

Chemistry 333

Examination #1

October 9, 2006

Professor Charonnat

Name: _____

Be certain that your examination has five (5) pages including this one.

Put your name on **each** page of this examination booklet.

By putting your name on this examination booklet you agree to abide by California State University, Northridge policies of academic honesty and integrity.

Molecular models are allowed for this examination. All electronic devices, including calculators, are unnecessary and are not allowed.

Name: _____

1. (25 points)

Circle the number that corresponds to the correct answer for each of the following five (5) questions.

A. Which of the following bonds is the most polar?

1. O-N
2. O-O
3. O-H

B. Which of the following compounds is the strongest acid?

1. $\text{H}_3\text{CCH}_2\text{CH}_2\text{OCH}_3$
2. $\text{H}_3\text{CCH}_2\text{CH}_2\text{OH}$
3. $\text{H}_3\text{CCH}_2\text{CO}_2\text{H}$

C. What is the hybridization of the nitrogen atom in $\text{H}_3\text{CCH}_2\text{NHCH}_2\text{CH}_2\text{CH}_3$?

1. sp^3
2. sp^2
3. sp

D. Elemental sulfur has

1. 6 valence electrons
2. 5 valence electrons
3. 4 valence electrons

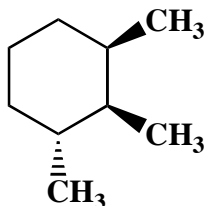
E. The electron distribution in a sigma bond is

1. spherically symmetrical about the internuclear axis
2. cylindrically symmetrical about the internuclear axis
3. unsymmetrical about the internuclear axis

Name: _____

2. (20 points)

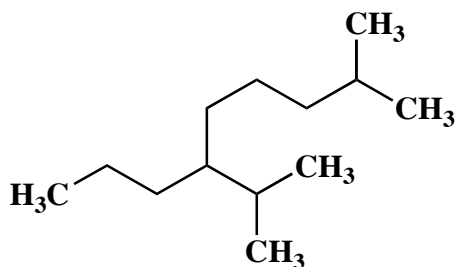
Draw the two possible chair conformations of the following 1,2,3-trisubstituted cyclohexane. Clearly denote all 1,3-diaxial interactions for both conformations. Then calculate the total strain energy for each conformation. Finally, put a star next to the more stable conformation. (Note: A 1,3-diaxial H/CH₃ interaction costs 3.7 kJ/mol. A 1,3-diaxial CH₃/CH₃ interaction is worth 15.5 kJ/mol.)



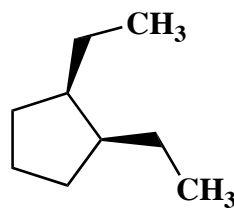
3. (20 points)

Use IUPAC nomenclature to write the systematic names of the following two (2) alkanes.

A.



B.

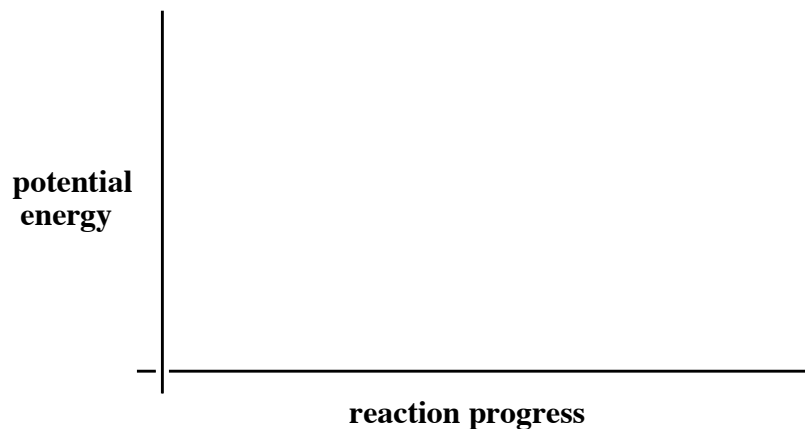
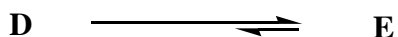
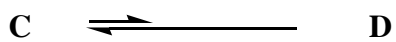


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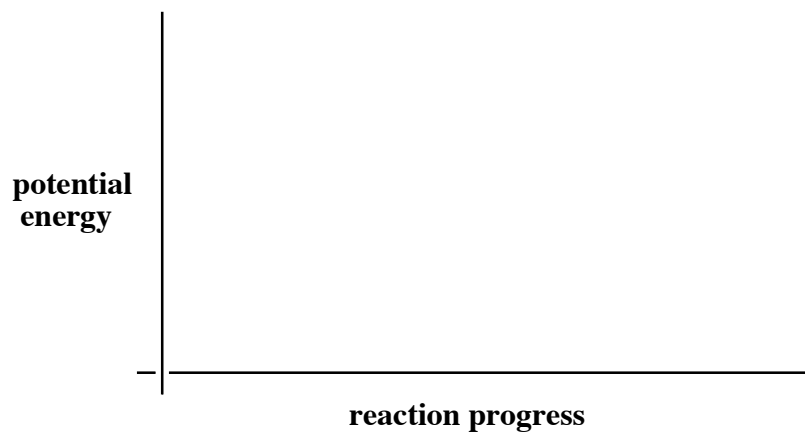
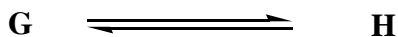
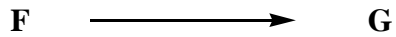
4. (20 points)

Draw reaction-energy diagrams (graph of reaction progress versus potential energy) for the following, two (2) reactions. Label each curve with the following: starting material (sm), transition states (ts_X), intermediates (int_X), product (p), activation energies (E_{aX}) and overall standard heat of reaction (ΔH°). Place a star next to the transition state of the rate-determining step.

A.



B.

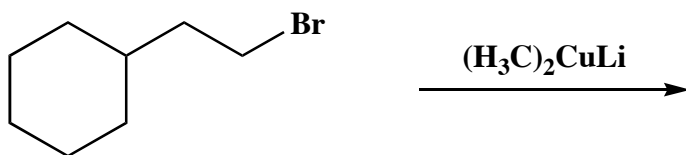


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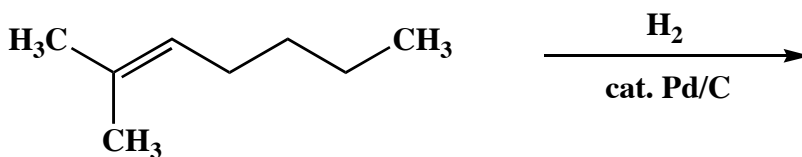
5. (15 points)

Draw the major organic product for each of the following three (3) reactions.

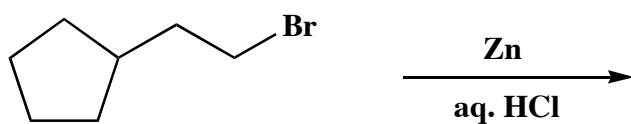
A.



B.



C.



Congratulations!

1	/25
2	/20
3	/20
4	/20
5	/15
Total:	/100