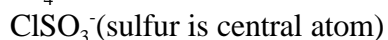


INORGANIC CHEMISTRY - PROBLEM SET 2

(Due Friday, October 4)

1. For the following molecules and ions, draw a correct Lewis structure and determine the idealized VSEPR geometry, and indicate approximate hybridization at the central atom.



2. The hybridization of atoms in strained three member rings may be quite unusual due to geometric constraints. Cyclopropane, C₃H₆, is one such example. The observed ¹J(C-H) coupling constant is 161 Hz.
- A. Calculate the fractional *s* character in the C-H bond.
- B. Determine the fractional *s* character in the C-C bond of the ring.
- C. Using the above information, draw a simple qualitative orbital overlap picture showing the bonding amongst the carbon atoms in the ring. Where does the region of maximum overlap lie in respect to the C-C ring vectors?
3. Pauling had related fractional ionic character of a covalent bond to the difference in electronegativities of the bonding atoms by the relationship below:

$$\text{fractional ionic character} = 1 - e^{-(1/4)(\chi_A - \chi_B)^2}$$

- A. Calculate the fractional ionic character in the following bonds:
- a. C-Cl
- b. Sr-F
- c. Si-N
- d. N-N
- B. What difference in electronegativity would give 50% ionic character in a bond?
4. For the idealized geometries found for the molecules and ions in problem 1, show all symmetry elements, and determine the correct point group.