Review Sheet: Unit 5 **Name**_____*KEY*_____

I. For each of the following statements, write "I" for ionic, "C" for covalent and "M" for metallic.

__*C*__ electrons are shared
__*M*__ electrons delocalized
__*I*__ electrons are transferred
__*I*__ crystal lattice
__*M*__ luster
__*C*__ nonconductors in the solid, molten, and dissolved state
__*M*__ malleable and ductile
__*I*__ high melting and boiling points
__*C*__ volatile liquids and gases
__*C*__ weaker forces between atoms
__*I*__ hard—difficult to crush

II. Fill in the blanks.

When an atom loses an electron, it becomes a(n) _____*cation*_____ with a _____*positive*_____ charge. When an atom gains an electron, it becomes a(n) _____*anion*_____ with a _____*negative*_____ charge.

In a polar covalent bond, the electrons are shared _____*unequally*_____. In a nonpolar covalent bond, the electrons are shared _____*equally*_____.

A molecule consisting of only two atoms has a _____*linear*_____ shape. A molecule with _____*two*_____ atoms bonded to the central atom with _____*zero*_____ unshared pair(s) of electrons has a linear shape. A molecule with _____*three*_____ atoms bonded to the central atom with _____*zero*_____ unshared pair(s) of electrons has a trigonal planar shape. A molecule with _____*four*_____ atoms bonded to the central atom with _____*zero*_____ unshared pair(s) of electrons has a tetrahedral shape. A molecule with _____*two*_____ atoms bonded to the central atom with _____*two*_____ unshared pair(s) of electrons has a bent shape. A molecule with _____*three*_____ atoms bonded to the central atom with _____*one*_____ unshared pair(s) of electrons has a trigonal pyramidal shape.

While bonding is the force of attraction WITHIN molecules, _____*intermolecular forces*_____ are the forces of attraction BETWEEN molecules.

The force present in all molecules that results from the movement of electrons is called _____*London-dispersion forces*_____. The force of attraction between the positive end of one molecule and the negative end of another molecule is _____*dipole-dipole*_____. The special type of this force involving hydrogen is called _____*hydrogen bonding*_____. This occurs when hydrogen is bonded to _____*fluorine*_____, _____*oxygen*_____, or _____*nitrogen*_____.

III. What type of bond will form between the following pairs of atoms?

Na and F
4.0 – 0.9 = 3.1
ionic

N and O
3.5 – 3.0 = 0.5
polar covalent

I and I
2.5 – 2.5 = 0.0
nonpolar covalent

Fe and Cl
3.0 – 1.8 = 1.2
polar covalent

Br and I
2.8 – 2.5 = 0.3
nonpolar covalent

Ca and O
3.5 – 1.0 = 2.5
ionic

IV. Draw Electron Dot Diagrams for the following elements.

magnesium

iodine

boron

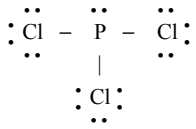
sulfur

carbon

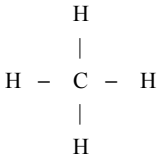
krypton

V. Draw Lewis Structures for the following molecules and polyatomic ions.

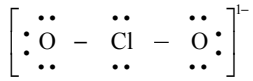
PCl_3



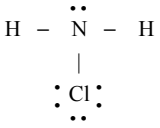
CH_4



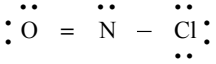
ClO_2^{1-}



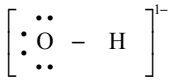
NH_2Cl



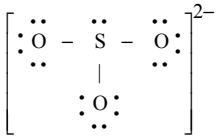
$ONCl$



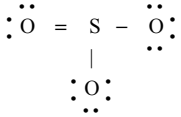
OH^{1-}



SO_3^{2-}

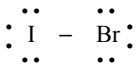


SO_3

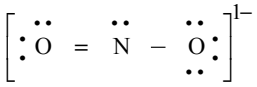


C_2H_2

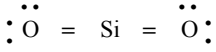
IBr



NO_2^{1-}



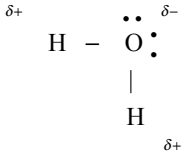
SiO_2



VI. Predict the shape each of the following molecules will form. (Hint: see previous page for Lewis Structures.)

PCl_3	*trigonal pyramidal*	CH_4	*tetrahedral*
NH_2Cl	*trigonal pyramidal*	SiO_2	*linear*
SO_3	*trigonal planar*	C_2H_2	*linear*
IBr	*linear*		

VII. Draw the Lewis Structure for H_2O. Predict the bond type. Label any partially positive or negative ends. Determine whether a molecule of water is polar or nonpolar and explain your answer.

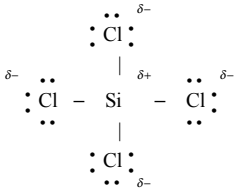


3.5 – 2.1 = 1.4
polar covalent bonds

The water molecule will have a bent shape because it has 2 atoms bonded to the central atom with 2 unshared pairs of electrons.

This will put the partially positive hydrogens on one end and the partially negative oxygen on the other, so the molecule is POLAR.

Draw the Lewis Structure for $SiCl_4$. Predict the bond type. Label any partially positive or negative ends. Determine whether a molecule of $SiCl_4$ is polar or nonpolar and explain your answer.



3.0 – 1.8 = 1.2
polar covalent bonds

The molecule will have a tetrahedral shape because it has 4 atoms bonded to the central atom with no unshared pairs of electrons. This will not allow for a positive and negative end, so the molecule is NONPOLAR.

VIII. Circle the intermolecular forces in the following diagram.