Name: _____   Block: _____   Date: _____

Chemistry 12
Review of Chem 11

Part A: Chemical Bonding

1. Define what is meant by the term valence electrons and state where they are located in the atom.

2. Complete the table below by filling in the information for each chemical family.

Chemical Family	General Electron Configuration	Number of Valence Electrons	Common Charge of Mono-atomic Ions	Number of Electrons Gained or Lost
Alkali Metals				
Alkaline-Earth Metals				
Nitrogen Family				
Oxygen Family				
Halogens				
Noble Gases				

3. Complete the table below.

Bond Type	What happens to bonding electrons?	Elements involved in bond formation	Electronegativity difference
Ionic Bond			
Covalent Bond			
Polar Covalent Bond			

PART B: NOMENCLATURE

4. State the name of the ionic compound from the formula provided

    a. K_2S _____

    b. $FeCl_3$ _____

    c. Na_2CrO_4 _____

    d. $Cu(NO_3)_2$ _____

5. Write the chemical formula of the ionic compound given the name.

    a. sodium bicarbonate _____

    b. chromium (III) oxalate _____

    c. potassium acetate _____

    d. nickel (II) sulphite _____

6. State the name of the covalent compound from the formula provided.

    a. SO_3 _____

    b. P_2O_5 _____

    c. N_2O_4 _____

    d. SF_6 _____

7. Write the chemical formula of the covalent compound given the name.

    a. carbon monoxide _____

    b. triarsenic pentasulphide _____

    c. dicarbon hexafluoride _____

    d. iodine heptabromide _____

8. State the name of the acid from the formula provided.

    a. HCl _____

    b. H_2CO_3 _____

    c. H_2SO_3 _____

    d. H_2S _____

    e. HNO_3 _____

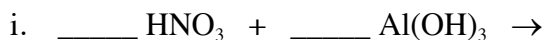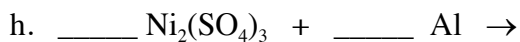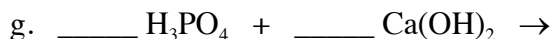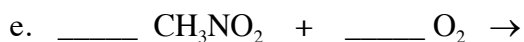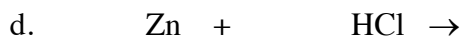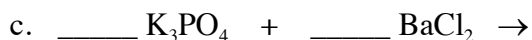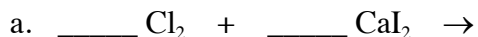9. Write the chemical formula for the acid given the name.

    a. hydrobromic acid _____

    b. oxalic acid _____

    c. nitrous acid _____

    d. hydroselenic acid _____

    e. chromic acid _____

PART C: CHEMICAL REACTIONS
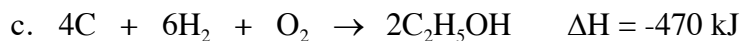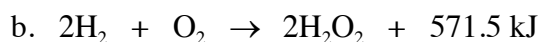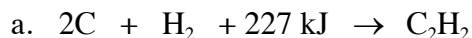
10. Complete and balance the equations for the following reactions then classify the reaction type.

                                                                    Classification

a. _____ Cl_2 + _____ CaI_2 →   _____

b. _____ C_2H_5OH + _____ O_2 →   _____

c. _____ K_3PO_4 + _____ $BaCl_2$ →   _____

d. _____ Zn + _____ HCl →   _____

e. _____ CH_3NO_2 + _____ O_2 →   _____

f. _____ $Pb(NO_3)_2$ + _____ $AlBr_3$ →   _____

g. _____ H_3PO_4 + _____ $Ca(OH)_2$ →   _____

h. _____ $Ni_2(SO_4)_3$ + _____ Al →   _____

i. _____ HNO_3 + _____ $Al(OH)_3$ →   _____
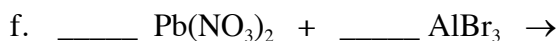
11. State whether each chemical reaction below is exothermic or endothermic and determine the value of **ΔH for one mole** of each product.

                                                                    Classification

a. $2C$ + H_2 + $227\ kJ$ → C_2H_2 _____

b. $2H_2$ + O_2 → $2H_2O_2$ + $571.5\ kJ$ _____

c. $4C$ + $6H_2$ + O_2 → $2C_2H_5OH$ $\Delta H = -470\ kJ$ _____

d. I_2 + Br_2 → $2IBr$ $\Delta H = +81.5\ kJ$ _____

PART D: MOLAR MASS

12. Find the molar mass of:
     a. $Na_2Cr_2O_7$ b. H_3PO_4
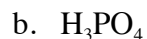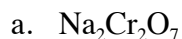
PART E: BASIC MOLE CONVERSIONS

Complete the following calculations. SHOW YOUR WORK! Pay attention to the correct number of SIGNIFICANT FIGURES.

