WJEC (Wales) Chemistry GCSE

SP 2.5 - Determination of the amount of Energy Released by a Fuel

Flashcards

Name the process used to measure the heat released during a chemical reaction

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Calorimetry

What apparatus is required to determine the amount of energy released by a fuel?

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- Retort stand and clamp
- 250 cm^3 conical flask
- 100 cm^3 measuring cylinder
- Thermometer
- Digital mass balance
- Spirit burners

Outline the procedure to determine the amount of energy released by a fuel

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1. Measure 100 cm^3 of cold water into a conical flask.
2. Clamp the flask above the spirit burner on a heatproof mat.
3. Weigh and record the mass of the spirit burner containing the alcohol.
4. Record the initial water temperature.
5. Place the spirit burner under the flask and light the wick.
6. Allow the alcohol to heat the water by 40°C. Record the temperature with the thermometer.
7. Extinguish the flame by replacing the cap.
8. Re-weigh the spirit burner and cap. Calculate the mass of alcohol used.

What equation can be used to determine the energy released per gram of alcohol?

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$$\text{Energy released per gram of alcohol (J/g)} = \frac{\text{mass of water (g)} \times \text{temperature rise (°C)} \times 4.2}{\text{mass of alcohol (g)}}$$

How can you prevent heat loss to the surroundings/apparatus?

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- Place a lid on the flask holding the water.
- Use a copper calorimeter to hold the water.
- Avoid large temperature differences between the surroundings and the calorimeter.

Why must the cap be replaced on the spirit burner between use?

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The cap prevents the evaporation of the alcohol fuel in the burner. This ensures the change in mass of the alcohol is only due to combustion.

Why is it important that the thermometer does not touch the bottom of the flask when recording the temperature of the water?

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The material of the flask will heat up at a different rate compared to the water. The thermometer will not give an accurate temperature measurement of the water if it is touching the flask.

The temperature of the water rises as it is heated. What type of reaction is taking place?

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Exothermic - energy is being given out to the surroundings.

Why is it important to stir the water during the calorimetry experiment?

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Stirring the water distributes the heat. This ensures the temperature reading of the water is consistent throughout the flask.