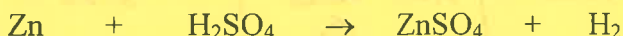


Stoichiometry of Gases at STP

1. What volume of hydrogen gas at STP would be produced from 28.0 grams of zinc reacting with an excess of sulfuric acid?



$$\frac{28.0}{65} = \boxed{.431 \text{ moles Zn}}$$

$$.431 = \frac{x}{22.4}$$

$$\boxed{x = 9.65 \text{ Liters H}_2}$$

2. Calcium carbonate will decompose to form carbon dioxide and calcium oxide. What volume of carbon dioxide gas will be produced at STP if 152 grams of calcium carbonate is used?

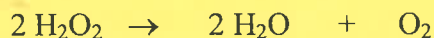


$$\frac{152}{100} = \boxed{1.52 \text{ moles CaCO}_3}$$

$$1.52 = \frac{x}{22.4}$$

$$\boxed{x = 34.0 \text{ Liters CO}_2}$$

3. According to the following balanced equation, what mass of hydrogen peroxide (H_2O_2) would be needed to prepare 29.4 Liters of oxygen gas at STP?



$$\frac{29.4}{22.4} = \boxed{1.31 \text{ moles O}_2} \times 2 = \boxed{2.62 \text{ moles H}_2\text{O}_2}$$

$$2.62 = \frac{x}{34} \quad \boxed{89.1 \text{ g H}_2\text{O}_2}$$

4. Consider the following balanced chemical reaction:



- (a) How many Liters of carbon dioxide gas at STP would be produced from 15.7 g of Fe_2O_3 ?

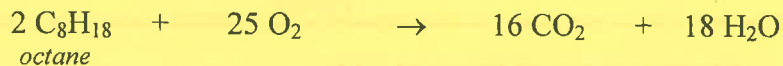
$$\frac{15.7}{160} = \boxed{.0981 \text{ moles Fe}_2\text{O}_3} \times 3 = \boxed{.294 \text{ moles CO}_2} \quad .294 = \frac{x}{22.4}$$

$$\boxed{x = 6.59 \text{ Liters CO}_2}$$

- (b) What mass of iron metal (Fe) could be produced from 15.7 grams of Fe_2O_3 ?

$$\frac{15.7}{160} = \boxed{.0981 \text{ moles Fe}_2\text{O}_3} \times 2 = \boxed{.196 \text{ moles Fe}} \quad .196 = \frac{x}{56} \quad \boxed{x = 11.0 \text{ g Fe}}$$

5. Consider the following balanced chemical reaction:



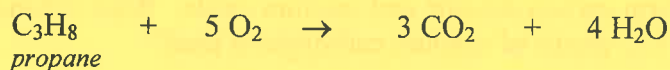
What volume of oxygen gas at STP is required for the complete combustion of 75 grams of octane?

$$\frac{75}{114} = .66 \text{ moles C}_8\text{H}_{18} \times 12.5 = 8.25 \text{ moles O}_2$$

$$8.25 = \frac{X}{22.4}$$

$$X = 185 \text{ Liters O}_2$$

6. Consider the following balanced chemical reaction:



(a) At STP, what volume of O₂ gas is necessary to react with 2.69 Liters of propane gas?

$$\frac{2.69}{22.4} = .120 \text{ moles C}_3\text{H}_8 \times 5 = .600 \text{ moles O}_2$$

$$.600 = \frac{X}{22.4} \quad X = 13.5 \text{ Liters O}_2$$

(b) At STP, what volume of CO₂ gas could be produced from 2.69 Liters of propane gas?

$$\frac{2.69}{22.4} = .120 \text{ moles C}_3\text{H}_8 \times 3 = .360 \text{ moles CO}_2$$

$$.360 = \frac{X}{22.4}$$

$$X = 8.06 \text{ Liters CO}_2$$

(c) At STP, what volume of H₂O gas could be produced from 2.69 Liters of propane gas?

$$\frac{2.69}{22.4} = .120 \text{ moles C}_3\text{H}_8 \times 4 = .480 \text{ moles H}_2\text{O}$$

$$.480 = \frac{X}{22.4}$$

$$X = 10.8 \text{ Liters H}_2\text{O}$$