NAME: _____ Period:_____

Ch 12 Test
Stoichiometry
Carmel High/Dooner

Show all work on separate sheets and box your answers. Place final answer on the line provided with correct sig figs.

1. _____ Rust(Fe_2O_3) is produced when iron (Fe) reacts with oxygen(O_2)

   $4Fe(s) + 3O_2(g) \rightarrow 2Fe_2O_3(s)$

   How many grams of Fe_2O3 are produced when 12.0 g of iron rusts?

2. _____ Hydrogen gas can be made by reacting methane(CH_4) with high temperature steam:

   $CH_4(g) + H_2O(g) \rightarrow CO(g) + 3H_2(g)$

   How many hydrogen molecules are produced when 158 g of methane reacts with steam?

3. _____ Ammonia(NH_3) reacts with oxygen(O_2) to produce nitrogen monoxide (NO) and water:

   $4NH_3(g) + 5O_2(g) \rightarrow 4NO(g) + 6H_2O(l)$

   How many liters of NO are produced when 1.40L of oxygen reacts with ammonia?

4. _____ Phosphoric acid reacts with sodium hydroxide according to the equation:

   $H_3PO_4(aq) + 3NaOH(aq) \rightarrow Na_3PO_4(aq) + 3H_2O(l)$

   If 1.75 mol H_3PO_4 is made to react with 5.00 mol NaOH, identify the limiting reagent.

5. _____ If 75.0 g of siderite ore($FeCO_3$) is heated with an excess of oxygen, 45.0 g of ferric oxide(Fe_2O_3) is produced:

   $4FeCO_3(s) + O_2(g) \rightarrow 2 Fe_2O_3(s) + 4CO_2(g)$

   What is the percent yield of this reaction?

6. _____ Nitrogen monoxide and oxygen gas combine to form the brown gas nitrogen dioxide, which contributes to photochemical smog. How many liters of nitrogen dioxide are produced when 34L of oxygen reacts with an excess of nitrogen monoxide. Assume conditions of STP:

$$2NO(g) + O_2(g) \rightarrow 2NO_2(g)$$

7. _____ How many molecules of oxygen are produced when 29.2 g of water is decomposed by electrolysis according to this balanced equation:

$$2H_2O(l) \rightarrow 2H_2(g) + O_2(g)$$

8. _____ What is the percent yield if 13.1 g CaO is actually produced when 24.8 g $CaCO_3$ is heated?

$$CaCO_3(s) \rightarrow CaO(s) + CO_2(g)$$

9. _____ Phosphorus trifluoride is formed from its elements:

$$P_4(s) + 6F_2(g) \rightarrow 4PF_3(g)$$

How many grams of fluorine are needed to react with 6.20 g of phosphorus?

10. _____ Nitric acid is formed by the reaction of nitrogen dioxide with water:

$$3NO_2(g) + H_2O(l) \rightarrow NO(g) + 2HNO_3(aq)$$

How many moles of water are needed to react with 8.4 mol of NO_2 ?

11. _____ Hydrazine(N_2H_4) is used as rocket fuel. It reacts with oxygen to form nitrogen and water:

$$N_2H_4(l) + O_2(g) \rightarrow N_2(g) + 2H_2O(g)$$

How many liters of N_2 (at STP) form when 1.0 kg N_2H_4 reacts with 1.0 kg O_2 ?

12. _____ In the reaction above, what is the excess reagent and how many grams of it remain after the reaction?