

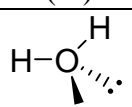
Accelerated General Chemistry
Problem Set 5—Part 1
Due Friday, October 16, 2009 (at 4:00 p.m.)
Total Points on This Assignment = 56

Note my standard policy on Lewis structures: (1) Every valid Lewis structure must have all non-zero formal charges labeled, even if your textbook does not ask for this. (2) Don't bother labeling any formal charges that are zero, even if your textbook does ask for this. (3) If it helps you to write down how you calculate the number of valence electrons or formal charges for a species, you are free to do so. But, unless I tell you otherwise, you are not required to do so for full credit. (4) If it is possible to eliminate formal charge by invoking valence expansion (for atoms in the 3rd period and below), you should always do it!

1. (3 points) Atkins and Jones Exercise 2.44
2. (14 points) Exercise 2.50. Briefly justify your choices of lowest-energy structures.
3. (4 points) Exercise 2.56—skip parts (c) and (d). For part (a), note that the hydrogen atoms are bonded directly to the oxygens.
4. (8 points) Exercise 2.60. Draw resonance structures if they are required by the symmetry of the species. In part (d), note that the hydrogen atom is bonded directly to an oxygen.
5. (6 points) Exercise 2.84. Put C in the middle of the molecule.
6. (6 points) Exercise 2.104. As part of your work, you must draw the Lewis structures of all three species.
7. (15 points) For each of the following species, do the following:
 - (i.) Draw the Lewis structure.
 - (ii.) Write down the coordination number and steric number for the central atom, and then write down the name of the shape.
 - (iii.) Draw the three-dimensional shape of the species. Draw the locations of all lone pairs on the central atom, but feel free to leave lone pairs off all substituents.
 - (iv.) Write down the ideal bond angle.
 - (v.) Writing an inequality, note any expected deviation from the ideal bond angle. If you do not expect any deviation, note that as well.

(a) AsF₃; (b) PCl₄⁺; (c) SF₂; (d) XeF₄; (e) XeF₂

As an example of what I expect for Problem 7, here are the answers for H₂O:

(i)	(ii)	(iii)	(iv)	(v)
$\text{H}-\ddot{\text{O}}-\text{H}$	CN = 2 SN = 4 bent		$\theta(\text{H}-\text{O}-\text{H}) = 109.5^\circ$	$\theta(\text{H}-\text{O}-\text{H}) < 109.5^\circ$