Chemistry 30S – Chemical Reactions Unit Review

Topics we have covered:

Isotope and abundance
Naming covalent and ionic bonds
Molar masses / formula masses
Balancing Chemical equations
Writing from word formula to symbolic formula and vice versa
Polyatomic ions and how they are used
Types of reactions
Mole Conversions
Stoichiometry to predict the number of products and vice versa
Limiting reagents and predictions
Empirical formulas

1) Name the following:
   a) N_2O_5
   b) $CuBr_2$
   c) $PbSO_4$
   d) Na_2CO_3
   e) CCl_4
   f) K_3PO_4

2) Balance the following equations:
   a) $Al + O_2 \rightarrow Al_2O_3$
   b) Potassium chlorate when heated produces potassium chloride plus oxygen gas

3) Identify the types of reactions in the following:
   a) $CO_2 \rightarrow C + O_2$
   b) $NaCl + AgNO_3 \rightarrow NaNO_3 + AgCl$
   c) $Zn + CuSO_4 \rightarrow ZnSO_4 + Cu$
   d) $2O_2 + N_2 \rightarrow N_2O_4$

4) Name all the diatomic molecules.

5) Predict the products of the following:
   a) $AgNO_3 + NaCl \rightarrow$
   b) $Zn + HCl \rightarrow$

6) Find the formula mass for the compounds listed in question 1.

7) How many molecules are found in 0.750 mol of zinc?

8) Calculate the number of moles in 16.9g of carbon tetrachloride

9) Calculate the mass of 3.80 moles of sodium carbonate

10) Determine the number of moles in 33.6L of He gas at STP

11) Given $Zn + 2HCl \rightarrow ZnCl_2 + H_2$ find:

a) How many moles of hydrogen are produced with 3 moles of zinc?
b) How many litres of zinc chloride are made given 4L of hydrochloric acid at STP?
c) How many grams of hydrochloric acid are present with 56g of zinc?
d) How many litres of hydrogen are produced at STP given 30g of hydrochloric acid.
e) How many molecules of zinc are present with 2 mol of zinc chloride?

12) If we had 2.5 mol of CH_4 and 4.8 mol of O_2, according to the following reaction, find:

$$CH_4 + 2O_2 \rightarrow CO_2 + 2H_2O$$

a) Which reactant is limiting?
b) How many moles of CO_2 would be produced?
c) How much of the excess is left over?

13) If we had 2.0 mol HCl reacting with 2 moles of MgO, find the following using the reaction:

$$2HCl + MgO \rightarrow MgCl_2 + H_2O$$

a) Which is the limiting reagent?
b) How much of the excess is left over?
c) How many grams of $MgCl_2$ would be made?

14) Boron has two naturally occurring isotopes with masses of 10.0129 amu which occupies 19.91 percent and another isotope of 11.0093 amu and occupying 80.09 percent. Calculate the average atomic mass of Boron

15) Determine the empirical formula of methane given that 6.0 g of methane can be decomposed into 4.5 g of carbon and 1.5 g of hydrogen.

16) The composition of a compound is 40% sulfur and 60% oxygen by weight. What is its empirical formula?