CHEMISTRY 241A

EXAM 2  
June 19, 2006

Name:_________ Key  ________________

ID#:________________________________

Use your models!!!
1. (12 pts) Circle the **more stable** species in the following pairs. If the structures are of approximately equal stability, write "EQUAL" between them.

(a)

(b)

(c)

2. (20 pts) In each of the following pairs, identify whether the species shown are constitutional isomers, resonance forms, identical, or conformers of the same compound.

(a)

(b)

(c)

(d)
3. (18 pts) Provide the three eclipsed conformations and three staggered conformations of 3-methylpentane ABOUT THE C(3)–C(4) BOND using the partial Newman projections provided. Draw all three of these conformers according to their relative energies as indicated by their position on the potential energy diagram below.

4. (7 pts) Using the partial chair structures below, draw two different conformations of the following structure. Circle the more stable conformation. Your axial/equitorial substituents must be clearly distinguishable (label them if necessary)!
5. Identify the following as either E (trans) or Z (cis) configurations. (12 pts)

Cl\(\text{C}^\text{N}\text{H}_2\text{O}\text{C}_\text{H}_3\text{N}\text{C}_\text{H}_2\text{O}\text{C}_\text{H}_2\text{O}\text{Cl}\)}

Z

\(\text{NC}_\text{N}^\text{C}_\text{H}^\text{C(\text{CH}_3)_2}}

Z

Z

6. (10 pts) Each of the following carbocations has the ability to rearrange to a more stable one. Write the structure of the most stable possible carbocation resulting from a single hydride or alkyl migration.

(a)

\(\text{H}_3\text{C}^+\text{CH}_3\)

\(\text{CH}_3\text{H}_3\text{CH}_3\)

(b)

\(\text{CH}_3\text{CH}_3^+\text{CH}_3\text{CH}_3\)

\(\text{CH}_3\text{CH}_3^+\text{CH}_3\text{CH}_3\)
7. (18 pts) Separate hydrobromination (HBr addition) of alkenes A and B yield the same product, compound C.

(a) Provide the structure of compound C in the box above.

(b) Provide the mechanism for the transformation of A to C using curved arrows to indicate electron flow.

(c) Provide the mechanism for the transformation of B to C using curved arrows to indicate electron flow.
(d) Provide a reaction coordinate diagram for the transformation of A to C assuming an exergonic reaction. Clearly label all transition states, intermediates, products, and starting materials. Indicate the rate determining step by circling the appropriate transition state.

(e) Provide a reaction coordinate diagram for the transformation of B to C assuming an exergonic reaction. Clearly label all transition states, intermediates, products, and starting materials. Indicate the rate determining step by circling the appropriate transition state.