

## Quiz 6.2 – Limiting Reactants and Percent Yield

Name: Key

## Question 1

2.50 g of  $\text{H}_2$  and 18.2 g of  $\text{O}_2$  react according to the equation:  $2\text{H}_2(\text{g}) + \text{O}_2(\text{g}) \rightarrow 2\text{H}_2\text{O}(\text{g})$

- Which reactant is the *limiting reactant*

$$\frac{2.50\text{g H}_2}{2.016\text{g}} \times \frac{1\text{mol}}{2\text{H}_2} \times \frac{2\text{H}_2\text{O}}{1\text{mol}} \times 18.015\text{g} = 22.34\text{g H}_2\text{O}$$

$$\frac{18.2\text{g O}_2}{31.999\text{g}} \times \frac{1\text{mol}}{1\text{O}_2} \times \frac{2\text{H}_2\text{O}}{2\text{H}_2} \times 18.015\text{g} = 20.5\text{g H}_2\text{O}$$

- How many g of water are produced?

20.5 g

 $\text{O}_2$  is limiting

- How many g of the excess reactant remain?

$$\frac{18.2\text{g O}_2}{31.999\text{g}} \times \frac{1\text{mol}}{1\text{O}_2} \times \frac{2\text{H}_2}{2\text{H}_2\text{O}} \times 2.016\text{g} = 2.29\text{g}$$

$$2.50\text{g} - 2.29\text{g} = 0.21\text{g}$$

- If 15.0 g of water are actually recovered, what is the % yield?

$$\frac{15.0\text{g}}{20.5\text{g}} \cdot 100\% = 73.2\%$$

## Question 2

5.00 g of  $\text{CH}_4$  and 20.0 g of  $\text{O}_2$  react according to the equation:  $\text{CH}_4(\text{g}) + 2\text{O}_2(\text{g}) \rightarrow \text{CO}_2(\text{g}) + 2\text{H}_2\text{O}(\text{g})$

- Which reactant is the *limiting reactant*

$$\frac{5.00\text{g CH}_4}{16.04\text{g}} \times \frac{1\text{mol}}{1\text{CH}_4} \times \frac{1\text{CO}_2}{1\text{CH}_4} \times 44.01\text{g} = 13.72\text{g CO}_2$$

$$\frac{20.0\text{g O}_2}{31.999\text{g}} \times \frac{1\text{mol}}{2\text{O}_2} \times \frac{1\text{CO}_2}{1\text{CH}_4} \times 44.01\text{g} = 13.75\text{g}$$

 $\text{CO}_2$  is limiting

- How many g of water and carbon dioxide are produced?

13.72 g  $\text{CO}_2$ 

$$\frac{5.00\text{g CH}_4}{16.04\text{g}} \times \frac{1\text{mol}}{1\text{CH}_4} \times \frac{2\text{H}_2\text{O}}{1\text{CH}_4} \times 18.015\text{g} = 11.23\text{g H}_2\text{O}$$

- How many g of the excess reactant remain?

$$\frac{5.00\text{g CH}_4}{16.04\text{g}} \times \frac{1\text{mol}}{1\text{CH}_4} \times \frac{2\text{O}_2}{1\text{CH}_4} \times 31.999\text{g} = 19.95\text{g O}_2$$

$$20.0 - 19.95 = 0.05\text{g O}_2$$

- If 10.5 g of water are actually recovered, what is the % yield?

$$\frac{10.5\text{g}}{11.23\text{g}} \cdot 100\% = 93.5\%$$