

First Exam

Chemistry 3332

February 19, 2010

Name: \_\_\_\_\_

Signature: \_\_\_\_\_

ID# \_\_\_\_\_

**PLEASE CIRCLE CLASS TIME!**

10:00 AM

1:00 PM

4:00 PM

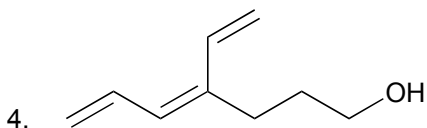
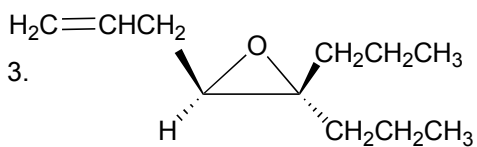
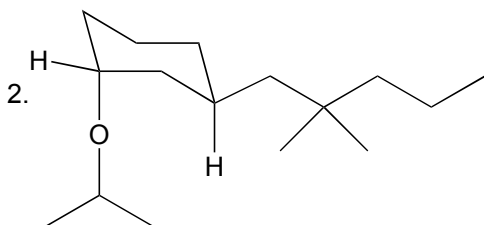
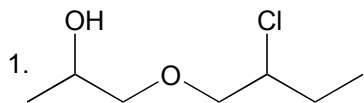
Page #	Score
1.16 pt	
2.18 pt	
3. 18 pt	
4. 12 pt	
5. 12 pt	
6. 12pt	
7. 12 pt	

Total: \_\_\_\_\_

**NOTE: Present your ID when you return the exam booklet**

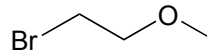
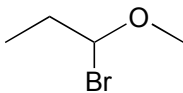
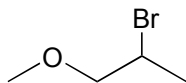
**A. Nomenclature:** (16 Points)

Give an acceptable name for each of the following compounds. Be sure to note stereochemistry where appropriate.

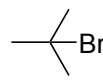
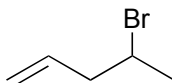
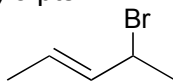


**B. Facts: 18 points**

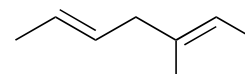
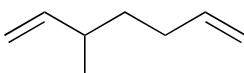
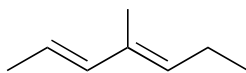
1. Place the following halides in order of increasing reactivity in an SN1 process. (1=least reactive, 3=most reactive) 3 pts



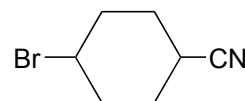
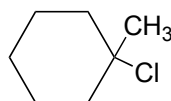
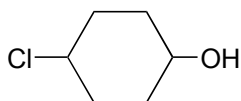
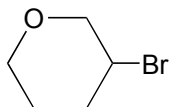
2. Place the following halides in order of increasing reactivity in an SN2 process. (1=least reactive, 3=most reactive) 3 pts



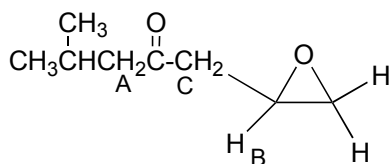
3. Place the following alkenes in order of increasing stability. (1=least stable, 3=most stable) 3 pts



4. Place a **Y** in the box below any halide that will form useful Grignard reagent and an **N** below any that will not (4 pts)



6. Answer the following questions for the molecule shown below and place the answers in the appropriate boxes. (i) how many distinct proton types are present in the molecule. (ii) How many distinct carbons are present? (iii) and (iv) What are the theoretically predicted multiplicities (splitting patterns) of the signals for the protons labeled **a** and **b**? (v) What is the multiplicity of the signal for carbon **c** in the proton-coupled  $^{13}\text{C}$ -NMR (5 pts)



