AP CHEMISTRY

TOPIC 2: STOICHIOMETRY, PART B

Day 14:

Stoichiometry

- Limiting Reactants

Homework problems:

1) Consider the reaction: $Ca_{(s)} + Cl_{2\ (g)} \rightarrow CaCl_{2\ (s)}$

Identify the limiting reagent in each of the reaction mixtures below:

a) 200 atoms of Ca and 300 molecules of Cl_2

b) 0.16 mol Ca and 0.25 mol of Cl_2

c) 50.0 grams of Ca and 50.0 grams of Cl_2

d) 0.75 mol Ca and 60.0 grams of Cl_2

2) Mercury and bromine gas, Br_2, will react with each other to produce mercury(I) bromide:

a) What is the mass of mercury(I) bromide can be produced from the reaction of 15.0 grams of Hg and 10.0 grams of Br_2?

b) What mass of which reactant is left un-reacted from above (part a)?

c) What is the mass of HgBr can be produced from the reaction of 5.00 mL of mercury (density 13.6 g/mL) and 5.00 mL of bromine (in the liquid state, Br_2) (density of 3.10 g / mL)?

3) 75.0 grams of sucrose, $C_{12}H_{22}O_{11}$, reacts with 10.0 grams of oxygen gas in a combustion reaction. What is the mass of the water vapor produced when the reaction is complete?

4) Hydrogen cyanide gas, HCN, is produced industrially from the reaction of gaseous ammonia, oxygen, and methane:

$$NH_{3\,(g)} + O_{2\,(g)} + CH_{4\,(g)} \rightarrow HCN_{\,(g)} + HOH_{\,(g)} \quad \text{(not balanced)}$$

If 4.50×10^4 kg of each reagent is reacted, what mass of HCN will be produced?