Balan the Sc Energy

LEARNING POINTS

- Simple calorimetry experiments are described.
- Energy changes in chemical reactions are determined and calculated.
- Specific heat capacity and molar enthalpy change are applied.

ΔH

Enthalpy change

is the amount of heat energy given out or taken in during a chemical reaction. It tells you whether a reaction gets hot or cold.

- **Negative ΔH** means the reaction gives out heat and feels hot. This is an exothermic reaction.
- **Positive ΔH** means the reaction takes in heat and feels cold. This is an endothermic reaction.

ΔH — Measuring Enthalpy Changes of Reaction

- Enthalpy change, or ΔH, is the total amount of heat released or absorbed during a chemical reaction. It tells us whether a reaction gets hotter or colder.
- We can't measure ΔH directly, so we use a simple device called a calorimeter.

Keyterm:

- **Specific Heat Capacity (c)**: The amount of energy needed to heat up 1 gram of a substance by 1°C.
- **Calorimetry**: The process of measuring the heat change in a reaction.
- **Calorimeter**: A device, like an insulated cup, used to measure heat changes.
- **Molar Enthalpy Change:** The energy change for one mole of a substance in a reaction.

Specific Heat Capacity (c)
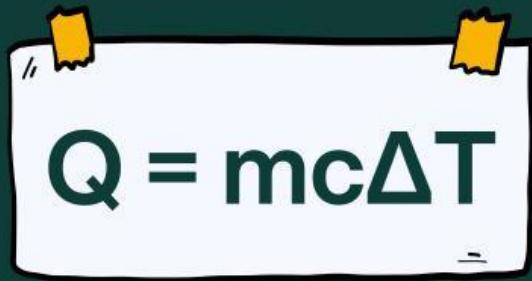
When we heat something, it gets **Hotter**

Example:
The specific heat capacity of water is approximately 4.18J/g°C. This means it takes 4.18 joules of energy to raise the temperature of 1 gram of water by 1°C.
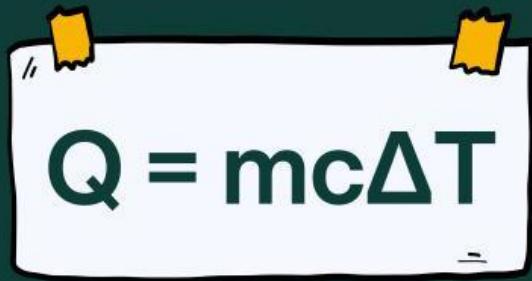
Specific Heat Capacity (c)

The formula to calculate the energy change (Q) for a substance based on its specific heat capacity is:

$$Q = mc\Delta T$$

- Q is the energy absorbed or released in joules (J).
- m is the mass of the substance in grams (g).
- c is the specific heat capacity of the substance in J/g°C.
- ΔT (delta T) is the change in temperature in degrees Celsius (°C) or Kelvin (K).

Specific Heat Capacity (c)

The formula to calculate the energy change (Q) for a substance based on its specific heat capacity is:

$$Q = mc\Delta T$$

- Calorimetry is the scientific technique used to measure heat changes. The word comes from Latin and Greek roots: calor meaning "heat" and metry meaning "to measure."
- to quantify the amount of heat energy (Q) that is either absorbed (in an endothermic process) or released (in an exothermic process).
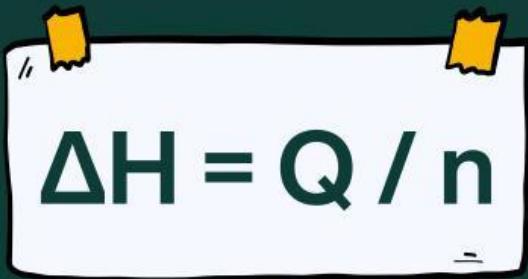
Specific Heat Capacity (c)

The change in temperature, ΔT, is calculated as:

$$\Delta T = T_{final} - T_{initial}$$

- positive ΔT indicates an increase in temperature,
- negative ΔT indicates a decrease in temperature

Specific Heat Capacity (c)

The formula to calculate the energy change (Q) for a substance based on its specific heat capacity is:

$$\Delta H = Q / n$$

- **find the value of Q,**
- then used to **find the enthalpy change (ΔH)** of the reaction.
- n = numbers of moles
- n = mass (m) / relative molecular mass (M_r)