Honors Chemistry

Chapter 8 & 9 Study Questions

1. Indicate the number of valence electrons in the following:
   a) oxygen b) Group 1
   c) an element with an electron configuration of $1s^2 2s^2 2p^6 3s^2 3p^1$

2. List the following elements in order of increasing electronegativity: O, Ge, C

3. Choose the atom or ion in each set with the smallest atomic radius.
   a) Li, Li^+, H^- b) Na^+, Cl^-, K^+ c) F, O^{2-}, F^-

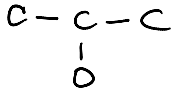
4. List at least 2 ions with each of the following electron configurations:
   a) $1s^2 2s^2 2p^6$ b) $1s^2 2s^2 2p^6 3s^2 3p^6$ c) $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6 5s^2 4d^{10} 5p^6$

5. What is the term for two ions with the same electron configuration?

6. Draw Lewis structures for the following compounds: (Follow the Octet Rule.)
   a) H_2S b) Br_2 c) NH_2F d) CH_2I_2 e) CO_3^{2-} f) SO_3^{2-}
   g) diphosphorus dichloride h) dinitrogen tetroxide i) $C_3H_4Cl_2$ j) C_3H_4

7. Indicate the molecular <u>geometry</u> of compounds (a)-(d) in question *6*. For each of these compounds, indicate whether they are <u>polar or nonpolar</u>.

8. Add hydrogen atoms and electrons in order to complete Lewis structures of the following compound: C_3H_6O (acetone; nail polish remover)



9.Explain the basis of a covalent bond. What makes a bond polar?What makes a molecule polar?

10. Which is a better predictor of chemical properties: Period number or Group number?

11. For each set below, indicate which bond would be the most polar:
   a) C – F, N – F, or O – F b) Si – F or C – F

12. Indicate the molecular geometry of the following compounds (which disobey the octet rule):
   a) SF_4 b) XeF_4 c) PF_5 d) SeF_6

13. Indicate the hybridization of the following atoms:
   a) C in CH_2I_2 b) C in CO_2 c) Xe in XeF_4
   d) S in SF_4 e) C in CO_3^{2-} f) P in diphosphorus dichloride

14. Indicate the number of sigma bonds and the number of pi bonds in the following molecules:
   a) CH_2I_2 b) CO_3^{2-} c) CO_2 d) CH_3COCH_3

Summary of Chapter 8: Bonding Concepts

valence electrons
ionic bonding
covalent bonding
electronegativity
dipoles
electron configuration of ions
sizes of ions
lone pairs of electrons, bonding pairs
Lewis structures
Octet rule
exceptions to Octet rule
resonance
formal charge
molecular geometry: linear, tetrahedral, trigonal pyramid, bent, trigonal planar, trigonal bipyramid, octahedral
polarity

Summary of Chapter 9: Covalent Bonding: Orbitals

orbital hybridization
sp^3 hybridization
sp^2 hybridization
sp hybridization
dsp^3 hybridization
sp^3d^2 hybridization
sigma (σ) bonds
pi (π) bonds