Remember . . .   1 mole = 6.02 x 10^{23} particles
                          1 mole = mass of element or compound in grams
                          1 mole = 22.7 L of a gas at STP

13. How many atoms of oxygen are in 0.58 moles of CH_3CH_2COOH?

14. What is the mass of 1.93 mol of $Al(NO_3)_3$?

15. How many molecules of N_2O_4 are there in 43.6 g of N_2O_4?

16. Carbon dioxide gas was collected as a product of a chemical reaction. If 150.0 mL of $CO_{2(g)}$ were collected at STP, how many $CO_{2(g)}$ molecules were made in the chemical reaction?

PART F: MOLARITY CALCULATIONS & IONS IN SOLUTION

Complete the following calculations. SHOW YOUR WORK! Pay attention to the correct number of SIGNIFICANT FIGURES.

17. What is the molarity of a solution which contains 0.250 mol of $FeCl_3$ in a volume of 150.0 mL?

18. What volume of 0.60 M $Na_2CO_{3(aq)}$ contains 12.5 g of Na_2CO_3?

19. How many grams of $AgNO_3$ would be required to prepare 500.0 mL of a 0.100 M solution?
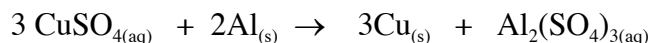
PART G: STOICHIOMETRY CALCULATIONS

The following questions will require you to use the balanced chemical equations provided in order to compare grams, moles, volume or number of molecules. SHOW YOUR WORK! Pay attention to the correct number of SIGNIFICANT FIGURES.

20. Ethane combines with oxygen gas in the following reaction:

$$2 \ C_2H_{6(g)} \ + \ 7O_2 \ \rightarrow \ 6 \ H_2O \ + \ 4 \ CO_{2(g)}$$
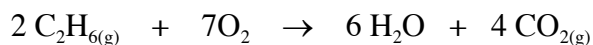
   a. Classify the type of reaction represented by the equation above. _____

   b. How many molecules of H_2O would be produced from 0.237 mol of C_2H_6 gas?

   c. If 15.4 L of $CO_{2(g)}$ is produced in the above reaction, how many grams of C_2H_6 were reacted at STP?

21. Aqueous copper (II) sulphate and solid aluminum metal combine to form solid copper metal and aqueous aluminum sulphate according to the balanced equation below:

$$3 \ CuSO_{4(aq)} \ + \ 2Al_{(s)} \ \rightarrow \ 3Cu_{(s)} \ + \ Al_2(SO_4)_{3(aq)}$$

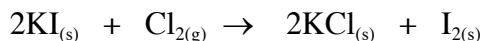   a. Classify the type of reaction represented by the equation above. _____

   b. When 85.0 mL of 0.200 M $CuSO_4$ is reacted with sufficient aluminum, how many grams of copper metal will be produced by this reaction?

PART H: LIMITING & EXCESS QUANTITIES

The following questions will require you to use the balanced chemical equations provided in order to determine which of the reactants is LIMITING and which of the reactants is in EXCESS. The amount of product will also be calculated using the limiting reactant. SHOW YOUR WORK and use correct SIGNIFICANT FIGURES.

22. In the chemical reaction below 4.56 g of KI is combined with 1.50 g of Cl_2 gas to form KCl and I_2.

$$2KI_{(s)} + Cl_{2(g)} \rightarrow 2KCl_{(s)} + I_{2(s)}$$

    a. Classify the type of reaction represented by the equation above. _____

    b. Which reactant is the EXCESS QUANTITY and which is the LIMITING REACTANT?

    c. Calculate the mass of the EXCESS reagent which will remain after the reaction is complete.

    d. Calculate the THEORETICAL yield (mass) of KCl which should be formed in this reaction, using the LIMITING REACTANT.

    e. After the reaction was completed, only 1.85 g of KCl was produced. Calculate the PERCENT YIELD for the reaction.

23. By reacting calcium oxide with ammonium chloride according to the reaction below, you can produce water, calcium chloride and ammonia.

$$CaO_{(s)} + 2\ NH_4Cl_{(aq)} \rightarrow H_2O_{(l)} + CaCl_{2(aq)} + 2NH_{3(g)}$$

a. If 15.0 g of CaO and 35.0 g of NH_4Cl are mixed, what is the maximum possible volume of $NH_{3(g)}$ that can be produced at STP?

b. Which reactant was the LIMITING REACTANT and which reactant was the EXCESS REACTANT in the reaction?

c. If 9.2 L of $NH_{3(g)}$ are actually produced in the reaction, what is the PERCENT YIELD of $NH_{3(g)}$?