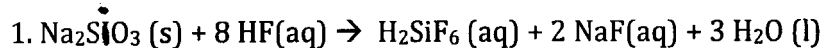


## Stoichiometry Worksheet



a. How many moles of HF are needed to react with 0.300 mol of  $\text{Na}_2\text{SiO}_3$ ?

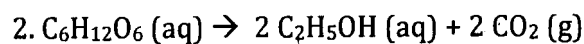
$$\frac{0.300 \text{ mol Na}_2\text{SiO}_3}{1 \text{ mol Na}_2\text{SiO}_3} \times \frac{8 \text{ mol HF}}{1 \text{ mol Na}_2\text{SiO}_3} = 2.40 \text{ mol HF}$$

b. How many grams of NaF form when 0.500 mol of HF reacts with excess  $\text{Na}_2\text{SiO}_3$ ?

$$0.500 \text{ mol HF} \times \frac{2 \text{ mol NaF}}{8 \text{ mol HF}} \times \frac{41.988 \text{ g NaF}}{1 \text{ mol NaF}} = 5.25 \text{ g NaF}$$

c. How many grams of  $\text{Na}_2\text{SiO}_3$  can react with 0.800 g of HF?

$$\frac{0.800 \text{ g HF}}{20.008 \text{ g HF}} \times \frac{1 \text{ mol Na}_2\text{SiO}_3}{8 \text{ mol HF}} \times \frac{122.0617 \text{ g Na}_2\text{SiO}_3}{1 \text{ mol Na}_2\text{SiO}_3} = 0.610 \text{ g Na}_2\text{SiO}_3$$



a. How many moles of  $\text{CO}_2$  are produced when 0.400 mol of  $\text{C}_6\text{H}_{12}\text{O}_6$  reacts in this fashion?

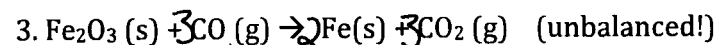
$$\frac{0.400 \text{ mol C}_6\text{H}_{12}\text{O}_6}{1 \text{ mol C}_6\text{H}_{12}\text{O}_6} \times \frac{2 \text{ mol CO}_2}{1 \text{ mol C}_6\text{H}_{12}\text{O}_6} = 0.800 \text{ mol CO}_2$$

b. How many grams of  $\text{C}_6\text{H}_{12}\text{O}_6$  are needed to form 7.50 g of  $\text{C}_2\text{H}_5\text{OH}$ ?

$$\frac{7.50 \text{ g C}_2\text{H}_5\text{OH}}{46.0688 \text{ g C}_2\text{H}_5\text{OH}} \times \frac{1 \text{ mol C}_6\text{H}_{12}\text{O}_6}{2 \text{ mol C}_2\text{H}_5\text{OH}} \times \frac{180.156 \text{ g C}_6\text{H}_{12}\text{O}_6}{1 \text{ mol C}_6\text{H}_{12}\text{O}_6} = 14.7 \text{ g C}_6\text{H}_{12}\text{O}_6$$

c. How many grams of  $\text{CO}_2$  form when 7.50 g of  $\text{C}_2\text{H}_5\text{OH}$  are produced?

$$\frac{7.50 \text{ g C}_2\text{H}_5\text{OH}}{46.0688 \text{ g C}_2\text{H}_5\text{OH}} \times \frac{2 \text{ mol CO}_2}{2 \text{ mol C}_2\text{H}_5\text{OH}} \times \frac{44.0098 \text{ g CO}_2}{1 \text{ mol CO}_2} = 7.16 \text{ g CO}_2$$



