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AP Chemistry

Name BRACKEN KEY
Period ____

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?

$$Zn + H_2SO_4 \rightarrow ZnSO_4 + H_2$$

$\frac{28.0}{65} =$ .431 moles Zn $\quad .431 = \frac{x}{22.4} \quad x = 9.65$ 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?

$$CaCO_3 \rightarrow CO_2 + CaO$$

$\frac{152}{100} =$ 1.52 moles $CaCO_3$ $\quad 1.52 = \frac{x}{22.4} \quad x = 34.0$ 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?

$$2\,H_2O_2 \rightarrow 2\,H_2O + O_2$$

$\frac{29.4}{22.4} =$ 1.31 moles O_2 $\times 2 =$ 2.62 moles H_2O_2

$2.62 = \frac{x}{34}$ 89.1 g H_2O_2

4. Consider the following balanced chemical reaction:

$$Fe_2O_3 + 3\,CO \rightarrow 2\,Fe + 3\,CO_2$$

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

$\frac{15.7}{160} =$ .0981 moles Fe_2O_3 $\times 3 =$ .294 moles CO_2 $\quad .294 = \frac{x}{22.4}$

$x = 6.59$ Liters CO_2

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

$\frac{15.7}{160} =$ .0981 moles Fe_2O_3 $\times 2 =$ .196 moles Fe $\quad .196 = \frac{x}{56} \quad x = 11.0$ g Fe

5. Consider the following balanced chemical reaction:

$$\underset{\textit{octane}}{2\ C_8H_{18}} + 25\ O_2 \rightarrow 16\ CO_2 + 18\ H_2O$$

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

$\frac{75}{114}$ = .66 moles C_8H_{18} × 12.5 = 8.25 moles O_2

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

$X = 185$ Liters O_2

6. Consider the following balanced chemical reaction:

$$\underset{\textit{propane}}{C_3H_8} + 5\ O_2 \rightarrow 3\ CO_2 + 4\ H_2O$$

(a) At STP, what volume of O_2 gas is necessary to react with 2.69 Liters of propane gas?

$\frac{2.69}{22.4}$ = .120 moles C_3H_8 × 5 = .600 moles O_2

$.600 = \frac{X}{22.4}$

$X = 13.5$ Liters O_2

(b) At STP, what volume of CO_2 gas could be produced from 2.69 Liters of propane gas?

$\frac{2.69}{22.4}$ = .120 moles C_3H_8 × 3 = .360 moles CO_2

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

$X = 8.06$ Liters CO_2

(c) At STP, what volume of H_2O gas could be produced from 2.69 Liters of propane gas?

$\frac{2.69}{22.4}$ = .120 moles C_3H_8 × 4 = .480 moles H_2O

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

$X = 10.8$ Liters H_2O