**Endothermic**
- Reactions that absorb energy.
- Temperature of the surroundings increases.
- Enthalpy change, $\Delta H$, is positive.
- Enthalpy of the products is higher than the enthalpy of the reactants.

**Exothermic**
- Reactions that release energy.
- Temperature of the surroundings increases.
- Enthalpy change, $\Delta H$, is negative.
- Enthalpy of the reactants is higher than the enthalpy of the products.

**Hess's Law**
- Definition: The total enthalpy change is independent of the route by which the chemical reaction takes place as long as the initial and final conditions are the same.
- $\Delta H_{f}^{\circ}$ (products) = $\Delta H_{f}^{\circ}$ (reactants)

**Examples**
1. Reactants $\rightarrow$ Products
   - $\Delta H_{f}^{\circ}$ elements
   - $\Delta H_{f}^{\circ}$ elements
   - $\Delta H_{f}^{\circ}$ elements
2. Elements $\rightarrow$ Compound Formation
   - $\Delta H_{f}^{\circ}$ elements
   - $\Delta H_{f}^{\circ}$ combustion products
   - $\Delta H_{f}^{\circ}$ elements

**Bond Energies**
- Bond (dissociation) energy: the specific energy required to break a certain covalent bond.
- Bond breaking: endothermic.
- Bond making: exothermic.
- Units: $kJ/mol^{-1}$.
- Average bond energy taken due to the same bond having different bond energies in different environments.
  (Ex: OH in ethanol B-H in water)

**Standard Enthalpy Change of Reaction, $\Delta H_{f}^{\circ}$**
- Enthalpy change when the amounts of reactants shown in the equation react to give products under standard conditions.
- The reactants & products must be in their standard states.
- Can be exothermic or endothermic.

**Standard Enthalpy Change of Formation, $\Delta H_{f}^{\circ}$**
- Enthalpy change when 1 mole of a compound is formed from its elements under standard conditions.
- The reactants & products must be in their standard conditions.
- Can be exothermic or endothermic.

**Standard Enthalpy Change of Combustion, $\Delta H_{f}^{\circ}$**
- Enthalpy change when 1 mole of a substance is burnt in excess $O_2$ under standard conditions.
- The reactants & products must be in their standard states.
- Always exothermic.

**Standard Enthalpy Change of Neutralisation, $\Delta H_{f}^{\circ}$**
- Enthalpy change when 1 mole of $H_2O$ is formed by the reaction of an acid with alkali under standard conditions.
- $\Delta H_{f}^{\circ}$ (aq) + OH$^{-}$ (aq) $\rightarrow$ $H_2O$(c)

**Standard Enthalpy Change of Solution, $\Delta H_{f}^{\circ}$**
- Enthalpy change when 1 mole of solute is dissolved in a solvent to form an infinitely dilute solution under standard conditions.
- Infinitely dilute solution - one that doesn't produce any further EC when more solvent is added.

**Standard Enthalpy Change of Atomisation, $\Delta H_{f}^{\circ}$**
- Enthalpy change when 1 mole of gaseous atoms is formed from its elements under standard conditions.
- $\frac{1}{2}H_2(g) \rightarrow H(g)$