Chapter 8 & 9 blank.

1. (3points) Write the Lewis symbol for:  Br–, N, and In.
2. (20 points) Sulfur tetrafluoride (SF4) reacts slowly with oxygen to form sulfur tetrafluoride monoxide (OSF4) according to the following unbalanced reaction:

SF4(g) + O2(g) 🡪OSF4(g)

1. Balance the equation (1 point)
2. Write a Lewis structure of OSF4 in which the formal charges of all atoms are zero. (4 points)
3. Use average bond enthalpies to estimate the enthalpy of the reaction.  Is it endothermic or exothermic? (4 points)
4. Determine the electron domain geometry of OSF4, (2 points)
5. Determine the molecular geometry (2 points)
6. Draw two possible isomers for the molecule based on this geometry. (4 points
7. Which of these structures is more likely to be observed?  Explain (3 points)
8. (4 points) Capsaicin is the molecule responsible for the hot spiciness of chili peppers.  A valid Lewis structure and ball and stick model is shown below. 1,2

1. What atomic orbitals mix to form the hybrids of N?
2. In what type of hybrid orbital does the lone pairs of N reside?
3. How many π bonds are present?

**Figure 1 Lewis Structure for Capsaicin**



1. (4 points) Silicone tetrafluoride reacts with fluoride to produce the hexafluorosilicate ion, SiF62—; GeF4 behaves similarly, but CF4 does not.  Why doesn’t CF4 react with F—; to form CF62—.
2. (6 points) Chlorine can form a variety of molecules and ions when bonded to fluorine.  Three formulas are  [ClF2]—, ClF3, and [ClF4]+..Draw the Lewis structure for the three species, showing lone pairs when appropriate.

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| [ClF2]— | ClF3 | ClF3 |
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1. (8 points) Nitrogen can form several types of compounds when it reacts with oxygen.  Two of these compounds are NO2+ and NO2—.  Draw the best Lewis structure for these two ions and based on resonance (or the lack thereof) pick the ion that has the longest N=O bond.  (6 points) Explain your answer. (2 points)
2. (15 points) Draw the Lewis structures for the following structures.  Follow the instructions. Clearly label the structures.
	1. BrF4— For this structure, draw a good Lewis structure of the ion.
	2. N2O, Nitrogen is the central atom.  The molecule is linear.  There are three resonance structures.  Draw them.  Determine the two most stable structures based on formal charge.
	3. BrF3 Use the molecular and electron domain geometry to help you determine where the lone pairs should go for the most stable molecular geometry
	4. ClO3— Draw the Lewis structure that obeys the octet rule.
	5. Cl2SO  Put S in the center and show formal charges for each atom; draw the structure that obeys the octet rule for the central atom
	6. Cl2SO Put O in the center and show formal charges for each atom; draw the structure that obeys the octet rule for the central atom
	7. For structures e and f, pick the most stable structure based on formal charge rules.