

Unit 4 - Chemical Changes

Chemical Quantities

- Moles and Particles (atoms/molecules)
- Mass and Moles
- Volume and Moles
- Percent Composition
- Empirical and Molecular Formulas

Chemical Reactions

- Formation
- Decomposition
- Combustion
- Single Replacement
- Double Replacement

Determine the number of atoms found in 3.18 moles of iron.

$$3.18 \text{ mol Fe} \times \frac{6.02 \times 10^{23} \text{ atoms Fe}}{1 \text{ mol Fe}} = 1.91 \times 10^{24} \text{ atoms Fe}$$

Determine the number of molecules found in 6.09 moles of NH₃.

Determine the number of atoms found in 10.2 moles of CO₂.

$$10.2 \text{ mol } \text{CO}_2 \times \frac{6.02 \times 10^{23} \text{ molecules } \text{CO}_2}{1 \text{ mol } \text{CO}_2} \times \frac{3 \text{ atoms}}{1 \text{ molecule } \text{CO}_2}$$

$$= 1.84 \times 10^{25} \text{ atoms}$$

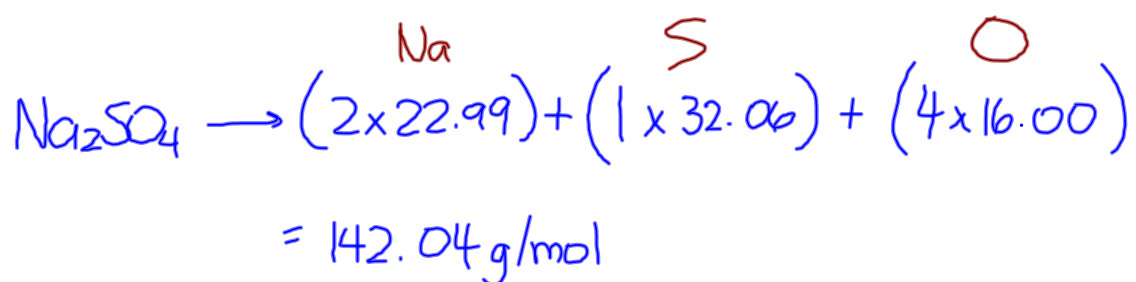
Calculate the number of moles contained in 45.0g of LiNO_3 .

$$45.0 \text{ g LiNO}_3 \times \frac{1 \text{ mol LiNO}_3}{68.95 \text{ g LiNO}_3} = 0.652 \text{ mol LiNO}_3$$

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

$$4.58 \text{ mol O}_2 \times \frac{22.4 \text{ L O}_2}{1 \text{ mol O}_2} = \boxed{103 \text{ L O}_2}$$

Determine the percent composition of Na₂SO₄.



$$\% \text{Na} = \frac{2 \times 22.99 \text{ g/mol}}{142.04 \text{ g/mol}} \times 100\%$$

$$= \boxed{32.3\%}$$

$$\% \text{S} = \frac{32.06 \text{ g/mol}}{142.04 \text{ g/mol}} \times 100\%$$

$$= \boxed{22.6\%}$$

$$\% \text{O} = \frac{4 \times 16.00 \text{ g/mol}}{142.04 \text{ g/mol}} \times 100\%$$

$$= \boxed{45.0\%}$$