(i) number of proton types

(ii) number of carbon types

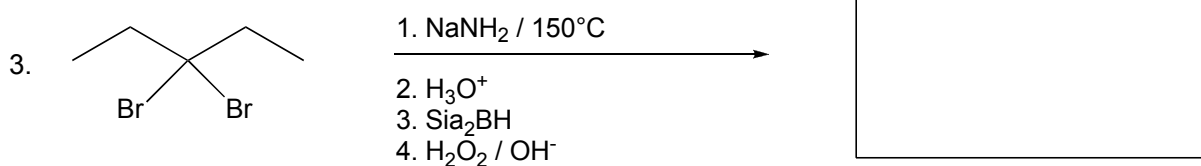
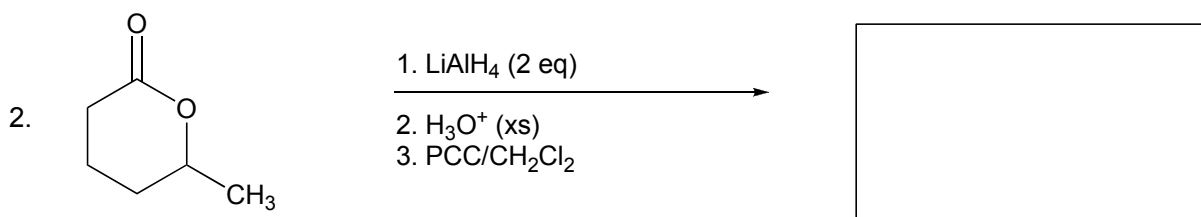
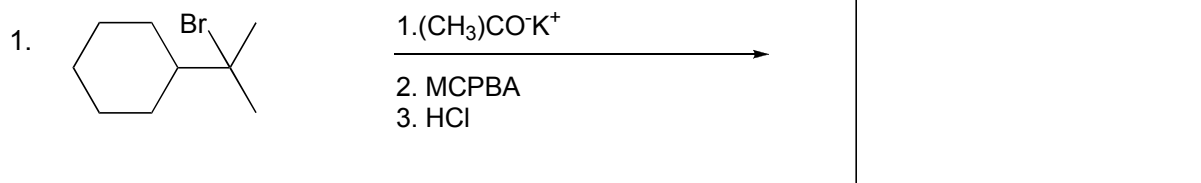
(iii) multiplicity of  $\text{H}_a$

(iv) multiplicity of  $\text{H}_b$

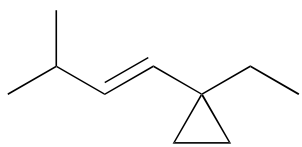
(v) multiplicity of  $\text{C}_c$

**C. Reactions:** Total = 30 points, 6 points each

Please provide the major product or the reagents in the answer box. Be sure your drawing indicates **stereochemistry** if applicable. Partial credit is awarded only when intermediate products in a multi-step reaction are shown below the reaction.



4.



NBS / light / 0°C

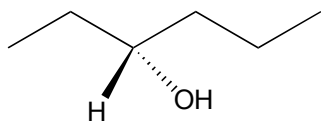


Major Product



Minor product

5.



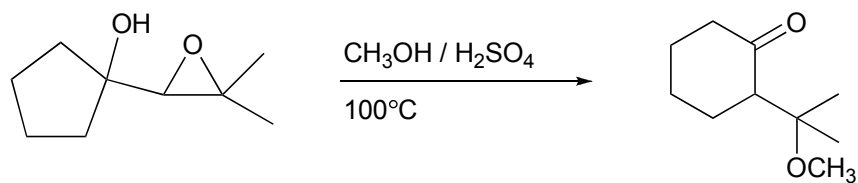
1. PBr<sub>3</sub>

2. NaCN / acetone



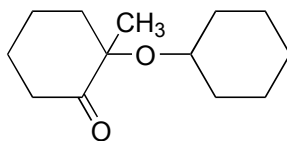
**D. Mechanism** (12 points)

Provide a clear mechanism to explain the formation of the product shown in the reaction below. Use curved arrows to indicate "electron flow". Remember to show only one step at a time. **Show all intermediates and all formal charges.**



**E. Synthesis** (12 points)

Synthesize the molecule below using any of the following reagents: alcohols and/or alkanes of **two carbons or less**, cyclohexane, any inorganic reagents, any oxidizing or reducing agents, and any peroxyacids.



## F. Spectroscopy: 12 points

A compound with the formula  $C_8H_{18}O$  exhibits the IR,  $^1H$ NMR and proton coupled  $^{13}C$ NMR spectra shown below. Please identify this compound and draw the structure in the box provided below.

