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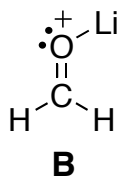
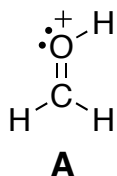
CHEM116L Section 1 Mini-Test (50 pts total)
September 15, 2006

- 1a) In the box below, draw the two resonance structures (showing all lone pairs of electrons and formal charges) that have the greatest contribution to the structure of nitrous acid (HONO, connected in that order). Then answer the questions that follow. (6 points)

Nitrous Acid

- 1b) Are the two oxygen atoms in nitrous acid equally basic? If not, indicate which oxygen atom in the molecule is *more* basic (by circling it). Provide a rationale for your choice below. (4 points)
- 1c) Draw an orbital picture of the major contributor of nitrous acid. In your illustration, be sure to label all orbitals and bonds, indicate bond angles, and show where lone pairs of electrons reside. (5 points)

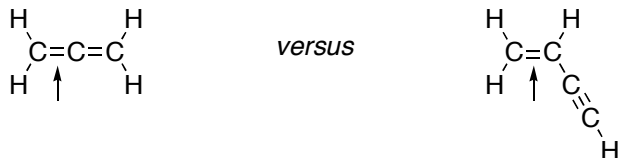
- 2) Use MO theory to determine whether cation **A** is more or less stable than cation **B**. Explain your choice through the use of a properly labeled MO energy diagram. (10 points)



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- 3) For each pair shown below, select the one that best fits the accompanying description by circling it. Provide a concise but thorough rationale for each of your decisions using words and pictures. *Note: a picture is required to receive full credit on most of these. Do not exceed the space provided.* (18 points)

A. The shorter bond?



B. The most acidic proton?



C. The ion with the greater dipole moment (the most polar ion)?



Disregard this question

- 4) The organic molecule shown below contains several protons. Determine which proton is most acidic and provide a rationale for your choice. Then provide a mechanism (curved arrow notation) for the reaction of this compound with sodium hydroxide and provide the products of the reaction to the right of the arrow. (7 points)

