-methylpropene and methanol under acid catalyzed conditions. Propose a mechanism for this conversion!

2. Claisen-like rearrangements do not only occur in aromatic compounds. Show a mechanism for the rearrangement of ether **a** shown below.



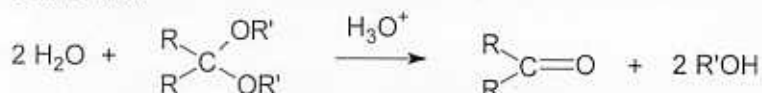
3. What products do you expect to obtain when compound **b** is treated with hydrobromic acid? Justify your answer!

4. Ketone **c** racemizes readily while ketone **d** does not. Explain!

5. The common solvent sulfolane **e** can be manufactured from 1,5-dichloropentane. Explain!

6. For several decades ethanol was manufactured industrially from ethyne, which was converted to ethanal, then to ethanol. Propose credible conditions for these conversions!

7. Diethers of the type below (called acetals) can be cleaved easily under acidic conditions because the second ether functionality can aid in the cleavage of the first one. Propose a mechanism for this conversion!



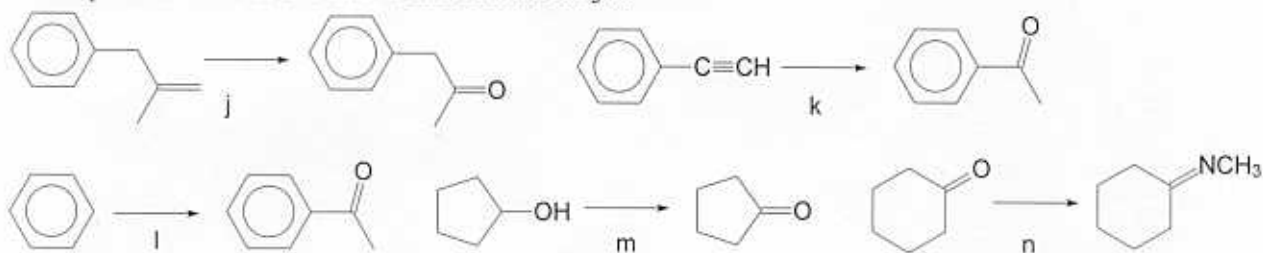
8. Multistriatin **f** is hydrolyzed to a compound,  $\text{C}_{10}\text{H}_{18}\text{O}_3$  when treated with dilute aqueous acid. Suggest a structure for this compound!

