Name: ______________________________ Date: ________________________________

Chemistry 30 – Electrons and Molecular Forces – Unit Homework

Topic	Textbook Reading	Textbook Questions
Electron Configuration	Sections 5.2-5.3	#18-23
Lewis Structures	Section 9.3	#30-34, 39-41
Periodic Trends	Sections 6.1-6.3	#16-18
Polarity	Section 9.5	
Properties of Compounds	Section 8.2	
VSEPR	Section 9.4	#49-53
Intermolecular Bonds	Section 13.2	

Electron Configuration

1. Write the electron configuration for each of the following elements:
   a. Be c. Pd e. C g. U i. W
   b. Xe d. Fe f. Mn h. Pb j. Er
2. Write each of the elements from #1 in noble gas configuration.
3. Write the electron configuration for each of the following, then determine the number of valence electrons:
   a. Cd c. Br e. Sn
   b. Ba d. Ne f. P
4. Predict the charge for each of the elements in #3. Note that one will not make an ion and one has two possible charges!

Lewis Structures

5. Draw Lewis structures for the following covalent compounds.
   a. I_3^- e. PCl_3 i. SF_6 m. ICl_3 q. ClF_3
   b. PF_5 f. PO_4^{3-} j. XeF_4 n. SO_2 r. BF_3
   c. H_2O g. O_3 k. XeF_2 o. SF_4 s. CO_2
   d. ClF_5 h. $CHCl_3$ l. OF_2 p. IOF_3 t. $COCl_2$

Periodic Trends and Polarity

6. Explain the relationship between atomic radius and electronegativity.
7. Which of the following has a larger atomic radius? How do you know?
   a. K or Cs c. C or F e. Te or S
   b. Re or Au d. Xe or He f. Ga or Mn
8. List the electronegativity differences for ionic, polar covalent and non-polar covalent bonds.
9. Determine the electronegativity difference and type of intramolecular force for each bond (ionic, polar covalent or non-polar covalent).
   a. C-H c. K-Cl e. O-F g. I-Cl i. C-C
   b. Br-Br d. Fe-O f. N-H h. C-S j. O-H
10. For all of the polar and ionic bonds in Question 10, identify the dipoles.

Properties of Compounds

11. Explain why ionic compounds have such high melting and boiling points when compared with covalent compounds.

12. Why do ionic compounds conduct electricity when dissolved in water, but not when in the solid state?
13. Why do ionic compounds tend to be brittle?
14. Identify which type of compound is described for each:
    a. Compound 1 has a melting point of 450°C and dissolves in water.
    b. Compound 2 is a flexible material that can be used to make electrical wires.
    c. Compound 3 is a gelatinous material that is formed when two other materials are combined in a crucible, and cannot be dissolved in water.

<u>VSEPR</u>

15. For each compound, determine the VSEPR shape:
    a. CO_2
    b. CH_4
    c. PCl_5
    d. H_2O
    e. SF_6
    f. SO_2
    g. PCl_3
    h. CO_3^{2-}
    i. HCN
16. For each compound in Question 16, determine if the molecule is polar, based on the bond polarity and VSEPR shape.

<u>Intermolecular Forces</u>

17. For dipole-dipole, London Forces and hydrogen bonding:
    a. Draw a diagram to illustrate each of the intermolecular forces.
    b. List the forces in order from strongest to weakest.
18. For each of the following compounds, determine the intermolecular forces present:
    a. CH_3Cl
    b. H_2
    c. HCl
    d. Ne
    e. NH_3
    f. HF
    g. CH_3OH
    h. C_2H_4
    i. CO_2
    j. CO
19. For HBr, HCl and HI:
    a. Identify the type of intramolecular force for each compound.
    b. Identify the strongest intermolecular force for each compound.
    c. Which compound would have the highest boiling point? Why?
20. For Cl_2, NaCl and HCl:
    a. Identify the type of intramolecular force for each compound.
    b. Identify the strongest intermolecular force for each compound.
    c. Which compound would have the lowest boiling point? Why?
    d. Which compound would dissolve best in water? Why?
21. For CH_4, C_2H_6 and C_3H_8:
    a. Identify the type of intramolecular force for each compound.
    b. Identify the strongest intermolecular force for each compound.
    c. Which compound would have the strongest intermolecular forces? Why?
    d. Which compound would have the lowest boiling point? Why?
    e. Which compound would be the most viscous (flow the slowest)? Why?
22. Explain why ICl boils at 97°C and Br_2 boils at 59°C.
23. Explain why, at room temperature, chlorine is a gas, bromine is a liquid and iodine is a solid.