

Seat No. _____

LAST NAME _____

FIRST NAME _____

There are 7 pages to this exam. Check to make sure you have a complete exam.

PLEASE ALSO PRINT YOUR NAME ON THE TOP OF
THE BACK OF THE LAST PAGE OF THE EXAM

CHEMISTRY 331

EXAM I

Spring 2007 (1/26/07)

I. (22 points) _____

II. (20 points) _____

III. (12 points) _____

IV. (10 points) _____

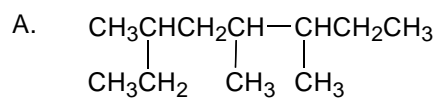
V. (10 points) _____

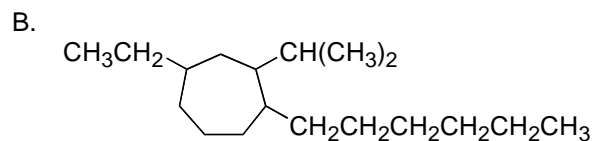
VI. (14 points) _____

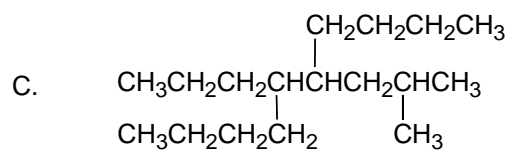
VII. (12 points) _____

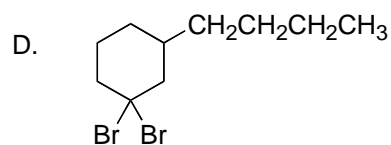
TOTAL (100 points) _____

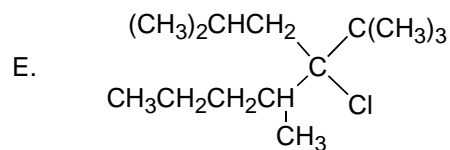
I. (22 points). Give IUPAC names for the following compounds.





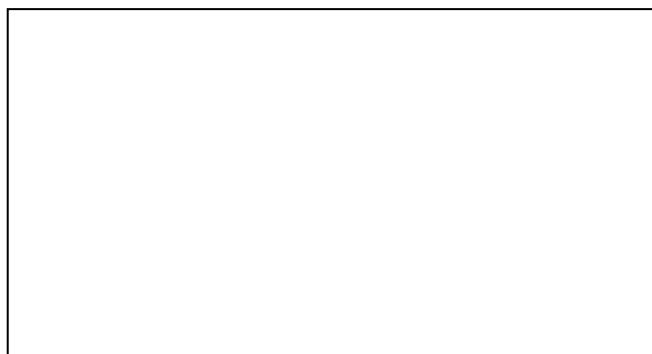






Draw the structures for the following names (show all hydrogens).

F. *sec*-butylcyclohexane



G. (4 points) *cis*-1,3-dibromocyclopentane

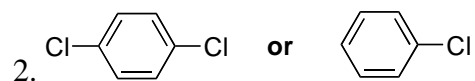


III. (12 points) In the boxes below draw line-bond structures that are consistent with valence rules for three molecules that have the molecular structure C_2H_4O . Show all hydrogen atoms and non-bonding valence electrons (use dots for electrons).

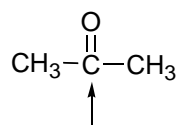
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IV. (10 points)

A. (4 points) Circle the more polar compound of each pair.

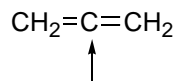


B. (6 points) Give the hybridization and approximate C–C–C bond angle for the atoms marked with an arrow.



hybridization

approximate C–C–C bond angle



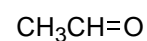
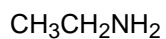
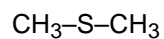
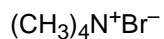
V. (10 points)

A. (6 points) The pK_a of water is 15.74. Acetone, $\text{CH}_3-\overset{\text{O}}{\parallel}{\text{C}}-\text{CH}_3$, is a weaker acid than water.

