Balancing Chemical Equations

A **chemical equation** is a shorthand method for representing a chemical reaction. The **reactants** are the original substances that are combined or heated. The **products** are the substances that are formed during the chemical reaction.

reactants → products

According to the **Law of Conservation of Mass**, the mass of the reactants is equal to the mass of the products in a chemical reaction. In any chemical reaction, the atoms present are simply rearranged.

i.e. $KClO_{3\,(s)} \xrightarrow{\Delta} KCl_{(s)} + O_{2\,(g)}$

In balancing the above equation, stoichiometric coefficients are placed before each chemical symbol or formula to ensure the same number of atoms of each element appear on both sides of the chemical equation.

i.e. $\mathbf{2}\ KClO_{3\,(s)} \xrightarrow{\Delta} \mathbf{2}\ KCl_{(s)} + \mathbf{3}\ O_{2\,(g)}$

The stoichiometric coefficients should be in the simplest whole number ratio. This method of balancing chemical equations if referred to as "balancing by inspection".

i.e. $Zn_{(s)} + \mathbf{2}\ HCl_{(aq)} \rightarrow ZnCl_{2\,(aq)} + H_{2\,(g)}$

$\mathbf{3}\ NH_4NO_{3\,(aq)} + K_3PO_{4\,(aq)} \rightarrow \mathbf{3}\ KNO_{3\,(aq)} + (NH_4)_3PO_{4\,(aq)}$

$\mathbf{2}\ C_4H_{10\,(g)} + \mathbf{13}\ O_{2\,(g)} \rightarrow \mathbf{8}\ CO_{2\,(g)} + \mathbf{10}\ H_2O_{(g)} + E$

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