

Name \_\_\_\_\_

Stdnt. No. \_\_\_\_\_

Lab Section \_\_\_\_\_

**Ask about any questions that are unclear to you.**

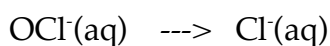
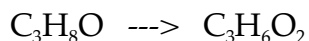
1. In our reduction lab, fluorenone was reduced to fluorenol and the reaction monitored by TLC. Which compound spot should move most rapidly in TLC? Why? Explain clearly in terms of the intermolecular forces responsible. (5 pt)

In a reduction experiment, 45.00 g of acetone,  $C_3H_6O$ , MWt = 58.08, is reduced with sodium borohydride,  $NaBH_4$ , MWt = 37.83, to form 2-propanol,  $C_3H_8O$ , MWt = 60.10.

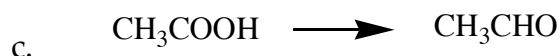
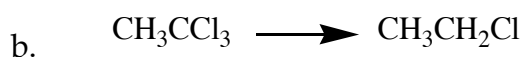
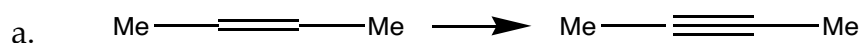
2. Write the balanced equation showing the overall stoichiometry of the reaction. The fate of the borohydride is not necessary, just the mole ratio to the acetone. (5 pt)
3. How many grams of  $NaBH_4$  are required to reduce 45.00 g of acetone? (5 pt)
4. If 40.00 gm of product are recovered, what is the percent yield for this reaction? (5 pt)

5. If acetone is reduced with  $\text{NaBH}_4$ , and workup is completed by adding  $\text{DCl}$ , (deuterated hydrochloric acid), what is the structure of the resulting product? (5 pt)

6. 1-propanol,  $\text{C}_3\text{H}_8\text{O}$  can be oxidized by  $\text{NaOCl}(\text{aq})$ , to propionic acid,  $\text{C}_3\text{H}_6\text{O}_2$  and  $\text{NaCl}(\text{aq})$ . Balance these half cells using the half cell method. You do NOT need to balance the entire redox reaction. (10 pt)



7. Label the following as oxidation or reduction reactions: (3 pt ea)



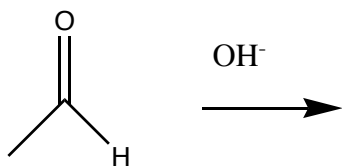
8. For our Grignard synthesis, show the sequence of reactions used, starting with bromobenzene and ending with the final product. Give names and structures for all organic intermediates and products. (6 pt)

9. The final product was tested with conc. sulfuric acid to produce a red color. Write the reaction that was occurring here. (5 pt)

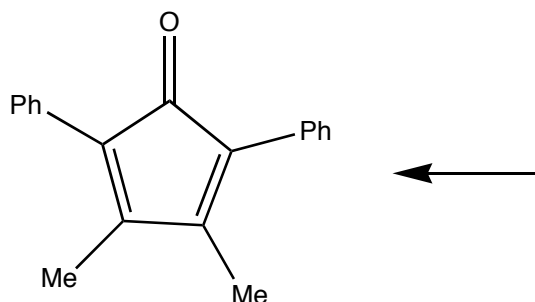
10. In the Grignard synthesis, how was the product separated from the biphenyl byproduct? (4 pt)

11. Grignard reagents,  $\text{RMgX}$ , react with traces of water. Write the reaction showing the product(s) of this reaction if we intentionally add  $\text{H}_2\text{O}$  to a Grignard reagent. (5 pt)

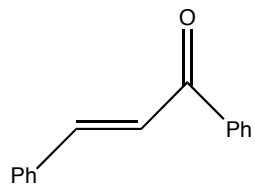
12. Write out the stepwise mechanism for the Aldol reaction of ethanal in aqueous sodium hydroxide, showing both the initial Aldol product and its final dehydration. (7 pt)



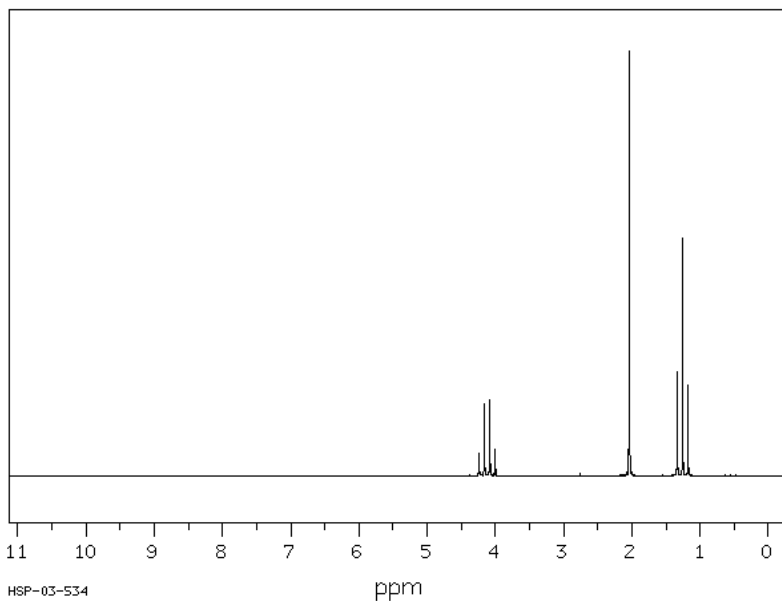
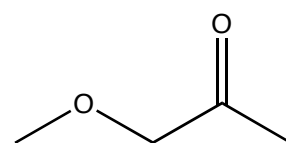
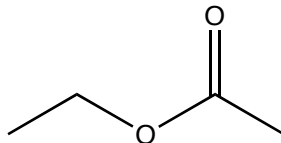
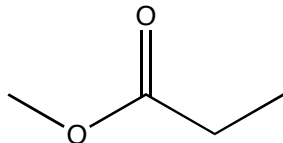
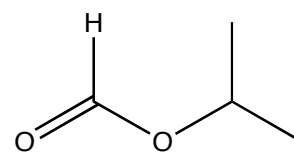
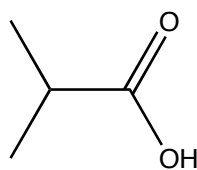
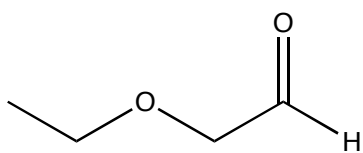
13. In our Aldol experiment, we produced tetraphenylcyclopentadienone. If we wanted to produce the structurally related compound shown below, what two compounds would we need as starting materials? (Ph = phenyl, a benzene ring) (6 pt)



14. What is the name of the general class of Aldol compounds having the following structure? (Ph = phenyl, a benzene ring) (3 pt)



15. A few of the possible structures for a compound with the empirical formula,  $C_4H_8O_2$ , are given below. For all structures shown, label all expected proton signals as to splitting and integrated intensity. Finally, pick the structure that best fits the  $^1H$  NMR shown, labeling the spectrum showing peak assignments. No credit for a structure guess without peak labeling shown. (15 pt)



16. Sketch a vacuum filtration setup, showing details of the proper trap orientation and label the names of the glassware. (4 pt)

17. On the following map of the lab, label the locations of a) fire extinguisher(s), b) safety shower, c) fire blanket, d) eyewash bottles, e) eyewash fountain, f) personal eyewash station. (6 pt)