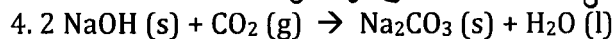
a. Calculate the number of grams of CO that can react with 0.150 kg of  $\text{Fe}_2\text{O}_3$

$$\frac{0.150 \text{ kg Fe}_2\text{O}_3}{1000 \text{ g Fe}_2\text{O}_3} \times \frac{1 \text{ mol Fe}_2\text{O}_3}{159.6922 \text{ g Fe}_2\text{O}_3} \times \frac{3 \text{ mol CO}}{1 \text{ mol Fe}_2\text{O}_3} \times \frac{28.01 \text{ g CO}}{1 \text{ mol CO}} = 124 \text{ g CO}$$

b. Calculate the number of grams of Fe and the number of grams of CO<sub>2</sub> formed when 0.150 kg of Fe<sub>2</sub>O<sub>3</sub> reacts

$$0.150 \text{ kg Fe}_2\text{O}_3 \left| \frac{1000 \text{ g Fe}_2\text{O}_3}{1 \text{ kg Fe}_2\text{O}_3} \right| \left| \frac{1 \text{ mol Fe}_2\text{O}_3}{159.6922 \text{ g Fe}_2\text{O}_3} \right| \left| \frac{2 \text{ mol Fe}}{1 \text{ mol Fe}_2\text{O}_3} \right| \left| \frac{65.847 \text{ g Fe}}{1 \text{ mol Fe}} \right| = 105 \text{ g Fe}$$

$$0.150 \text{ kg Fe}_2\text{O}_3 \left| \frac{1000 \text{ g Fe}_2\text{O}_3}{1 \text{ kg Fe}_2\text{O}_3} \right| \left| \frac{1 \text{ mol Fe}_2\text{O}_3}{159.6922 \text{ g Fe}_2\text{O}_3} \right| \left| \frac{3 \text{ mol CO}_2}{1 \text{ mol Fe}_2\text{O}_3} \right| \left| \frac{44.0098 \text{ g CO}_2}{1 \text{ mol CO}_2} \right| = 124 \text{ g CO}_2$$



a. Which reagent is the limiting reactant when 1.85 mol NaOH and 1.00 mol CO<sub>2</sub> are allowed to react?

L.R

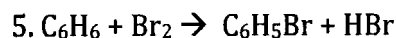
NaOH:  $1.85 \text{ mol NaOH} \left| \frac{1 \text{ mol Na}_2\text{CO}_3}{2 \text{ mol NaOH}} \right| = 0.925 \text{ mol Na}_2\text{CO}_3$  (L.R)

CO<sub>2</sub> excess

$1.00 \text{ mol CO}_2 \left| \frac{1 \text{ mol Na}_2\text{CO}_3}{1 \text{ mol CO}_2} \right| = 1.00 \text{ mol Na}_2\text{CO}_3$

b. How many moles of Na<sub>2</sub>CO<sub>3</sub> can be produced?

0.925 mol Na<sub>2</sub>CO<sub>3</sub>



a. What is the theoretical yield of C<sub>6</sub>H<sub>5</sub>Br in this reaction when 30.0 g of C<sub>6</sub>H<sub>6</sub> reacts with 65.0 g of Br<sub>2</sub>?

L.R

L.R C<sub>6</sub>H<sub>6</sub>

$30.0 \text{ g C}_6\text{H}_6 \left| \frac{1 \text{ mol C}_6\text{H}_6}{78.1134 \text{ g C}_6\text{H}_6} \right| \left| \frac{1 \text{ mol C}_6\text{H}_5\text{Br}}{1 \text{ mol C}_6\text{H}_6} \right| \left| \frac{157.0095 \text{ g C}_6\text{H}_5\text{Br}}{1 \text{ mol C}_6\text{H}_5\text{Br}} \right| = 59.5 \text{ g C}_6\text{H}_5\text{Br}$  (L.R)

$65.0 \text{ g Br}_2 \left| \frac{1 \text{ mol Br}_2}{159.808 \text{ g Br}_2} \right| \left| \frac{1 \text{ mol C}_6\text{H}_5\text{Br}}{1 \text{ mol Br}_2} \right| \left| \frac{157.0095 \text{ g C}_6\text{H}_5\text{Br}}{1 \text{ mol C}_6\text{H}_5\text{Br}} \right| = 63.9 \text{ g C}_6\text{H}_5\text{Br}$

b. If the actual yield of C<sub>6</sub>H<sub>5</sub>Br was 56.7 g, what is the percent yield?

% yield =  $\left( \frac{56.7 \text{ g}}{59.5 \text{ g}} \right) \times 100 = 95.3\%$