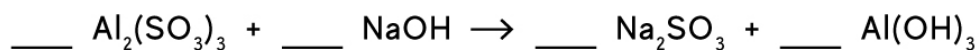


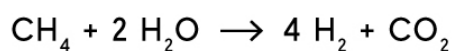
Limiting Reactant Worksheet

- 1 Given the following reaction: (First, balance the reaction)



- a) Suppose 10 g of $\text{Al}_2(\text{SO}_3)_3$ reacts with 10 g of NaOH. Determine the limiting reactant.
- b) Determine the number of grams of $\text{Al}(\text{OH})_3$ produced.
- c) Determine the number of moles of excess reactant left over in the reaction.

- 2 Given the following reaction:

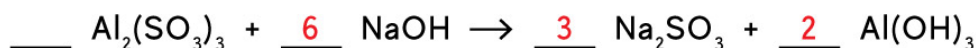


How many liters of hydrogen can be produced from the reaction between 80 g of methane and 16.3 g of water? Determine the limiting reactant first.

Limiting Reactant Worksheet

Answers

- 1 Given the following reaction: (First, balance the reaction)



- a Suppose 10 g of $\text{Al}_2(\text{SO}_3)_3$ reacts with 10 g of NaOH. Determine the limiting reactant.

$$10 \text{ g Al}_2(\text{SO}_3)_3 \times \frac{1 \text{ mol Al}_2(\text{SO}_3)_3}{294.15 \text{ g Al}_2(\text{SO}_3)_3} \times \frac{3 \text{ mol Na}_2\text{SO}_3}{1 \text{ mol Al}_2(\text{SO}_3)_3} \times \frac{126 \text{ g Na}_2\text{SO}_3}{1 \text{ mol Na}_2\text{SO}_3} = 12.9 \text{ g Na}_2\text{SO}_3$$

$$10 \text{ g NaOH} \times \frac{1 \text{ mol NaOH}}{40 \text{ g NaOH}} \times \frac{3 \text{ mol Na}_2\text{SO}_3}{6 \text{ mol NaOH}} \times \frac{126 \text{ g Na}_2\text{SO}_3}{1 \text{ mol Na}_2\text{SO}_3} = 15.8 \text{ g Na}_2\text{SO}_3$$

$\text{Al}_2(\text{SO}_3)_3$ produces less amount of Na_2SO_3 than NaOH does. $\text{Al}_2(\text{SO}_3)_3$ is the limiting reagent.

- b Determine the number of grams of $\text{Al}(\text{OH})_3$ produced.

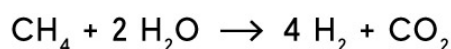
$$10 \text{ g Al}_2(\text{SO}_3)_3 \times \frac{1 \text{ mol Al}_2(\text{SO}_3)_3}{294.15 \text{ g Al}_2(\text{SO}_3)_3} \times \frac{2 \text{ mol Al}(\text{OH})_3}{1 \text{ mol Al}_2(\text{SO}_3)_3} \times \frac{78 \text{ g Al}(\text{OH})_3}{1 \text{ mol Al}(\text{OH})_3} = 5.3 \text{ g Al}(\text{OH})_3$$

- c Determine the number of moles of excess reactant left over in the reaction.

$$10 \text{ g Al}_2(\text{SO}_3)_3 \times \frac{1 \text{ mol Al}_2(\text{SO}_3)_3}{294.15 \text{ g Al}_2(\text{SO}_3)_3} \times \frac{6 \text{ mol NaOH}}{1 \text{ mol Al}_2(\text{SO}_3)_3} \times \frac{40 \text{ g NaOH}}{1 \text{ mol NaOH}} = 8.16 \text{ g of NaOH used}$$

$$10 \text{ g NaOH} - 8.16 \text{ g NaOH} = 1.894 \text{ g of NaOH left}$$

- 2 Given the following reaction:



How many liters of hydrogen can be produced from the reaction between 80 g of methane and 16.3 g of water? Determine the limiting reactant first.

$$80 \text{ g CH}_4 \times \frac{1 \text{ mol CH}_4}{16 \text{ g CH}_4} \times \frac{2 \text{ mol H}_2\text{O}}{1 \text{ mol CH}_4} \times \frac{18 \text{ g H}_2\text{O}}{1 \text{ mol H}_2\text{O}} = 180 \text{ g H}_2\text{O}$$

$$16.3 \text{ g H}_2\text{O} \times \frac{1 \text{ mol H}_2\text{O}}{18 \text{ g H}_2\text{O}} \times \frac{1 \text{ mol CH}_4}{2 \text{ mol H}_2\text{O}} \times \frac{16 \text{ g CH}_4}{1 \text{ mol CH}_4} = 72.5 \text{ g CH}_4$$

H_2O is the limiting reactant.

$$16.3 \text{ g H}_2\text{O} \times \frac{1 \text{ mol H}_2\text{O}}{18 \text{ g H}_2\text{O}} \times \frac{4 \text{ mol H}_2}{2 \text{ mol H}_2\text{O}} \times \frac{22.4 \text{ L H}_2}{1 \text{ mol H}_2} = 40.5 \text{ L H}_2$$