AQA Chemistry A-Level

RP2 - Measuring enthalpy change

Flashcards

What is Hess's Law?

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- 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?

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

How can you reduce the uncertainty in the mass measurement?

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

What is percentage uncertainty and how do you calculate it?

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Percentage uncertainty in a measurement =

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

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 (1g = $1cm^3$), *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 $\Delta H_r^{\ominus}$ is exothermic or endothermic.

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

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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?

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- 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?

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- 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?

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