Name _____ Honors Chemistry ___/___/___

Covalent Compounds Practice Test

Part I: For each of the following, fill in the missing information. **All molecules should be drawn so that the central atom has a formal charge of zero.** If a resonance structure can be drawn, write "resonance" in the Lewis Structure box.

Name	Lewis Structure	Shape	Bond Polarity	Molecular Polarity
silicon dioxide				
Formula		Hybridization of Central Atom	# sigma bonds	# pi bonds

Name	Lewis Structure	Shape	Bond Polarity	Molecular Polarity
ammonia				
Formula		Hybridization of Central Atom	# sigma bonds	# pi bonds

Name	Lewis Structure	Shape	Bond Polarity	Molecular Polarity
methane				
Formula		Hybridization of Central Atom	# sigma bonds	# pi bonds

Name	Lewis Structure	Shape	Bond Polarity	Molecular Polarity
sulfur trioxide				
Formula		Hybridization of Central Atom	# sigma bonds	# pi bonds

Name	Lewis Structure	Shape	Bond Polarity	Molecular Polarity
nitrate ion				
Formula		Hybridization of Central Atom	# sigma bonds	# pi bonds

Name	Lewis Structure	Shape	Bond Polarity	Molecular Polarity
phosphorus pentachloride				
Formula		Hybridization of Central Atom	# sigma bonds	# pi bonds

Name	Lewis Structure	Shape	Bond Polarity	Molecular Polarity
chlorine trifluoride				
Formula		Hybridization of Central Atom	# sigma bonds	# pi bonds
Name	Lewis Structure	Shape	Bond Polarity	Molecular Polarity
dihydrogen monoxide				
Formula		Hybridization of Central Atom	# sigma bonds	# pi bonds
Name	Lewis Structure	Shape	Bond Polarity	Molecular Polarity
beryllium dichloride				
Formula		Hybridization of Central Atom	# sigma bonds	# pi bonds
Name	Lewis Structure	Shape	Bond Polarity	Molecular Polarity
bromine pentafluoride				
Formula		Hybridization of Central Atom	# sigma bonds	# pi bonds
Name	Lewis Structure	Shape	Bond Polarity	Molecular Polarity
boron trichloride				
Formula		Hybridization of Central Atom	# sigma bonds	# pi bonds
Name	Lewis Structure	Shape	Bond Polarity	Molecular Polarity
sulfur tetrafluoride				
Formula		Hybridization of Central Atom	# sigma bonds	# pi bonds

Part II - Draw all resonance structures for carbonate ion.

Part III - For each of the following, indicate if it is a property of ionic compounds or covalent compounds.

1. _____ They have high melting and boiling points.

2. _____ They are composed of two non-metals.

3. _____ They can sometimes have resonance structures.

4. _____ Their atoms are arranged into distinct molecules.

5. _____ They are generally solid at room temperature.

6. _____ They conduct electricity when dissolved in water.

Part IV - Multiple Choice: For each of the following, pick the best answer. Circle and write it on the line.

1. _____ Which of the following bonds is the weakest?
   a. single covalent bond b. double covalent bond c. triple covalent bond
   d. hydrogen bond e. London dispersion force

2. _____ Which of the following types of attractions is the strongest?
   a. dispersion forces b. dipole interactions c. covalent bonds
   d. hydrogen bonds e. all are equal in strength

3. _____ Which of the following molecules has polar bonds but is a non-polar molecule?
   a. silicon tetrahydride b. ammonia c. silicon dioxide
   d. dihydrogen monoxide e. diatomic nitrogen

4. _____ Which of the following is the most non-polar covalent bond?
   a. C - N b. N - H c. C - O d. N – O e. F - F

5. _____ Which of the following is an ionic bond?
   a. H-O b. P-F c. C-O d. O-K e. Cu-Cu

6. _____ Which of the following intermolecular forces explains why fluorine is a gas, but iodine is a solid?
   a. dispersion forces b. dipole interactions c. hydrogen bonds
   d. covalent bonds e. ionic bonding

7. _____ Which of the following molecules would have the most hydrogen bonding?
   a. H_2O b. H_2 c. CH_4 d. HCN e. HCl

8. _____ Which of the following molecules has the strongest dispersion forces?
   a. H_2 b. I_2 c. Br_2 d. F_2 e. Cl_2

9. _____ Which of the following compounds does not have a resonance structure?
   a. SCl_2 b. NO_3^{1-} c. SO_2 d. CO_3^{2-} e. NO_2^{1-}

10. _____ Which of the following elements never follows the octet rule?
    a. C b. N c. H d. I e. F

11. _____ Which of the following bonds is the longest?
    a. single bond b. double bond c. triple bond d. all bonds are the same length

12. _____ Which of the following molecules has the strongest bonds between atoms?
    a. H_2 b. F_2 c. O_2 d. N_2 e. I_2

Part V – Free Response **NO_2** **NO_2^-** **NO_2^+**

(a) Draw the Lewis electron-dot structure for each of the three species.
(b) List the species in order of increasing bond angle.
(c) List the species in order of increasing bond length.
(d) Give the hybridization of the nitrogen atom in each molecule.
(e) Identify the only one of the species that dimerizes and explain what causes it to do so.

H 2.20																He
Li 0.98	Be 1.57											B 2.04	C 2.55	N 3.04	O 3.44	F 3.98	Ne
Na 0.93	Mg 1.31											Al 1.61	Si 1.90	P 2.19	S 2.58	Cl 3.16	Ar
K 0.82	Ca 1.00	Sc 1.36	Ti 1.54	V 1.63	Cr 1.66	Mn 1.55	Fe 1.83	Co 1.88	Ni 1.91	Cu 1.90	Zn 1.65	Ga 1.81	Ge 2.01	As 2.18	Se 2.55	Br 2.96	Kr 3.00
Rb 0.82	Sr 0.95	Y 1.22	Zr 1.33	Nb 1.6	Mo 2.16	Tc 1.9	Ru 2.2	Rh 2.28	Pd 2.20	Ag 1.93	Cd 1.69	In 1.78	Sn 1.96	Sb 2.05	Te 2.1	I 2.66	Xe 2.60