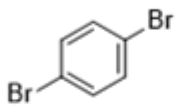
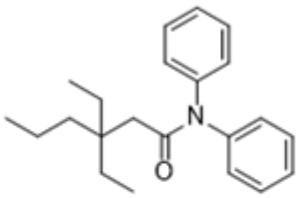
CHM 2120 – DGD – 2019 Final Exam Review

1. Name the following molecules using IUPAC nomenclature or accepted trivial names: **(2 points)**

a.



b.



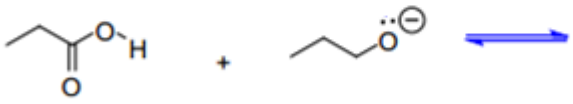
2. Draw clear structures for the following molecules: **(2 points)**

a. (*E*)-4-methylhex-3-en-2-one

b. phenyl 4-aminopentanoate

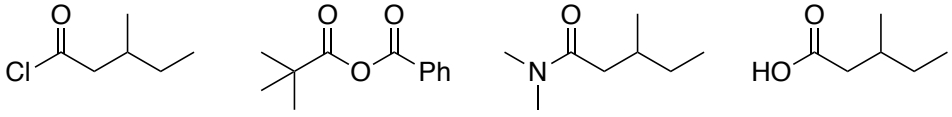
3.

a. Write equations for the following reaction using arrow notation. **(2 points)**
b. Will the reaction favour the starting materials or the products? **(1 point)**
c. Justify your choice. **(3 points)**

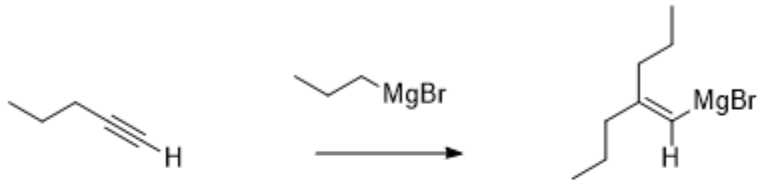


4.

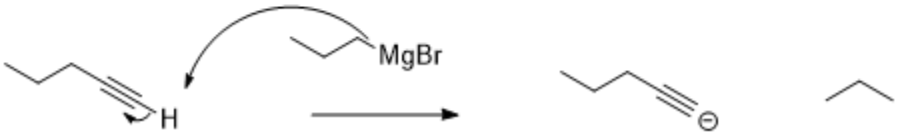
Rank the following molecules in increasing order of nucleophilic reaction with MeMgBr.



5. The following reaction won't work as shown:



a. Show what would happen instead. **(2 points)**

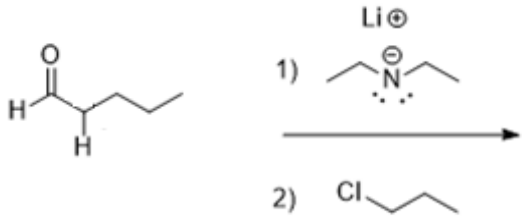


6.

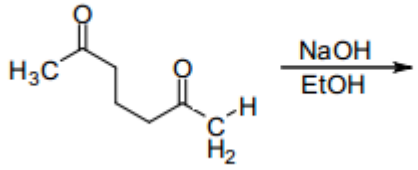
a. What are the three criteria for aromaticity? **(3 points)**

b. Is the following ion aromatic? Explain clearly how you came to this conclusion. **(2 points)**

7. Give a mechanism for each step in the following reaction sequence: **(5 points)**

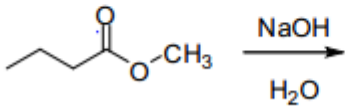


8. Provide a mechanism for the following reaction: **(6 points)**



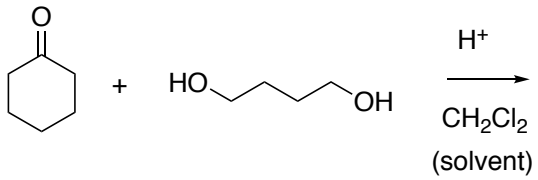
9.

a. Provide a mechanism and product for the following reaction **(5 points)**
b. Identify and name the key intermediate in the reaction **(1 point)**
c. Why is this reaction irreversible overall? **(1 point)**



10.

a. Provide a mechanism and product for the following reaction.

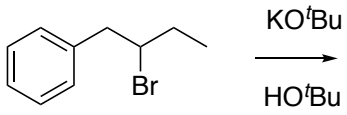


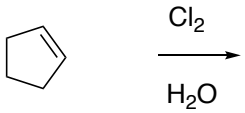
b. Spectroscopy analysis with IR of the final product recovered in the lab gave the following data:
   - Strong stretch at 1715 cm^{-1}

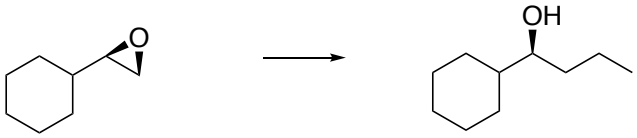
i. Explain what this IR data tells us about how the reaction proceeded.

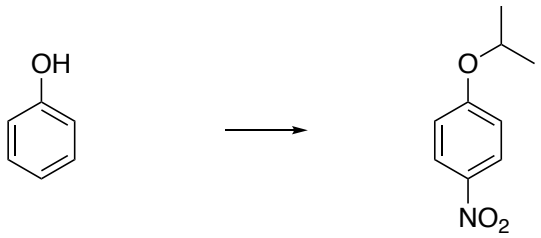
ii. Suggest *two* ways to combat the issue described in your answer to (i), and briefly rationalize each suggestion with reference to your mechanism.

