Name ___________________ Per. _________

Polarity and Stoichiometry Review

When examining trends in the periodic table, as we move towards the top-right the elements have a greater ________________ (atomic radius/ electronegativity), which is a measure of how much they want to _____________ (hold onto/ let go of) their electrons. For any two elements that share a chemical bond, we can calculate the difference in electronegativity by _____________ (multiplying/ subtracting/ adding) their electronegativity values that we can get from a table. In our textbook there is a table on page 177. As the difference in electronegativity becomes __________ (larger/ smaller) bonds will go from being nonpolar covalent to polar covalent to ionic.

If a bond is polar that means that the atoms share their electrons __________ (unevenly / evenly), which causes the more electronegative element to have a __________ (full/ slightly) negative charge and the other to have a slightly __________ (positive/ negative) charge. As the difference in electronegativity becomes greater substances will also have __________ (higher/ lower) melting points. This is evident in how the nonpolar covalent compound methane is a __________ (gas/ liquid/ solid) at room temperature, the polar covalent compound water is a __________ (gas/ liquid/ solid) at room temperature, and the ionic compound sodium chloride is a __________ (gas/ liquid/ solid) at room temperature.

For chemical reactions the reactants are found on the __________ (left/ right) side of the chemical equation and the products are found on the __________ (left/ right) side of the chemical equation. Two quantities that are always conserved, meaning stays the same, during a chemical reaction are [circle 2] (number and type of atoms/ number of molecules/ mass/ volume/ temperature). There are 4 basic types of chemical reactions which are [list them]:
1. ____________________ 2. ____________________ 3. ____________________ 4. ____________________

One specific type of double substitution reaction is combustion where some type of hydrocarbon fuel reacts with oxygen gas and burns. When there is sufficient oxygen present, _______________ (complete/ incomplete) combustion occurs and the products are carbon dioxide and water vapor. When there is **not** sufficient oxygen present, _______________ (complete/ incomplete) combustion occurs and the products are carbon monoxide and water vapor. Carbon monoxide is an odorless, poisonous gas. Exposure to it leads to approximately 500 unintentional deaths and 15,000 of emergency room visits each year in the United States. This is why you should never start a car inside a garage while the garage door is closed and never operate a barbeque inside of a house.

Sometimes we want to use the amount of one reactant or product in a chemical reaction to predict the maximum possible amount of another reactant or product. This is called _______________________ (density/ writing a chemical formula/ stoichiometry).

Sometimes not all of both reactants are completely used up in a chemical reaction. The reactant that will be completely used up is called the ______________ (limiting/ excess) reactant. The reactant that we have in extra amounts of is called the ______________ (limiting/ excess) reactant. When you divide the amount in moles of each reactant by their coefficient from the balanced chemical equation, the lesser one is the limiting reactant.

Element	Li	Na	K	C	N	O	F	S	Cl
E.N.	1.0	1.0	0.9	2.5	3.0	3.5	4.0	2.5	3.0

Δ E.N. = | E.N.$_1$ – E.N.$_2$ |

Δ E.N. Range	**Type of Bond***
0 to 0.5	Nonpolar Covalent
0.5 to 1.9	Polar Covalent
1.9 or greater	Ionic

1. Calculate Δ E.N. for each of the following bonds and state the type of bond.
   a. C-Cl
   b. F-Cl
   c. Li-F
   d. C-N
   e. C-O
   f. O-O

$2\ B + 3\ Cl_2 \rightarrow 2\ BCl_3$

2) What is the mole ratio between boron (B) and chlorine gas (Cl_2)?

3) What is the mole ratio between boron (B) and boron trichloride (BCl_3)?

4) How many moles of chlorine gas (Cl_2) are needed to completely react with 8 moles of boron (B)?

5) How many grams of boron trichloride (BCl_3) are produced when 5.00 grams of boron (B) reacts completely with chlorine gas (Cl_2)?

$1\ FeCl_3 + 3\ NaOH \rightarrow 1\ Fe(OH)_3 + 3\ NaCl$

6) If you have 5 moles of iron (III) chloride ($FeCl_3$) and 12 moles of sodium hydroxide (NaOH), which is the limiting reactant? Which is the excess reactant?

7) How many moles of sodium chloride (NaCl) will be produced if the above amounts of the reactants react?