• The following reaction takes place. You react 2.19 L of oxygen gas at 1.5 atm and 25 °C, which weighs 0.896 g with $1.35 \times 10^{22}$ molecules of $C_8H_{18}(g)$. If you collect the $CO_2(g)$ and $H_2O(g)$ in a 45 mL vessel at 25 °C, what is the total pressure of the gases in the vessel?

• You react 250 mL of 0.0105 M $H_2SO_4(aq)$ with 250 mL of 0.0105 M $NaOH(aq)$. What is the pH of the resulting solution?

• The following reaction occurs. If you have 1.5 L of a 0.15 M solution of $MnO_4^-$ reacting with 25.34 g of $C_2O_4^{2-}$, what mass of $CO_2$ will be produced?

\[ MnO_4^-(aq) + C_2O_4^{2-}(aq) \rightarrow CO_2(g) + Mn^{2+}(aq) \]  
(Not Balanced)

• Let us say you did not know the identity of gas 1. In order to determine the molecular weight of gas 1 you reacted magnesium sulfite with hydrochloric acid and collected the gas that was given off in a vessel labeled gas 2. You then determined the rate at which it takes for gas 2 to pass through a porous barrier. You determined that it took 5.34 mL/min for gas 2. If it takes 6.44 mL/min for gas 1 to pass through the same barrier, what is the molecular weight of gas 1?

• In most of its ionic compounds, cobalt is either Co(II) or Co(III). One such compound, containing chloride ion and waters of hydration, was analyzed, and the following results were obtained.

A 0.256 g sample of the compound was dissolved in water, and excess silver nitrate was added. The silver chloride was filter, dried, and weighed, and it had a mass of 0.308 g.

A second sample of 0.416 g of the compound was dissolved in water, and an excess of sodium hydroxide was added. The hydroxide salt was filtered and heated in a flame, forming cobalt(III) oxide. The mass of cobalt(III) oxide formed was 0.145 g.

How many water molecules can be extracted from $6.584 \times 10^{-23}$ g of the cobalt containing compound?

• Determine the molecular formula of the unknown compound from the following information.
  a. The compound is 92.3 % carbon and 7.7% hydrogen
  b. When comparing the rate of effusion of this compound to methane (CH₄), methane effuses at a rate of 4.35 mL/min and the unknown compound at a rate of 1.97 mL/min.
\[ P(0.045L) = 0.18224 \text{ mols} \]

\[ \text{P} = \frac{\text{nRT}}{V} \]

\[ 0.134 \text{ mols O}_2 \times \frac{34 \text{ mols Gas}}{25 \text{ mols O}_2} = 0.18224 \text{ mols Gas} \]

\[ \text{1 atm} \times 0.0224 \text{ mols} \]

\[ \text{L.R.} \]

\[ 1.35 \times 10^2 \text{ mole} \]

\[ 2.19 \text{ L} \]

\[ 1.5 \text{ atm} \]

\[ 25^\circ \text{C} \]

\[ \text{0.134 mols} \]

\[ \text{34 Grades} \]

\[ \text{Since treating like all ideal, we can say} \]

\[ \text{16C}_2\text{H}_2\text{O}_5 + 18\text{H}_2\text{O(g)} \]
0.288 mol \text{Ca}_4 \times \frac{5 \text{ mol} \text{CO}_2}{10 \text{ mol} \text{CO}_2} = 0.253 \text{ mol} \text{CO}_2

\text{Balance:}
16 \text{H}_2 + 2 \text{HNO}_3 + 5 \text{CO}_2 \rightarrow \text{L.H.} + 2 \text{H}_2\text{O} + 2 \text{CO}_2 + 10 \text{CO}_2

\text{Balance:}
2\text{H}_2 + \text{HNO}_3 + 5\text{CO}_2 \rightarrow \text{L.H.} + 2\text{H}_2\text{O} + 2\text{CO}_2 + 10\text{CO}_2
$X = \text{H}_2 \text{SO}_4$ molar

\[
\frac{x}{6\text{h}} = 64\text{h}
\]

\[
\frac{x}{5.34} = 6.4\text{h}
\]

\[
\frac{5.34}{6.4}\text{ml/min}
\]

\[
\text{MW} = 64\text{g/mol}
\]

\[
\therefore = \text{SO}_2
\]

\[
\text{MgSO}_3 + 2\text{HCl} \rightarrow \text{SO}_2 + \text{H}_2\text{O} + \text{MgCl}_2
\]

\[
\text{Gas 1} \rightarrow \text{Gas 2}
\]

\[
\text{Gas 1} \rightarrow \text{Gas 2}
\]
x = \pm 8 \, \text{mol/l}

\frac{16}{x} = 4.88

\text{V} = 1.07 \, \text{ml/min}

\frac{16}{x} = 4.35

\text{CH}_4

\text{H} + \text{C}_2\text{H}_5\text{OH}

1.3 = \text{EF}

\text{CH}_4 = \text{EF}

\frac{2.692}{\text{mol}}

93.3\%

\text{H} + \text{C}_2\text{H}_5\text{OH}

\frac{2.7}{\text{mol}}

\%