a. (2 points) Circle the pK of acetone: 9.9 **or** 19.3

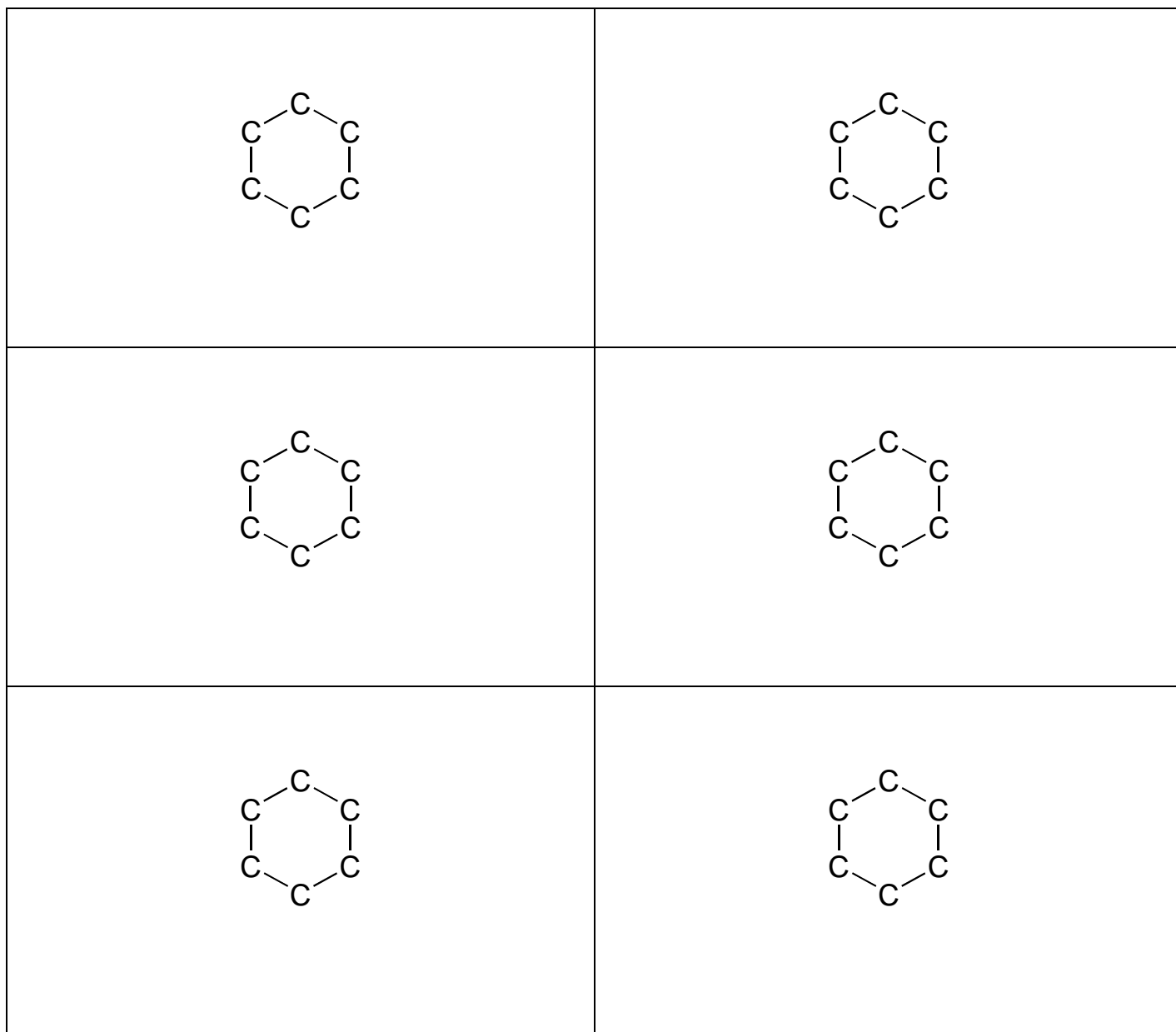
b. (4 points) Draw the conjugate base of acetone.

B. (4 points) Circle the following reagents which are likely to act as Lewis acids (4 points for no errors; 2 points for one error; 0 points for 2 or more errors).



VI. (14 points)

A. Complete the structures below to show ALL constitutional isomers (note: constitutional isomers only, no stereoisomers) of **cyclohexanes** that have the formula C_9H_{18} and have three methyl groups (i.e., they are all trimethylcyclohexanes). **Be sure to show all hydrogens.** There are no more than 6 constitutional isomers and there may be fewer. **Cross out any boxes that are not used.** Points will be deducted for duplicate or incorrect structures.



B. Circle all constitutional isomers that can exist as two or more cis-trans isomers.

VII. (12 points)

A. Draw the structure of an isomer of C_6H_{14} that has 1° , 2° , and 3° hydrogens.

B. Draw the structure of an isomer of C_6H_{14} that has only 1° and 3° hydrogens.

C. Draw the structure of an ester that has the molecular formula $C_4H_8O_2$.

D. Circle the alkane that should have the highest boiling point.

