Balan
the Sc
Energy



LIVEWORKSHEETS

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.

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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.

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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.

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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.

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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.

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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).

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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).

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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

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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)

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