Name
Section
Rec TA

Side 1 of 1

Ch 1a, Problem Set Six
Due Friday, Nov. 3, 2006
at 4 PM in the Ch1a box

Problems one and four are designated (⌘) as "no collaboration" problems.

Recall that from now on, problem sets are worth 200 points, and you may not substitute your Quiz One score for these sets.

⌘ 1. (60 Points, 10 Each) For each of the following molecules, draw a Lewis dot structure and state its geometry using VSEPR. Show any significant resonance structures and formal charges.

a. CO_2
b. PF_5
c. CO
d. PH_3
e. HCP
f. IF_3

2. (40 Points, 8 Each) For each of the following molecules, draw a Lewis dot structure and then state its geometry using VSEPR. Show any significant resonance structures and formal charges.

a. BrF_5
b. N_2O
c. CH_3CCH
d. H_2NBH_2
e. SF_2O

3. (40 Points, 10 each) When drawing Lewis dot structures, many students encounter the pitfall of thinking in only two dimensions, even though molecules exist in three dimensions. Several phosphorus compounds show interesting architectures for which Lewis dot structures cannot be drawn if one is constrained in two-dimensional thinking.

Draw the structure of the following compounds. Don't consider resonance structures or formal charges. The 3D geometry must be clear from your drawing. *Hints*: The structure of (b.) has three six-membered rings that share common atoms. In (d.) don't worry about the charge, just put four bonds around two of the boron atoms, 3 around the other two. The molecule contains a plane of symmetry.

a. P_4
b. P_4O_{10}
c. H_2CCCH_2
d. $[B_4O_5(OH)_4]^{2-}$

⌘ 4. (60 points, 10 each) Electrochemsitry involves transferring electrons from one molecule to another in solution. This often requires the production of ions. Give the Lewis dot structures for the following ions with any appropriate resonance structres and formal charges. Make sure the geometry is clear from your drawings.

a. CF^+
b. PO_4^{3-}
c. ClO_4^-
d. OH_3^+
e. ClO_2^-
f. XeO_4^{2-} *(hints: there's an O-O bond. Don't consider triple bonds or O-O double bonds)*