Chemistry Name____________________ Date____________ Period____ Row____

Stoichiometry Practice

1. Tin(II) fluoride, stannous fluoride, is used in some home dental treatment products. It is made by reacting tin with hydrogen fluoride according to the equation below.

$$Sn(s) + 2HF(g) \rightarrow SnF_2(s) + H_2(g)$$

If 126 g of tin are used, how many moles of tin(II) fluoride, SnF_2, can be produced?

$126g\ Sn \times \frac{1\ mol\ Sn}{118.7g\ Sn} \times \frac{1\ mol\ SnF_2}{1\ mol\ Sn} = 1.06\ mol\ SnF_2$

2. Magnesium burns in oxygen to produce magnesium oxide.
   a. Write a balanced equation.

   $2Mg_{(s)} + O_{2(g)} \rightarrow 2MgO_{(s)}$

   b. How many moles of oxygen gas are needed to burn 2.5 grams of magnesium?

   $2.5g\ Mg \times \frac{1\ mol\ Mg}{24.3g\ Mg} \times \frac{1\ mol\ O_2}{2\ mol\ Mg} = 0.051\ mol\ O_2$

3. Laughing gas (nitrous oxide, N_2O) is sometimes used as an anesthetic in dental work. It is produced when ammonium nitrate is decomposed. Another product is water.
   a. Write a balanced equation.

   $NH_4NO_3 \rightarrow N_2O + 2H_2O$

   b. How many grams of ammonium nitrate is required to produced 33.0 g of nitrous oxide?

   $33.0g\ N_2O \times \frac{1\ mol\ N_2O}{44.02g\ N_2O} \times \frac{1\ mol\ NH_4NO_3}{1\ mol\ N_2O} \times \frac{80.06g\ NH_4NO_3}{1\ mol\ NH_4NO_3} = 60.0g\ NH_4NO_3$

   c. How many grams of water are produced in this reaction?

   $33.0g\ N_2O \times \frac{1\ mol\ N_2O}{44.02g\ N_2O} \times \frac{2\ mol\ H_2O}{1\ mol\ N_2O} \times \frac{18.01g\ H_2O}{1\ mol\ H_2O} = 27.0g\ H_2O$

4. When sodium reacts with water, hydrogen gas and sodium hydroxide are produced.
   a. Write a balanced equation.

   $2Na_{(s)} + 2H_2O_{(l)} \rightarrow 2NaOH_{(aq)} + H_{2(g)}$

   b. Determine the mass of sodium hydroxide when 0.25 g of sodium ~~reacts with water~~:

   $0.25g\ Na \times \frac{1\ mol\ Na}{22.9g\ Na} \times \frac{2\ mol\ NaOH}{2\ mol\ Na} \times \frac{39.91g\ NaOH}{1\ mol\ NaOH} = 0.44g\ NaOH$

   c. Calculate the number of water molecules required to produce 10.0 L of hydrogen gas at STP.

   $10.0L\ H_2 \times \frac{1\ mol\ H_2}{22.4L\ H_2} \times \frac{2\ mol\ H_2O}{1\ mol\ H_2} \times \frac{6.02\times10^{23}\ molecules\ H_2O}{1\ mol\ H_2O} = 5.38\times10^{23}$ molecules of H_2O

   d. Determine the mass of the water molecules ~~produced from~~ that react with 3.27×10^{24} atoms of sodium.

   $3.27\times10^{24}\ atoms\ Na \times \frac{1\ mol\ Na}{6.02\times10^{23}\ atoms\ Na} \times \frac{2\ mol\ H_2O}{2\ mol\ Na} \times \frac{18.01g\ H_2O}{1\ mol\ H_2O} = 97.8g\ H_2O$