

Chemistry 333

Examination #1

October 5, 1998

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.

Name: _____

1. (30 points)

Answer the following three (3) questions precisely, succinctly and with correct grammar.

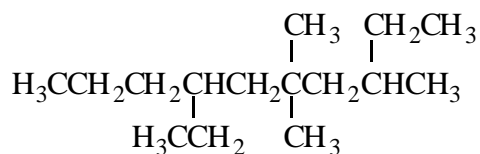
A. Distinguish between covalent and ionic bonding. Give a specific example of each type of bonding.

B. Distinguish between a Lowry-Brønsted and a Lewis acid. Give a specific example of each acid.

C. What experimental evidence suggests that free-radical chlorination of methane occurs via a chain-reaction mechanism?

2. (10 points)

Use IUPAC nomenclature to write the systematic name of the following branched alkane.



Name: _____

3. (20 points)

For each of the following four (4) questions, draw the specific reagent(s) necessary to effect the transformation shown. If more than one reaction is involved in an answer, be certain to distinguish the individual steps clearly.

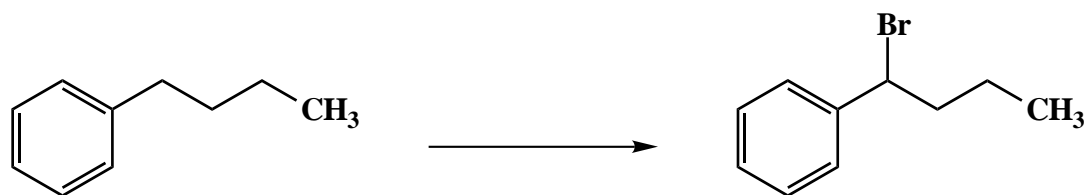
A.



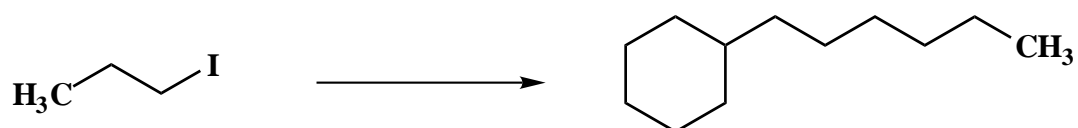
B.



C.



D.



Name: _____

4. (20 points)

For each of the following four (4) questions, circle the number that corresponds to the correct answer.

A. A late transition state is structurally and energetically similar to:

1. the starting material
2. the product
3. both of the above
4. neither of the above

B. Covalent bond heterolysis produces:

1. radicals
2. ions
3. carbenes
4. stable, unreactive organic molecules

C. The second most stable, named conformation of *n*-butane is the:

1. anti conformation
2. eclipsed conformation
3. gauche conformation
4. totally eclipsed conformation

D. The rate determining step of the free-radical chlorination of methane is:

1. homolytic dissociation of molecular chlorine
2. hydrogen atom abstraction from methane by a chlorine atom
3. chlorine atom abstraction from molecular chlorine by a methyl radical
4. radical recombination of a chlorine atom and a methyl radical

Name: _____

5. (20 points)

Draw the two possible chair conformations of *trans*-1-ethyl-3-methylcyclohexane. Clearly denote all 1,3-diaxial interactions for both conformations. Calculate the total strain energy for each conformation. (Note: The 1,3-diaxial interaction between a hydrogen and a methyl group is 0.90 kcal/mol. The value for a 1,3-diaxial interaction between a hydrogen and an ethyl group is 0.95 kcal/mol.) Finally, circle the more stable conformation.

Congratulations!

1	/30
2	/10
3	/20
4	/20
5	/20
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Total:	/100