9. Propose a reasonable name for the crown ether **g**! (2 pts)

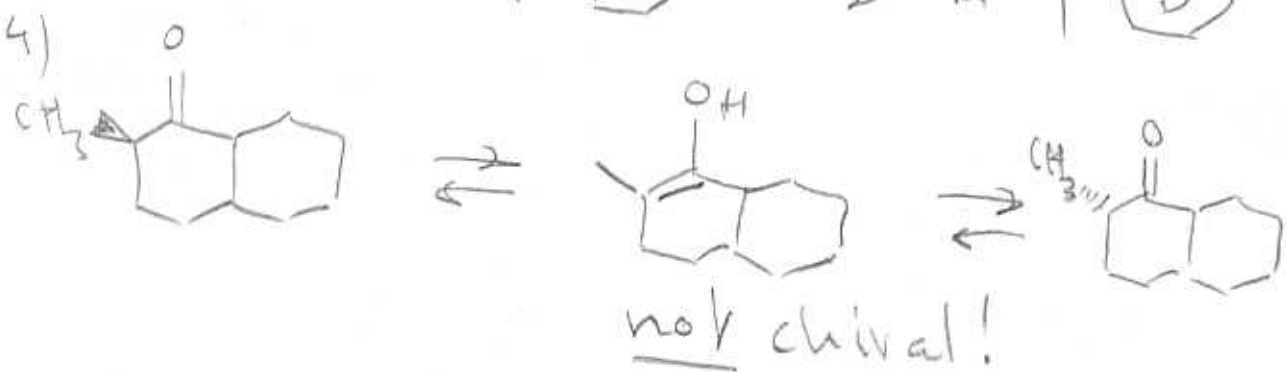
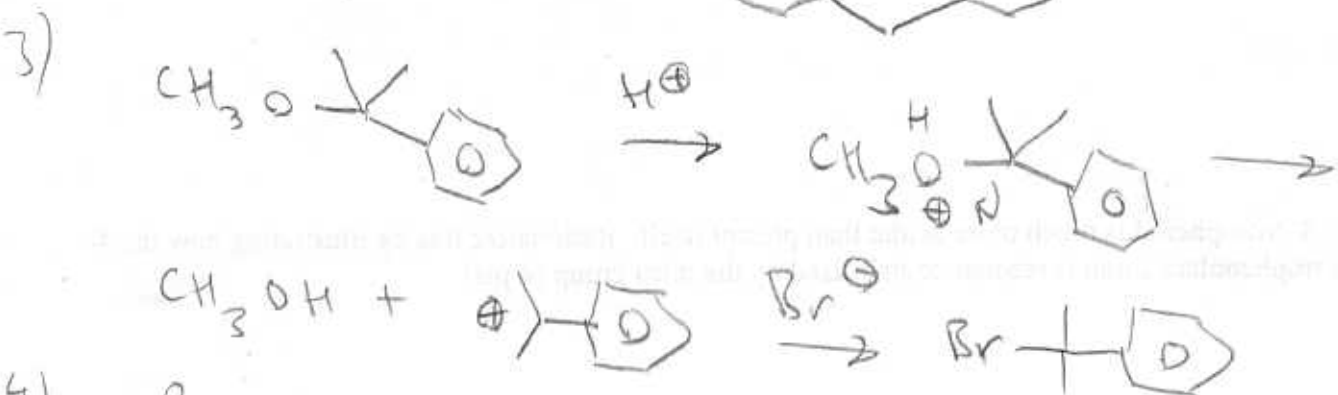
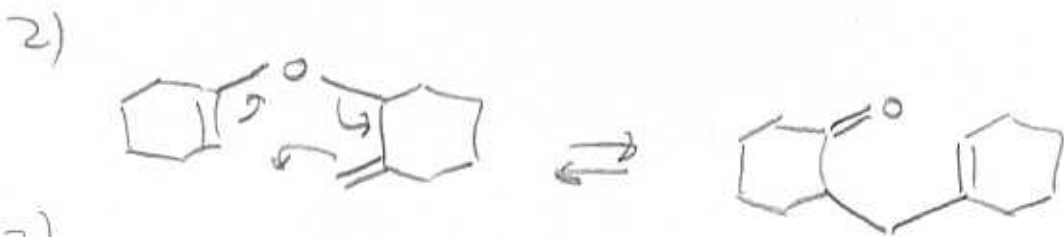
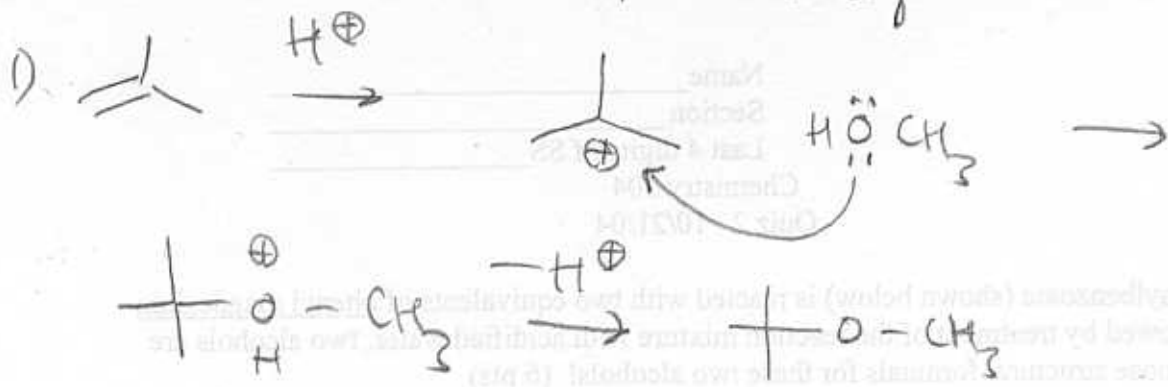


10. The two cyclohexenones **h** and **i** are easily interconverted under base-catalyzed or acid-catalyzed conditions. Suggest plausible mechanisms for both the base-catalyzed or acid-catalyzed cases.

11. Propose conditions to achieve transformations j-n.



12. Show structures for the reaction products of cyclohexanone with a) cyclohexylamine, b) methylmagnesium iodide (followed by aqueous workup), c) phenylhydrazine, d)  $\text{NaBH}_4$  (followed by aqueous workup), e)  $\text{KMnO}_4/\text{NaOH}/\text{H}_2\text{O}$ .



d cannot form an enol at the chiral center!

