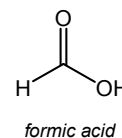
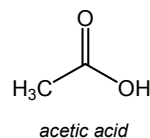
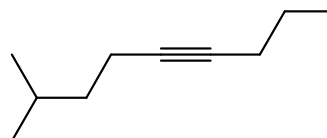
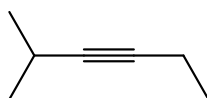
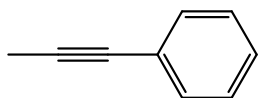




1. (12 pts) 2-bromo-2-methylpropane undergoes solvolysis in either acetic acid or formic acid. (a) In one solvent the  $S_N1$  reaction is 5000 times faster than it is in the other. In which solvent is the reaction more rapid? Briefly explain. (b) Write a mechanism for the faster reaction. Draw a box around the product of the solvolysis mechanism.

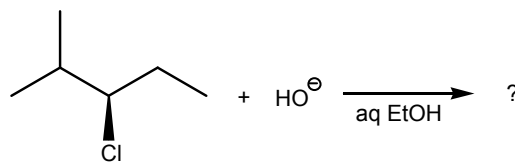


2. (10 pts) Of the alkynes shown below, which can be synthesized in the highest yield starting from ethyne. Clearly explain.



3. (4 pts each) For each pair of reactions, circle which reaction (if either) should have faster rate of reaction. In all cases you can assume that the reactions occur. Explain your choice in 7 words or less.
- reaction of cyanide anion with bromoethane in methanol or acetone
  - reaction of 3-methyl-2-butanol or 2,3-dimethyl-2-butanol in aqueous acid
  - reaction of ethanol or sodium ethoxide with 1-chloropropane in methanol
  - reaction of 2-chloro-2-methylbutane with iodide anion or bromide anion in ethanol

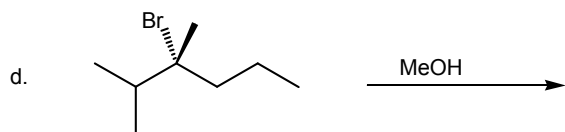
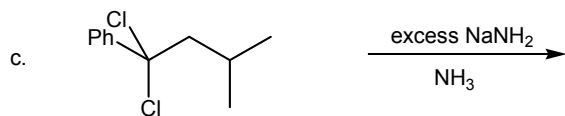
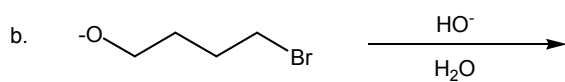
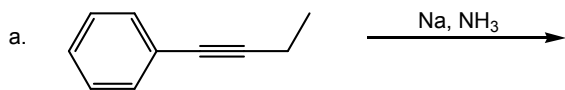
4. (16 pts) Consider the reaction of (*R*)-3-chloro-2-methylpentane, as shown to the right.



a. Show the structures of all possible products, both major and minor, assuming second order kinetics. Under each product, label it as major or minor and give the name of the mechanism that produces the product.

b. Draw a three-dimensional picture of the transition state that leads to the formation of the major product identified in Part 4a.

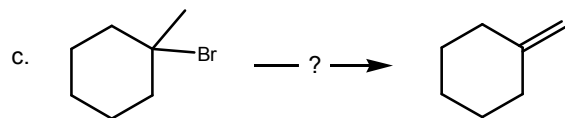
5. (3 pts each) Draw products of the following reactions.



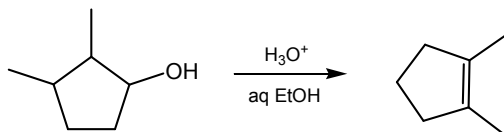
6. (16 pts) For parts a through c, outline a synthesis starting from the given reactant. You may use any other needed reagents. More than one reaction may be necessary. Mechanisms are not required.

a. 2-butanol  $\xrightarrow{?}$  butane

b. alkyl halide  $\xrightarrow{?}$  tBuOCH<sub>3</sub>  
of your  
choosing



7. (18 pts) (a) Draw a reasonable mechanism for the reaction shown below. (b) Draw a reaction coordinate for the mechanism that you propose. Briefly annotate your diagram to indicate how you arrived at your answer.



**CHEMISTRY 301**  
**11:15 AM Section**  
**EXAM 3**  
**22 Nov 2010**

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

<b>Page</b>	<b>Points</b>	<b>Score</b>
2	38	
3	28	
4	34	
Total	100	