

AQA Chemistry A-Level

RP2 - Measuring enthalpy change

Flashcards



What is Hess's Law?



What is Hess's Law?

- The enthalpy change for a chemical reaction is always the same, regardless of the route from reactants to products.
- (For a Hess's cycle the sum of the clockwise enthalpy changes equals the sum of the anticlockwise enthalpy changes)



What is the weighing by difference technique?



What is the weighing by difference technique?

- It is a method to weigh materials accurately.
- $\text{Mass of substance} = \text{Mass of weighing dish and substance} - \text{Mass of dish after substance has been transferred.}$



How can you reduce the uncertainty in the mass measurement?



How can you reduce the uncertainty in the mass measurement?

- Use a balance with a greater resolution.
- Use a larger mass.



What is percentage uncertainty and how do you calculate it?



What is percentage uncertainty and how do you calculate it?

Percentage uncertainty in a measurement =

$$100 \times \frac{\textit{absolute uncertainty}}{\textit{calculated value}}$$



How do you calculate enthalpy change experimentally?



How do you calculate enthalpy change of reaction experimentally?

- $q = mc\Delta T$
- Where m is the mass of the solution that changes temperature ($1\text{g} = 1\text{cm}^3$), c is the specific heat capacity (usually of water) and ΔT is the temperature change, measured using a thermometer and q is the heat energy taken in or released (in joules).
- Divide this number, in kJ, by the number of moles of the limiting reactant.
- Add a sign to show whether ΔH_r^\ominus is exothermic or endothermic.



Why may an experimental value for enthalpy change be different to the theoretical value?



Why may an experimental value for enthalpy change be different to the theoretical value?

1. Heat loss to apparatus/surroundings.
2. Incomplete combustion.
3. Non-standard conditions.
4. Evaporation of alcohol/water.



How do you prevent heat loss to surroundings/apparatus?



How do you prevent heat loss to surroundings/apparatus?

- Insulate the beaker by placing it in a polystyrene cup with a lid.
- Avoid large temperature differences between surroundings and calorimeter.
- Use a bomb calorimeter



Other than preventing heat loss, how can the accuracy of this experiment be improved?



Other than preventing heat loss, how can the accuracy of this experiment be improved?

- Read the thermometer at eye level to avoid parallax errors.
- Stir the solution so the temperature is evenly distributed.
- Use a digital thermometer for more accurate and faster readings.
- Use greater concentrations and masses, leading to a greater temperature change and thus smaller uncertainty.



What is accuracy?



What is accuracy?

The more accurate the data, the closer it is to the actual value.

