Name _____   Date _____   Grade _____

CHEM-01A
Work Session 4: Stoichiometry

1. For the following balanced equation: $3\ Cu(s)\ +\ 8\ HNO_3(aq) \rightarrow 3\ Cu(NO_3)_2(aq)\ +\ 2\ NO(g)\ +\ 4\ H_2O(l)$

    a) How many moles of HNO_3 will react with 10 moles of Cu?

    b) How many moles of NO will form if 0.50 moles of Cu reacts?

    c) If 0.80 moles of H_2O forms, how much NO must also form?

    d) How many moles of Cu are in 10.0 grams of Cu?

    e) If 10.0 g of Cu reacts, how many moles of NO will form?

    f) If 10.0 g of Cu reacts, how many grams of HNO_3 are required?

    g) If 10.0 g of Cu and 20.0 g of HNO_3 are put together in a reaction vessel, which one will be in excess?

h) How many grams of the excess substance will be left over?

i) How many grams of NO will form in the reaction described in part g?

2. For the reaction: $C_8H_{18}(l) + 12.5\ O_2(g) \rightarrow 8\ CO_2(g) + 9\ H_2O(l)$

a) How many grams of O_2 are required to react with 1000 g of octane? (Octane is the name of the carbon compound)

b) A gallon of gasoline weighs roughly 3000 grams. How many grams of CO_2 are produced per gallon of gasoline burned? Assume that gasoline is C_8H_{18}, just for simplicity's sake.

3.   A solution is prepared by dissolving 20.5 g of $CaCl_2$ in enough water to make 500. ml of solution. What is the molarity of the solution?

4.   a) How many moles of $Cu(NO_3)_2$ are in 25 ml of a 0.35 M solution of $Cu(NO_3)_2$?

        b) How many moles of NO_3^- are present in 25 ml of the above solution?

        c) What volume of this solution should be used to get 0.050 moles of $Cu(NO_3)_2$?

5.   A storeroom solution of HCl is 6.0 M. How much of this solution should be used to make 10. L of 0.50 M HCl?

6. A sodium hydroxide solution is 19 M. What will be the strength of the solution formed if 25 ml of this NaOH solution is diluted to 5.0 liters?

7. For the following reaction: $CaCO_3(s) + 2 HCl(aq) \rightarrow CaCl_2(aq) + CO_2(g) + H_2O(l)$
    a) 25.0 g of $CaCO_3$ and 65.0 ml of 2.00 M HCl are placed in a reaction vessel. How many moles of each are present?

    b) Which substance is the limiting reagent?

    c) How much of the excess reagent will be left unreacted? (give both moles and grams)

    d) How many moles of CO_2 will form?