Chemistry 2202 - Unit 2 Bonding

Worksheet #6 Electronegativity, Polarity & Solubility

Electronegativity

1. Defiene electronegativity.

2. Arrange the elements in each set in order of increasing attraction for electrons in a bond.
   a) Li,Br, Zn, La, Si b) P, Ga, Cl, Y Cs

3. Discuss the periodic trends in electronegativity.

Polar Bonds & Bond Dipoles

4. For each of the following pairs of atoms, predict whether a bond between them will be nonppolar covalent, polar covalent or ionic.
   a) carbon and fluorine c) chlorine and chlorine
   b) oxygen and nitrogen d) silicon and hydrogen

5. For each of the polar bonds in the following pairs of atoms , indicate the locations of the partial positive charges. Use an arrow over the element symbols to indicate the bond dipole. a) carbon and fluorine c) chlorine and chlorine
   b) oxygen and nitrogen d) silicon and hydrogen

Polarity of Molecules

6 . Using VSEPR theory to predict the shape of each of the following molecules. From the molecular shape and the polarity of the bonds, determine whether or not the molecule is polar.
   a) CH_3F b) CH_2O c) AsI_3 d) H_2O_2

7. Freon-12, CCl_2F_2, was used as a coolant in refrigerators until it was suspected to be a cause of ozone depletion. Determine the molecular shape of CCl_2F_2 and discuss the possibility that the molecule will be polar.

8. Which is more polar NF_3 or NCl_3? Justify your answer.

9. For each of the following molecules, draw3 a Lewis dostructure and determine if the molecule is polar or nonpolar.
   a) $AsCl_3$ b) CH_3CN c) Cl_2O d) $SiCl_4$

10. What similarities and what differences would you expect in the molecular shape and the polarity of CH_4 and CH_3OH? Explain your answer.

11. Identify and explain the factors that determine the structure and polarity of molecules.

12. How can a molecule with polar covalent bonds be non–polar?

13. With reference to WORKSHEET #2 Problem #1 Table, identify which substances are **polar** and which are **non-polar.**

14. **Place your answers in TABLE format.** For each of the following molecules:

H_2CO, $CHCl_3$, OCl_2, PCl_3, CS_2

i) draw a Lewis dot diagram
ii) draw a structural diagram
iii) draw a shape diagram
iv) name shape and indicate bond angles
v) draw arrows on shape diagram to indicate bond dipoles
vi) indicate whether molecule is polar or non-polar

Solubility

15. Water, H_2O and carbon tetrachloride, CCl_4 are molecules with different characteristics.

i) Indicate which is polar and which is non-polar. Explain the reason for this difference.
ii) Are these two molecules soluble in each other. Explain.