# Chemical Reactions and Equations

- In a chemical reaction, at least one of the following will occur:
- Change in state
- Change in colour
- Evolution of a gas
- Change in temperature

- **Balanced chemical equation**
  Reactants → Products
  LHS RHS
  Total number of atoms on the LHS = Total number of atoms on the RHS

    - **How to balance an equation**
  - Write reactants and products
  - Balance the max. number of a particular atom on both sides
  - Balance other atoms
  - A complete balanced equation should look like

$$CO_{(g)} + 2H_{2(g)} \xrightarrow{340\,atm} CH_3OH_{(l)}$$



**Types of reactions**

- **Combination reaction**
  - Two or more reactants combine to form one single product.
  - **Examples**

$CaO_{(s)} + H_2O_{(l)} \rightarrow Ca(OH)_{2(aq)}$
$Ca(OH)_2 \rightarrow$ Slaked lime
$C + O_2 \rightarrow CO_2$
$2H_2 + O_2 \rightarrow 2H_2O_{(l)}$

- **Exothermic reaction** – Heat gets released in the reaction. Most combination reactions are exothermic. For example,

| $CaO(s)$ | + | $H_2O(l)$ | → | $Ca(OH)_2(aq)$ |
|---|---|---|---|---|
| Calcium oxide (Quick lime) | | Water | | Calcium hydroxide (Slaked lime) |

- **Endothermic reaction** – Heat is absorbed in the reaction. Very few combination reactions are endothermic. For example,

$\frac{1}{2}N_2(g) + O_2(g) \rightarrow NO_2(g)$