

Chem 0310
Dennis P. Curran
February 2, 2004
Exam 1

Name: _____

Signature: _____

Answer all questions on this exam. If you need more space than that provided, use the back of any page.

1. _____ (20 points)

2. _____ (20 points)

3. _____ (20 points)

4. _____ (20 points)

5. _____ (20 points)

TOTAL _____ (100 points)

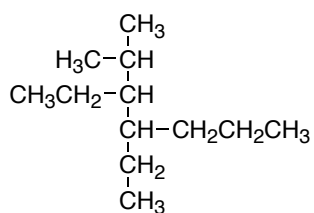
The test has 5 pages (including this cover page) and 5 questions
Each question has four parts. All parts are worth 5 points.
Partial credit will be given.
The exam ends at 10:55 am sharp.

Good Luck !!!

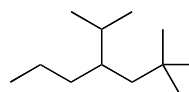
1) Structures and Names (20 points)

Provide IUPAC names for the following alkanes.

a)



b)



Draw cleared condensed or bond-line structures for compounds with the following names.

c) 1-bromo-8-chloro-3,3-dimethyloctane

d) *tert*-butyl bromide

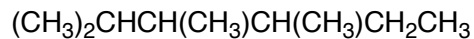
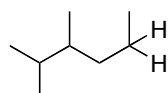
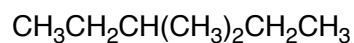
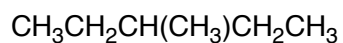
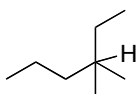
2) Short answer questions (20 points)

a) Draw all possible isomeric alkanes with the formula C_5H_{12} .

b) Draw a structure of an alkane that has primary (1°) and secondary (2°) hydrogens but **no** (3°) hydrogens.

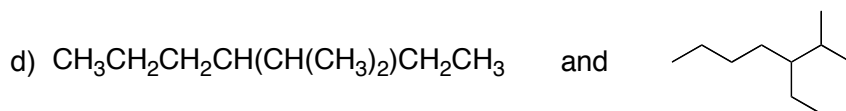
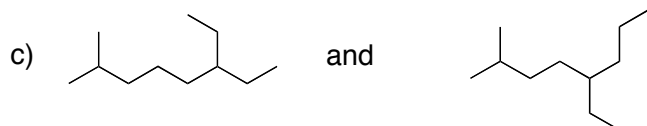
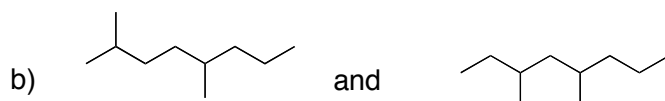
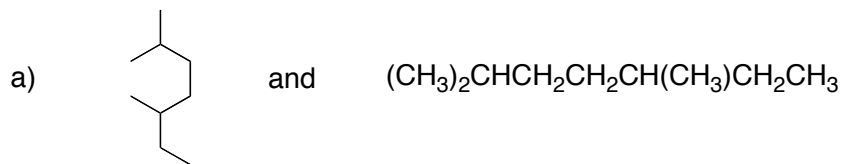
c) Show the resonance structures and the resonance hybrid for the isocyanate anion, ${}^{-}\text{O}-\text{CN}$.

d) Indicate whether the following structures are valid or invalid. For the invalid structures, indicate the error.



3) Isomers (20 points)

What is the relationship between the following pairs of compounds. Are they the same, constitutional isomers, or neither?



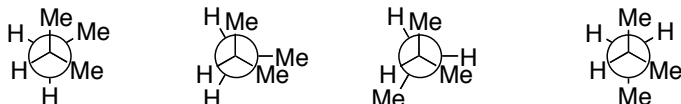
4) Conformations (20 points)

a) Draw Newman projections for staggered and eclipsed ethane.

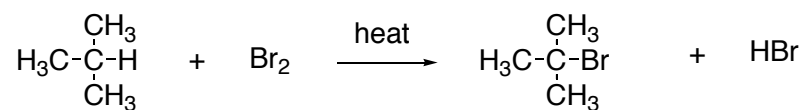
b) Draw Newman projections of the CH₂–CH₂ bonds of anti and gauche butane.

c) What isomer in (b) is more stable? By how much energy? Why?

d) Below are shown several conformations of 2-methylbutane. Which is the most stable? Which is the least stable? Explain your reasoning.



5) Answer the following questions regarding the bromination of isobutane.



a) Write the initiation and termination steps for this reaction. Use arrows to show electron movement.

b) Write the propagation steps for this reaction. Use arrows to show electron movement.

c) Using the table of bond dissociation energies on the next page, calculate the ΔH° for this reaction. Is the reaction exothermic or endothermic? The DH° of Br_2 is 46 kcal/mol.

d) What other possible isomeric product could be formed in this reaction? Why is this product not formed?