Homework - Reactions Worksheet

COMBUSTION

4 27 20 18

$$2\,C_5H_9O_{(\ell)} + \frac{27}{2}\,O_{2(g)} \rightarrow 10\,CO_{2(g)} + 9\,H_2O_{(g)}$$

2 27

Determine the number of atoms found in 2.78 moles of carbon.

$$2.78 \text{ mol C} \times \frac{6.02 \times 10^{23} \text{ atoms C}}{1 \text{ mol C}} = 1.67 \times 10^{24} \text{ atoms C}$$

Determine the number of molecules found in 6.09 moles of NH_3.

Determine the number of atoms found in 12.6 moles of H_2O.

$$12.6 \text{ mol } H_2O \times \frac{6.02 \times 10^{23} \text{ molecules } H_2O}{1 \text{ mol } H_2O} \times \frac{3 \text{ atoms}}{1 \text{ molecules } H_2O}$$

$$= 2.28 \times 10^{25} \text{ atoms}$$

Determine the number of atoms found in 2.78 moles of carbon.

Calculate the number of moles contained in 45.0g of $LiNO_3$.

$$45.0\,g\,LiNO_3 \times \frac{1\ mol\ LiNO_3}{68.95\,g\,LiNO_3} = 0.653\ mol\ LiNO_3$$

$LiNO_3 \rightarrow (1 \times 6.94) + (1 \times 14.01) + (3 \times 16.00)$

$= 68.95\ g/mol$

Determine the percent composition of $CaSO_4$.

$CaSO_4 \rightarrow (1 \times 40.08) + (1 \times 32.06) + (4 \times 16.00)$

$\rightarrow 136.14\ g/mol$

A compound is composed of 31.0% Al, 13.8% C, and 55.2% O. Determine the empirical and molecular formula of the compound. The molar mass of the compound is 260.93 g/mol.

$31.0\text{g Al} \times \frac{1\text{ mol Al}}{26.98\text{ g Al}} = \frac{1.149\text{ mol}}{1.149\text{ mol}} = 1$

$13.8\text{g C} \times \frac{1\text{ mol C}}{12.01\text{ g C}} = \frac{1.149\text{ mol}}{1.149\text{ mol}} = 1$

$55.2\text{g O} \times \frac{1\text{ mol O}}{16.00\text{g O}} = \frac{3.450\text{ mol}}{1.149\text{ mol}} = 3$

EMPIRICAL

$AlCO_3$ → x3 → $Al_3C_3O_9$

MOLECULAR

86.99 g/mol → x3 → 260.93 g/mol

$AlCO_3 \rightarrow (1 \times 26.98) + (1 \times 12.01) + (3 \times 16.00)$

86.99 g/mol

Worksheet

Calculate the volume of 4.58 moles of oxygen gas at STP conditions.