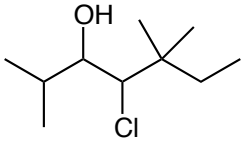
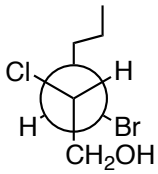
L. I. U.

Chem. 121, Sect 005, Exam 1 Fall, 2011, 100 points

1. Name the following molecules. For questions (a) and (b) you must first make a good expanded drawings and for question (c) you must first make (i) a good sawhorse drawing looking down the C2-C3 bond and then (ii) an expanded drawing, as well as naming both compounds. (20 pts)

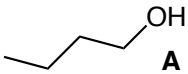
(a) 

(b) $(CH_3)_3CCH_2CH(CH_2CH_2OH)CH(CH_3)_2$

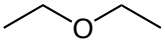
(C) 

2. (a) Draw 2-methyl-3-bromo-2-hexanol. (b) Draw a Newman projection looking down the C2-C1 bond for the low energy conformation of methyl cyclohexane. (10 pts)

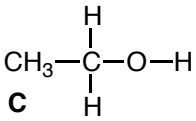
3. (a) Which molecule **A** or **B**, has the greater boiling point and the greater water solubility? (b) Which molecule **C** or **D** is the stronger acid? Briefly explain your answer in each case. (10 pts)

(a) 

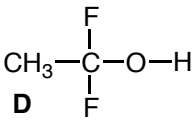
A



B

(b) 

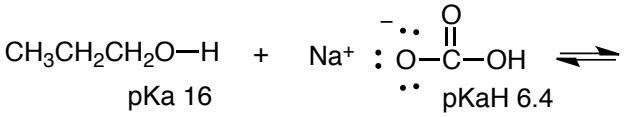
C

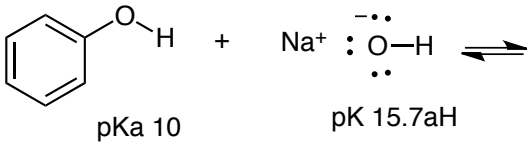


D

4. Which molecule would have the lower heat of combustion, *cis*-1,2-diisopropylcyclohexane or *trans*-1,4-diisopropylcyclohexane? To answer this question you must make careful three-dimensional chair drawing of both molecules, showing both conformations and identifying in each case which conformation would have the lower heat of combustion and then finally choosing the lowest overall heat of combustion. (20 pts)

5. For the following acid-base reactions, identify the acid and the base, give the product of the reaction, show the movement of the electrons using the arrow formalism, show all charges, and also calculate the equilibrium constant for the reaction. If the equilibrium constant is very unfavorable, you can simply state NO REACTION. (30 pts)

(a) 

(b) 

(c) $AlCl_3$ + $HOCH_3$ ⟶

6. Draw *cis*- and *trans*-1,2-dimethylcyclopropane and indicate which one would be lower in energy. (10 pts) **BONUS** Make a Newman projection looking down the 1,2 bond in each molecule so as to show the relationship between the substituents. (10 pts)