CHEM 3311, Fall 2010
Professor Walba
First Hour Exam
September 23, 2010

scores:

1)

2)

3)

4)

5)

CU Honor Code Pledge: On my honor, as a University of Colorado at Boulder Student, I have neither given nor received unauthorized assistance.

Name (printed): _____

Signature: _____

Recitation TA Name: _____

Recitation day and time: _____

This is a closed-book exam. The use of notes, calculators, scratch paper, or cell phones will not be allowed during the exam. You may use models brought in a clear ziplock bag. Please put all you answers on the test. Use the backs of the pages for scratch.

PLEASE read the questions very carefully!

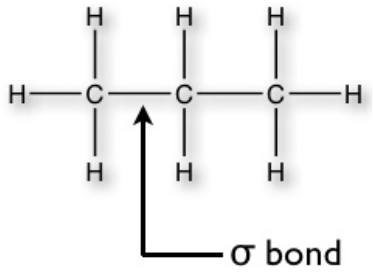
Partial Periodic Table

1A							8A
1 H	2A						2 He
3 Li	4 Be	5 B	6 C	7 N	8 O	9 F	10 Ne
11 Na	12 Mg	13 Al	14 Si	15 P	16 S	17 Cl	18 Ar
						35 Br	
						53 I	

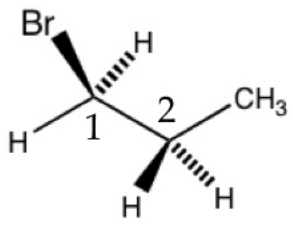
Printed Name: _____

1) (20 points) a) Draw a valence bond structure for all possible acyclic (with no ring) isomers with molecular formula C_5H_{10}. Be sure to include all possible stereoisomers and constitutional isomers. **Draw each isomer only once**. You do not need to show hydrogens in your structures.

b) Describe the nature of the indicated bond for propane in terms of overlap of hybrid atomic orbitals (e.g. Csp^3–H1s). Put your answer in the box to the right of the structure.



c) Draw a Newman projection for the indicated conformation of 1-bromopropane citing down the C1–C2 bond. Put your drawing in the box to the right of the structure



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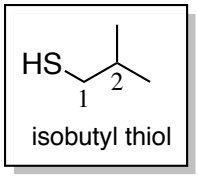
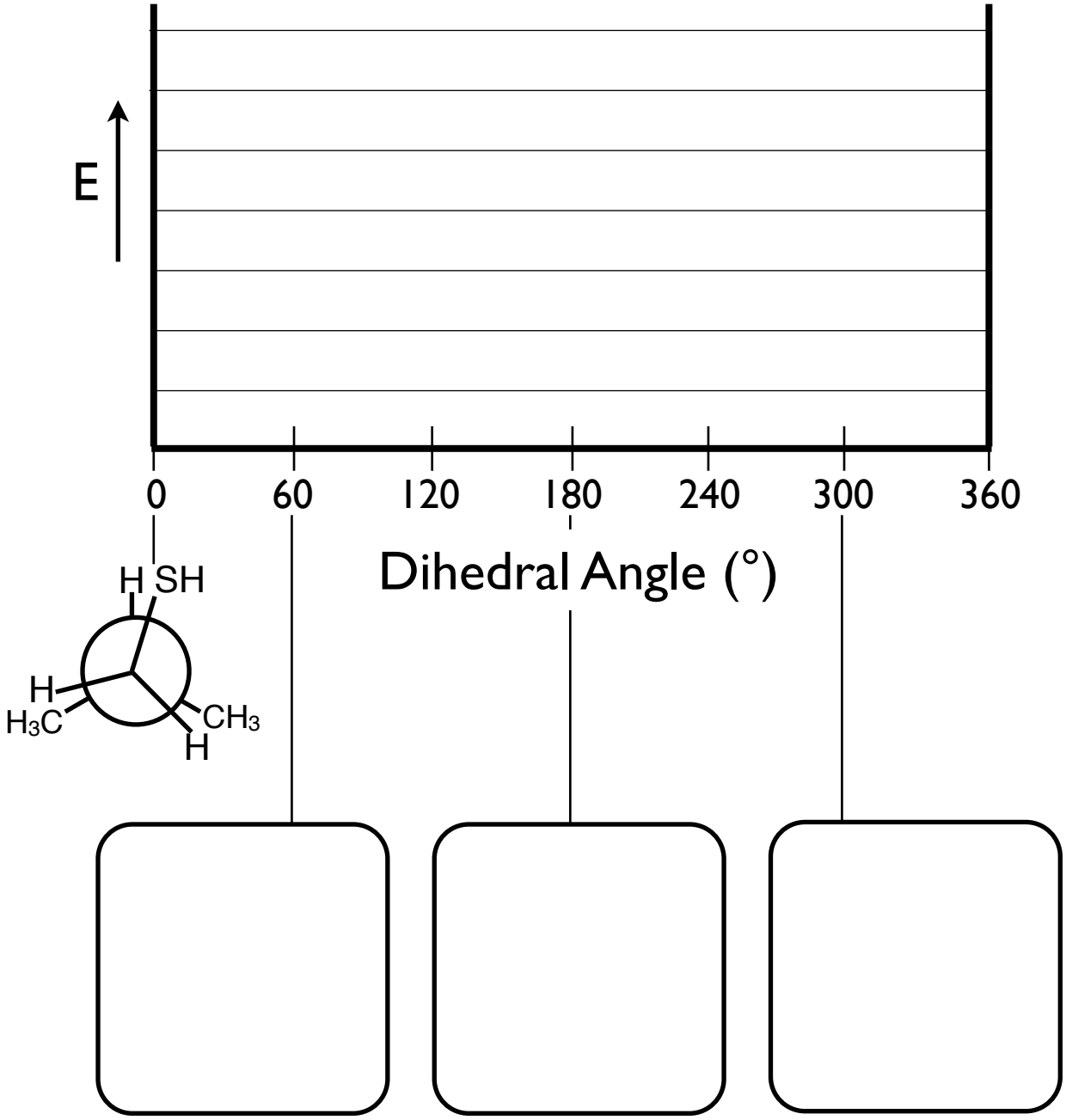
2) (20 pts) The structure of isobutyl thiol is given in the box to the right. Perform a conformational analysis for isobutyl thiol **sighting down the C1–C2 bond (C1 in front), rotating the front carbon clockwise**. Define the 0° eclipsed conformation as indicated on the diagram (the front carbon is rotated a little so you can see the back carbon). In this conformation, the S atom on C1 is eclipsing the H on C2.

