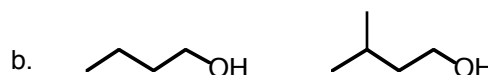
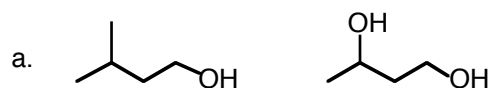


1. Give Names or structures for the following: (9 points)

ortho-chlorophenol



2. For each of the following pairs, circle the one that is higher boiling and put a square around the one with the higher water solubility. (4 points)



3. Of the listed four chemicals, circle those which would ionize methanol (convert it to sodium or magnesium methoxide)? (4 points)

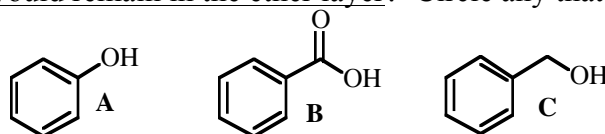
Na

$\text{NaNH}_2$

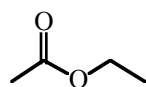
NaOH

$\text{CH}_3\text{MgBr}$

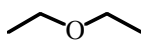
4. If an ether solution of the following three compounds was washed with  $\text{NaOH}/\text{H}_2\text{O}$ , which (if any) of the compounds would remain in the ether layer? Circle any that would. (3 points)



5. Of the following common solvents, circle those that are unsuitable as solvents for the preparation and reactions of Grignard reagents (assuming you want the Grignard reagent to react with something else). (3 points)



ethyl acetate



diethyl ether

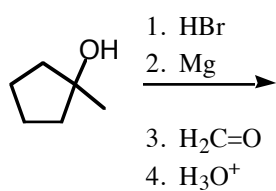
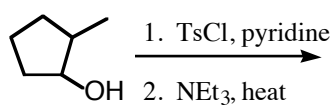
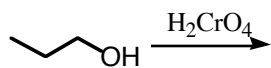
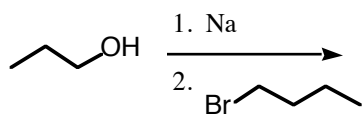
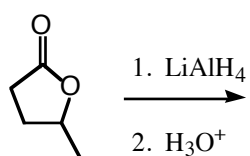
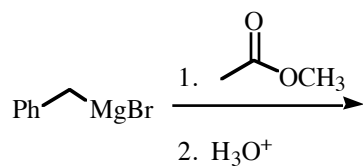
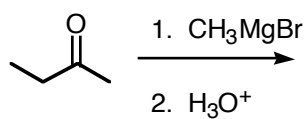


isopropanol

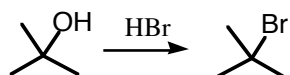
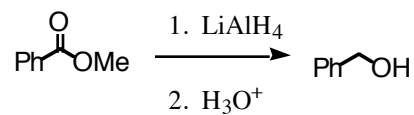
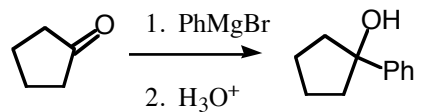


tetrahydrofuran

6. Give the major product of the following reactions. (3 points each)



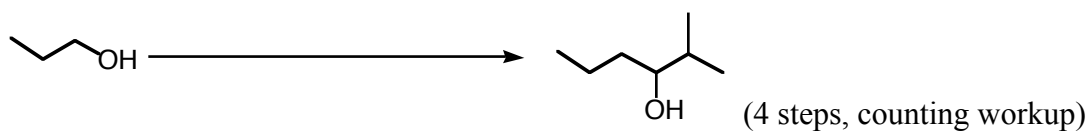
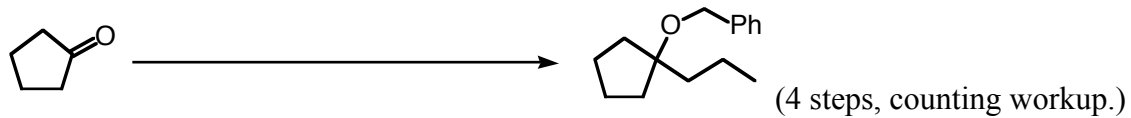
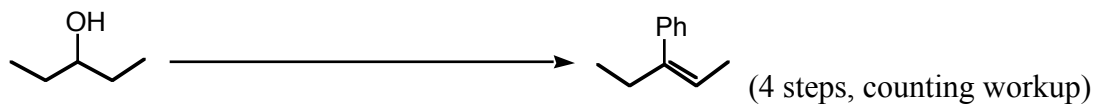
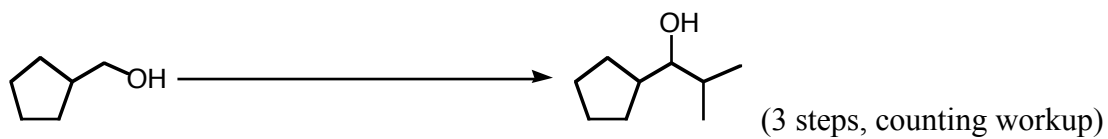
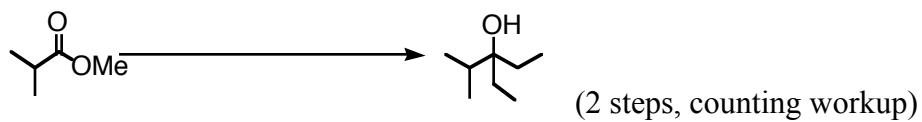
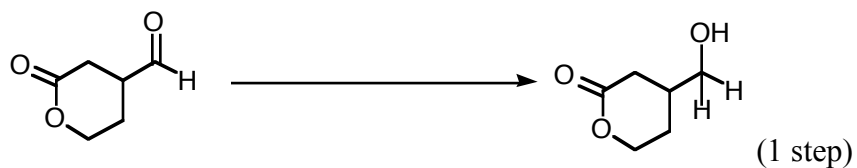
7. Draw mechanisms for the following reactions. (3, 5, and 5 points)



8. Suggest a possible structure for an unknown **A** whose formula is C<sub>6</sub>H<sub>12</sub>O, and gives the following chemical test results: (Double check that your answer is consistent with all the data) 5 pt

|                    |                                  |             |
|--------------------|----------------------------------|-------------|
| Formula:           | C <sub>6</sub> H <sub>12</sub> O |             |
| Hydrogenation Test | H <sub>2</sub> /Pt               | No reaction |
| Chromic Acid Test  | H <sub>2</sub> CrO <sub>4</sub>  | Turns green |
| Lucas Test         | HCl/ZnCl <sub>2</sub>            | No reaction |

9. Provide reagents for the following transformations. ("workup" means  $\text{H}_3\text{O}^+$  or  $\text{H}_2\text{O}$  steps)  
 (First two are 3 points each; last four are 5 points each)



10. Design syntheses for the following. Allowed starting materials (same as practice) include:  
bromobenzene  
cyclopentanol  
any acyclic alcohol or alkene with  $\leq 5$  carbons  
any esters  
ethylene oxide  
formaldehyde ( $\text{CH}_2\text{O}$ )  
iodomethane  
any "inorganic" agents (things that won't contribute carbons to your skeleton)
- Note: In this test, I had allowed alcohols of up to 5 carbons, not limited to only 4.

