

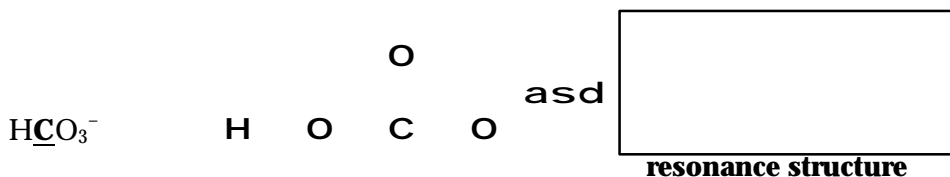
Organic Chem I: Exam #1
September 21, 2004

→ create code
 Name (printed) _____

100 points. Read carefully! Write your answers **in the space provided**.

1. (18 pts.) Draw the best Lewis structure for the compound, **showing all lone pairs**, and complete the table:

Formula	Best Lewis Structure	Around <u>Underlined</u> Atom	
		Shape	Bond Angles

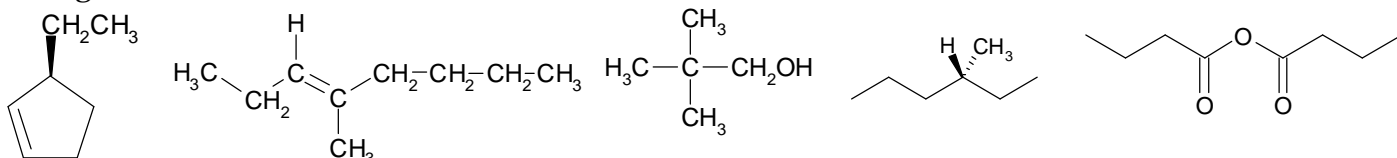


Use curved arrows to generate the other important resonance structure of the bicarbonate ion, HCO₃⁻, and draw it in the box above. Be sure to show any non-zero formal charges.

2. (15 pts.) Draw complete structures for the following species, clearly showing all relevant stereochemistry:

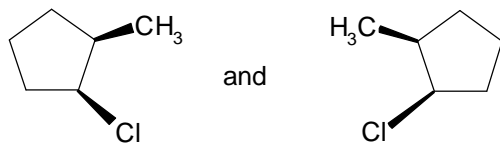
<p>a. <i>cis</i>-1,3-dimethylcyclobutane</p>	<p>b. <i>trans</i>-1,3-dimethylcyclobutane</p>
<p>c. Complete the potential energy diagram. Draw one line for the combustion of <i>cis</i>-1,3-dimethylcyclobutane and one for <i>trans</i>-1,3-dimethylcyclobutane. (Hint: is the combustion exothermic or endothermic? Hint #2: Which molecule has the higher heat of reaction?) Add a heat of reaction arrow to the diagram for the burning of the molecule that is a better fuel.</p> <div style="text-align: center;"> </div>	

3. (10 pts.) Circle the two chiral molecules in the the list below. Mark each chiral carbon with the absolute configuration **R** or **S**.

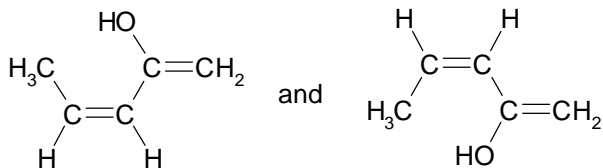


4. (21 pts.) Indicate the isomeric relationship between each of the following pairs of compounds (identical, structural isomers, conformational isomers, geometric isomers, enantiomers, diastereomers, not isomers).

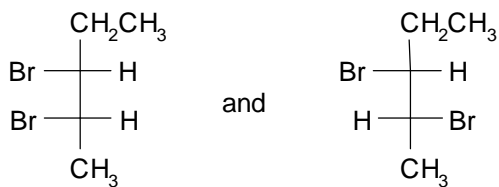
a.



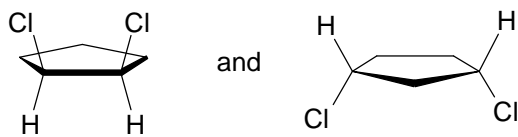
b.



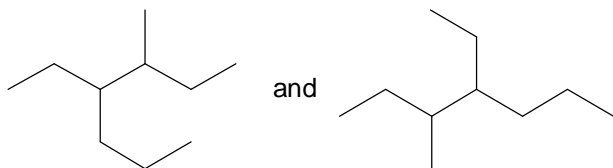
c.



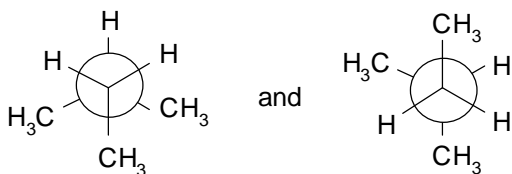
d.



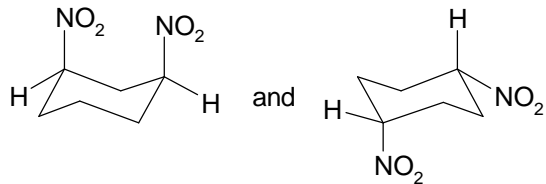
e.



f.

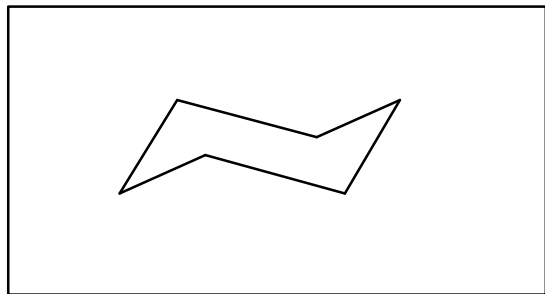


g.

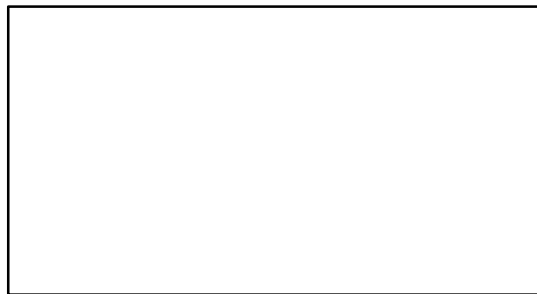


5. (10 pts.) Draw the **most stable conformation** of:

a. (4 pts.) *cis*-1-methyl-4-isopropylcyclohexane



b. (4 pts.) *trans*-1-methyl-4-isopropylcyclohexane



c. (2 pts.) Of your two structures in (a) or (b), circle the more stable compound.

6. (10 pts) Draw Newman projections of hexane, looking along the C3–C4 bond, for:

a. the most stable conformation (*anti*)



b. a *gauche* conformation.



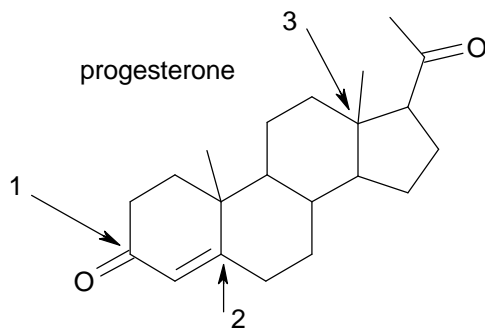
7. (16 pts.) Indicate the bond angles and hybridization of the carbons indicated

a. the C in HCN

bond angle _____

shape name _____

b.



bond angle	shape name
1	1
2	2
3	3