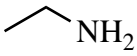
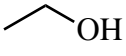


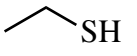
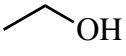
Carefully draw Newman projections for the three staggered conformations in the appropriate boxes, and indicate the relative energies of each staggered and eclipsed conformation on the diagram.

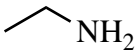
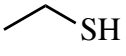


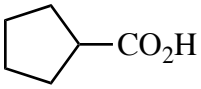
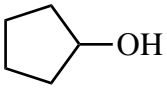
3) (18 pts) For each of the following pairs of molecules, circle the stronger Brønsted acid.

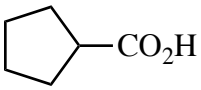
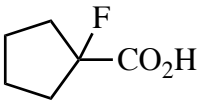
a) H_2O H_3O^+

b)  

c)  

d)  

e)  

f)  

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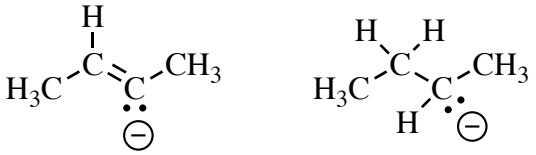
4) (21 pts) A) For each of the following pairs of isomers a - d, circle the more stable isomer (i.e. lower standard heat of formation). One of the two ions in part e is much more stable than the other. Circle the more stable ion.

a) 

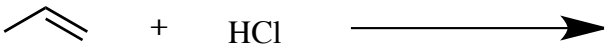
b) 

c) 

d) 

e) 

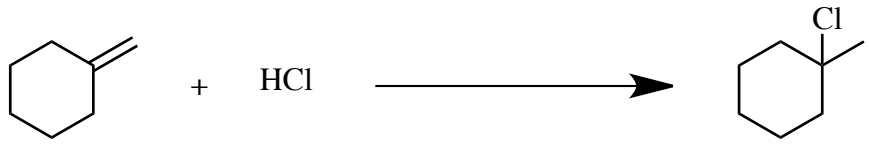
B) Give the single major product of the following reactions.

f) 

g) 

Printed Name: _____

5) (21 pts) A) Propose an arrow-pushing mechanism for each of the following reactions.

a) 

b)