Mole Ratio Worksheet

1) Given this equation: $N_2 + 3\ H_2 \rightarrow 2\ NH_3$, write the following molar ratios:

a) N_2 / H_2 1 : 3

b) N_2 / NH_3 1 : 2

c) H_2 / NH_3 3 : 2

2) Given the following equation: $8\ H_2 + S_8 \rightarrow 8\ H_2S$, write the following molar ratios:

a) H_2 / H_2S 8 : 8 → 1 : 1

b) H_2 / S_8 8 : 1

c) H_2S / S_8 8 : 1

3) Answer the following questions for this equation: $2\ H_2 + O_2 \rightarrow 2\ H_2O$

a) What is the H_2 / H_2O molar ratio? 2 : 2 → 1 : 1

b) Suppose you had 20 moles of H_2 on hand and plenty of O_2, how many moles of H_2O could you make? $20\ H_2 \cdot \frac{2\ H_2O}{2\ H_2} = 20\ mol\ H_2O$

c) What is the O_2 / H_2O molar ratio? 1 : 2

d) Suppose you had 20 moles of O_2 and enough H_2, how many moles of H_2O could you make? $20\ O_2 \cdot \frac{2\ H_2O}{1\ O_2} = 40\ mol\ H_2O$

4) Use this equation: $N_2 + 3\ H_2 \rightarrow 2\ NH_3$, for the following problems

a) If you used 1 mole of N_2, how many moles of NH_3 could be produced? $1\ mol\ N_2 \cdot \frac{2\ NH_3}{1\ N_2} = 2\ mol\ NH_3$

b) If 10 moles of NH_3 were produced, how many moles of N_2 would be required? $10\ mol\ NH_3 \cdot \frac{1\ N_2}{2\ NH_3} = 5\ mol\ N_2$

c) If 3.00 moles of H_2 were used, how many moles of NH_3 would be made? $3\ mol\ H_2 \cdot \frac{2\ NH_3}{3\ H_2} = 2\ mol\ NH_3$

d) If 0.600 moles of NH_3 were produced, how many moles of H_2 are required? $0.6\ mol\ NH_3 \cdot \frac{3\ H_2}{2\ NH_3} = 0.9\ mol\ H_2$

Mole Ratio Worksheet

1. Consider the chemical reaction represented by the equation below:

$$3\ MgCl_2 + 2\ Al \rightarrow 3\ Mg + 2\ AlCl_3$$

   a. If 8 moles of magnesium chloride react with enough aluminum, how many moles of aluminum chloride are produced?

$$8\ mol\ MgCl_2 \cdot \frac{2\ AlCl_3}{3\ MgCl_2} = 5.33\ mol\ AgCl_3$$

   b. How many moles of magnesium chloride are needed to with 10 moles of aluminum?

$$10\ mol\ Al \cdot \frac{3\ MgCl_2}{2\ Al} = 15\ mol\ MgCl_2$$

2. Consider the following chemical reaction:

$$N_2 + 3\ H_2 \rightarrow 2\ NH_3$$

   a. How many moles of nitrogen gas are needed to react with to react with 7.5 moles of hydrogen?

$$7.5\ mol\ H_2 \frac{1\ N_2}{3\ H_2} = 2.5\ mol\ N_2$$

   b. How many moles of ammonia would you get if 4.5 moles of hydrogen gas reacted?

$$4.5\ mol\ H_2 \cdot \frac{2\ NH_3}{3\ H_2} = 3\ mol\ NH_3$$

   c. How many moles of nitrogen gas are needed in order to produce 5 moles of NH_3?

$$5\ mol\ NH_3 \frac{1\ N_2}{2\ NH_3} = 2.5\ mol\ N_2$$

3. Consider the combustion of methane (CH_4).

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

   a. How many moles of carbon dioxide are obtained when 20 moles of methane are burned?

$$20\ mol\ CH_4 \cdot \frac{1\ CO_2}{1\ CH_4} = 20\ mol\ CO_2$$

   b. If only 15 moles of oxygen are available, how many moles of methane will burn?

$$15\ mol\ O_2 \cdot \frac{1\ CH_4}{2\ O_2} = 7.5\ mol\ CH_4$$

   c. During combustion, 12 moles of carbon dioxide were obtained. How many moles of water were also obtained?

$$12\ mol\ CO_2 \cdot \frac{2\ H_2O}{1\ CO_2} = 24\ mol\ H_2O$$