

Seat No. _____

Name _____
(Please print your name and **circle** your last name)

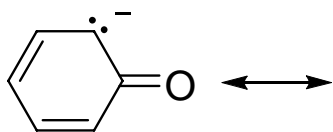
CHEMISTRY 331

EXAM I

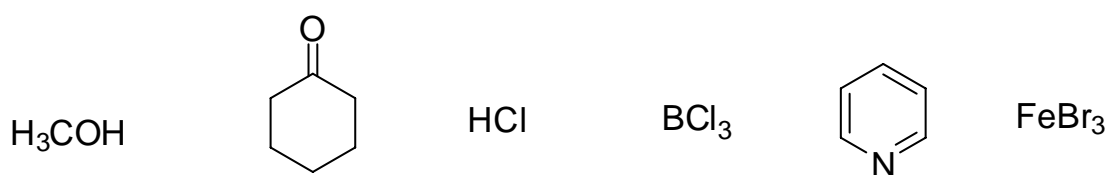
Wednesday, February 6, 2008

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|--------------------|-------|
| I. (8 points) | _____ |
| II. (12 points) | _____ |
| III. (10 points) | _____ |
| IV. (6 points) | _____ |
| V. (5 points) | _____ |
| VI. (9 points) | _____ |
| VII. (8 points) | _____ |
| VIII. (9 points) | _____ |
| IX. (10 points) | _____ |
| X. (6 points) | _____ |
| XI. (6 points) | _____ |
| XII. (6 points) | _____ |
| XIII. (5 points) | _____ |
| _____ | |
| TOTAL (100 points) | _____ |

- I. (8 pts.) Draw two additional resonance structures for the one provided here. Clearly show all π -bonds, lone pairs of e's and charge location. Use curved arrows to indicate e-pair movement.



- II. (12 pts.) Circle each of the compounds likely to behave as Lewis Bases.



- III. (10 pts.) Draw the most stable conformer of *trans*-1,4-dimethylcyclohexane and of its *cis*-isomer.

IV. (6 pts.) Cyclohexane is more stable than cyclopentane despite the fact that the angles of a regular pentagon (108°) are almost exactly the same as those of a tetrahedron. This is due to _____ of the six-membered ring to minimize both _____ and _____ strains.

V. (5 pts.) Draw a Newman projection of the anti conformation of 1,2-dichloroethane.

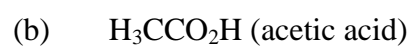
VI. (9 pts.) Using condensed structures provide an example of

(a) a 4-carbon molecule with two sp^3 -hybridized carbons and two that are sp -hybridized.

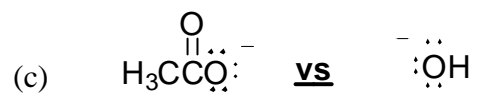
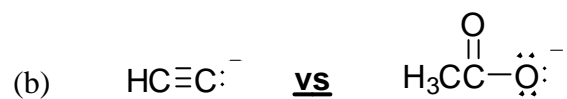
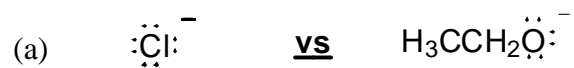
(b) a 3-carbon molecule with one sp^2 carbon, two sp^3 carbons and one sp^2 oxygen.

(c) a 6-carbon molecule w/4 sp^3 and 2 sp^2 carbons and the molecular formula of C_6H_{10} .

VII. (8 pts.) Provide Lewis (e-dot) structures for (a) and (b) which show all valence-shell electrons.



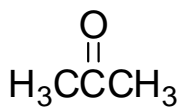
VIII. (9 pts.) Circle the strongest Brønsted-Lowry base in each pair.

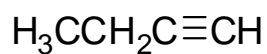


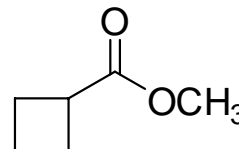
IX. (10 pts.) Under each of the following compounds put the number corresponding to the functional group in the compound.

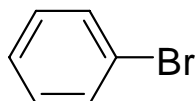
- 1) aldehyde
- 2) amine
- 3) halide
- 4) alcohol
- 5) ketone

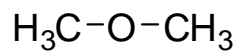
- 6) carboxylic acid
- 7) alkyne
- 8) ether
- 9) alkane
- 10) ester

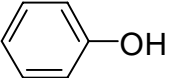




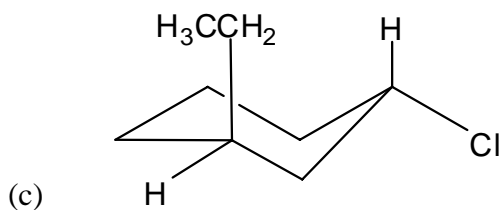
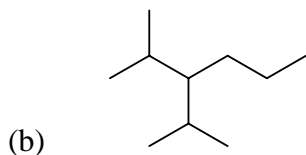
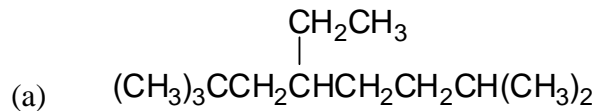






X. (6 pts) Phenol, , is much more acidic than is ethanol, $\text{H}_3\text{CCH}_2\text{OH}$ (pka 10 vs. 16). Explain why this is so in one concise statement.

XI. (6 pts.) Provide a proper IUPAC name for each of the following compounds.



XII. (6 pts.) Draw structures corresponding to each of the following names.

(a) 3-ethyl-2-methylhexane

(b) 4-isopropyl-3-methylheptane

(c) 4-(2,2-dibromoethyl)-3,5-dichloroheptane

XIII. (5 pts.) Show the products of the following reaction and use curved arrows to illustrate the required e-flow leading to them.