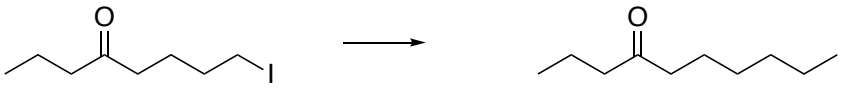
11. Give the missing reagent(s) or the major product for each of the following reactions.



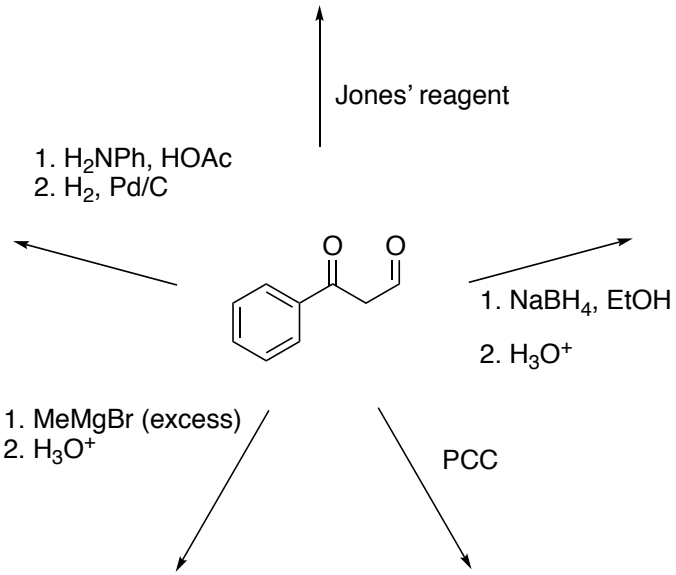




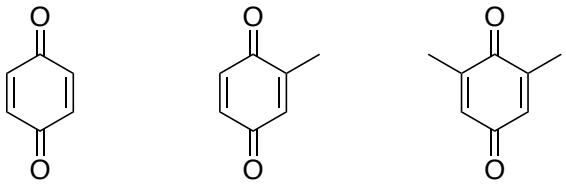




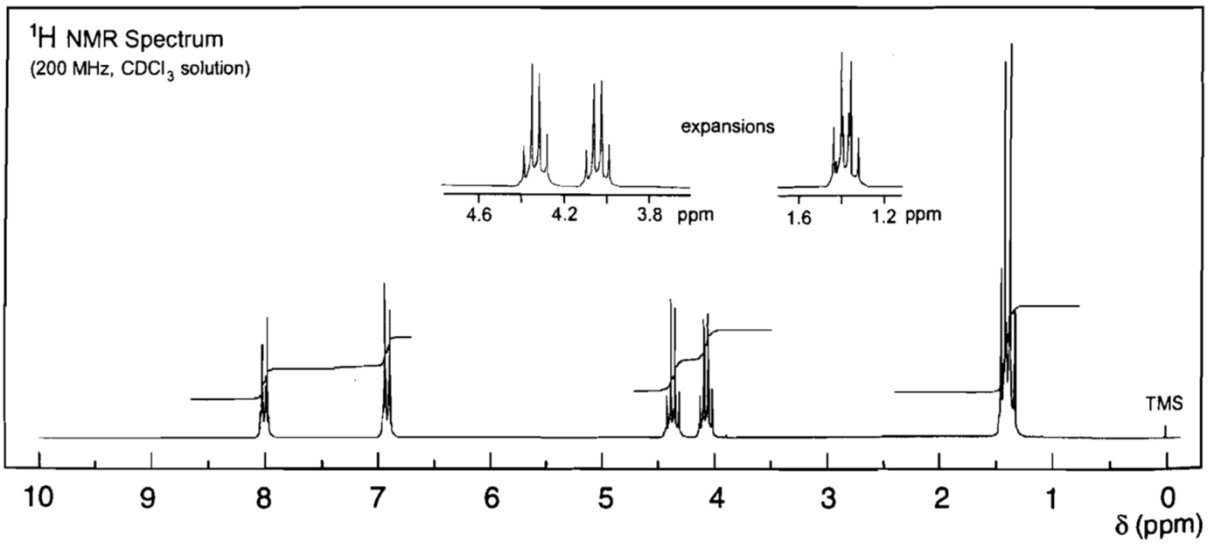
12. Give the major product of the following reactions.



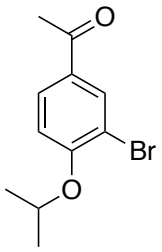
13. How many unique protons signals would be expected in the ^1H NMR of the following molecules?



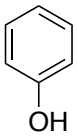
14. Determine the structure of the compound ($C_{11}H_{14}O_3$) represented in the NMR spectrum below. Be sure to show your work in the space below (chemical shift, multiplicity, integration).



15. Propose a synthesis of the following molecule from the starting materials shown.

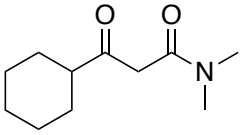


from



and any molecules with three carbons

16. Propose a synthesis of the following molecule from the starting materials shown.



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