

**General Chemistry I**  
**Problem Set 4**  
**Due Monday, October 11, 2004 (at 5 p.m.)**

Remember 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 is possible to eliminate formal charge by invoking valence expansion (for atoms in the 3rd period and below), you should always do it! (4) 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.

Also note that formal charges are usually left off representations of three-dimensional shape.

1. [Postponed from Problem Set 3] Silberberg 10.18 (6 points). Draw the best Lewis structure(s) based on the formal charge rules we discussed in class. Draw as many resonance structures as you need to show all possible locations of double bonds. You do not need to label oxidation numbers.
2. Silberberg 10.42 (12 points). Hint: Remember to consider the possibility of resonance structures that make apparently different kind of bonds in reality equivalent.
3. Silberberg 10.44 (15 points). Be sure to draw also: (i) the Lewis structure and (ii) the shape of each species. Remember that when you render the shape, you should show the locations of all lone pairs on the central atom, and show if substituents are pointing into or out of the plane of the paper.
4. Silberberg 10.46 (15 points). Be sure to draw also: (i) the Lewis structure and (ii) the shape of each species. Remember that when you render the shape, you should show the locations of all lone pairs on the central atom, and show if substituents are pointing into or out of the plane of the paper.
5. Silberberg 10.50 (20 points). Be sure to draw also: (i) the Lewis structure and (ii) the shape of each species. Remember that when you render the shape, you should show the locations of all lone pairs on the central atom, and show if substituents are pointing into or out of the plane of the paper.
6. (15 points) For the compound  $\text{SOF}_4$ , do the following:
  - (i) Draw the Lewis structure.
  - (ii) Write down the central atom's coordination number and steric number, and the name of the molecular shape.
  - (iii) Draw the shape. If relevant, label atoms as equatorial (eq) and axial (ax) to facilitate completing parts (iv) and (v).
  - (iv) Write down the ideal bond angles. (Hint: There are four angles.)
  - (v) Note all expected deviations from the ideal bond angles.
  - (vi) Explain the expected deviations from the ideal bond angles.