Name Key Date _____

Review Sheet - Bonding

Quantitative Chemistry

1. Complete the table below. What are the differences between ionic and covalent bonds? How do substances containing these bonds differ from one another?

	Ionic	Covalent
Differences in Bonds		
Differences in Properties of Substances Containing These Bonds		

2. Definitions:
   a. Bond - _____
   b. Valence Electrons - _____
   c. Electronegativity - _____
   d. Resonance - _____
   e. Polar Covalent Bond - _____
   f. Nonpolar Covalent Bond - _____

Na 0.9	O 3.5	Cl 3.0	H 2.1	P 2.1	F 4.0
Si 1.8	Br 2.8	Mg 1.2	N 3.0	B 2.0	S 2.5

3. Using the electronegativity values in the table above, indicate whether each of the following bonds would be ionic, polar-covalent or nonpolar-covalent.

   a. N⇢O $|3.0-3.5| = 0.5$ PC
   b. Na—Br $|0.9-2.8| = 1.8$ I
   c. B⇢Cl $|2.0-3.0| = 1.0$ PC
   d. Mg—Cl $|1.2-3.0| = 1.8$ I
   e. P—H $|2.1-2.1| = 0.0$ NPC
   f. S—P $|2.5-2.1| = 0.4$ NPC

4. Use an arrow to illustrate the dipole moment for each of the following polar covalent bonds.

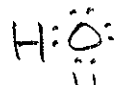
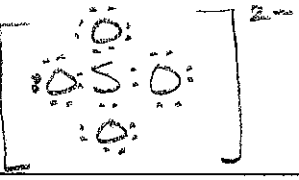
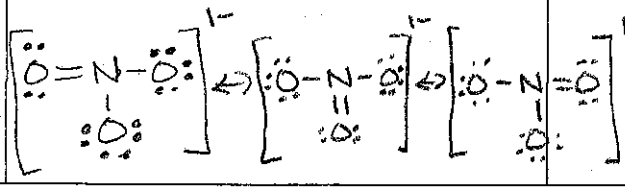
   a. O⇠Br $|3.5-2.8| = 0.7$
   b. H⇢N $|2.1-3.0| = 0.9$
   c. Si⇢Cl $|1.8-3.0| = 1.2$
   d. S⇢F $|2.5-4.0| = 1.5$

5. Draw packed sphere structures for the following compounds. (Include at least 4 cations.)
   a. NaCl b. $MgCl_2$ (Same as CaF_2)

See Packet Pg 2

6. Compare and contrast the bond length and bond energy for single, double, and triple bonds.
   As bond energy increases the bond length decreases

7. Calculate the **total** number of valence electrons, drawing the appropriate Lewis Structure for each molecule, and identify the bond polarity (if applicable). Predict the molecular geometry for each.

Formula	# of Valence Electrons	Lewis Structure	Molecular Geometry (VSEPR)
PI_3	1(5) = 5 3(7) = 21 26		Trigonal Pyramidal
C_2H_2	2(4) = 8 2(1) = 2 10		Linear [tetratomic]
H_2O	2(1) = 2 1(6) = 6 8		Angular or Bent
SO_4^{2-}	1(6) = 6 4(6) = 24 + 2 32		Tetrahedral
NO_3^-	1(5) = 5 3(6) = 18 + 1 24		Trigonal Planar

8. List any other molecular geometries not in the table above. How do they appear?
   linear diatomic, linear triatomic; Straight line (both)

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9. What is important about the structure of water as it relates to its intermolecular forces?

10. Compare and contrast London Dispersion Forces, Dipole-Dipole, and Hydrogen Bonding.

Identify the <u>strongest</u> force that would exist between molecules of the following:
1) H_2O 2) HF 3) Cl_2 4) SO_2