OCR (A) Physics GCSE

PAG 05 - Determining the specific heat capacity of a metal.

Flashcards

Define specific heat capacity.

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The energy needed to produce a temperature increase of 1℃ in 1kg of a material.

What measurements must be taken to work out the specific heat capacity of a material?

What measurements must be taken to work out the specific heat capacity of a material?

- Mass
- Temperature change
- Energy supplied

What equation is used to calculate specific heat capacity?

What equation is used to calculate specific heat capacity?

$$E = mc\Delta\theta$$

Energy (J) = mass (kg) x specific heat capacity (J/kg°C) x change in temperature (°C)

How is the mass of an object measured?

How is the mass of an object measured?

Using a calibrated mass balance.

Describe the apparatus required for this experiment.

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- ● Metal block with two slots
  - ○ One slot for an electric heater, with voltmeter and ammeter attached
  - ○ One slot for a thermometer
- ● Insulating container
- ● Heatproof mat

What can be done to improve the reading given by the thermometer?

What can be done to improve the reading given by the thermometer?

Add a few drops of water in the hole with the thermometer to improve the thermal contact and ensure even heating.

How is the energy transfer worked out (power given)?

How is the energy transfer worked out (power given)?

When the power of the heater is given, multiply the power by the time the heater was used for.

Energy (J) = Power (W) x time (s)

How is the energy transfer worked out?

How is the energy transfer worked out using voltmeters and ammeters?

Record the current and voltage of the heater and run the experiment for a set period of time.

Energy (J) = current (A) x voltage (V) x time (s)

What readings are taken?

What readings are taken?

Temperature readings, at 1 minute intervals.

What graph do you plot with the data?

What graph do you plot with the data?

A graph of temperature against work done by the heater.

Why might the graph be non linear?

Why might the graph be non linear?

Thermal inertia means the block will initially heat up more slowly.

How can you overcome the error which causes the graph to be non linear?

How can you overcome the error which causes the graph to be non linear?

Heat the apparatus for 5 minutes to acclimatise before you start timing.

Describe the method used to determine the specific heat capacity of a metal.

Describe the method used to determine the specific heat capacity of a metal.

- Measure the mass of the metal
- Record the initial temperature using a thermometer
- Heat for 5 minutes to acclimatise, take V and I readings if necessary, and then start stopwatch. Take temperature readings every minute for 10 minutes.
- Plot a graph of temperature against energy supplied (energy = VIt = Pt). Find the gradient.
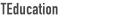- The gradient = 1/c so use the reciprocal (1/gradient) to find c

What safety precautions must be taken with this method?

What safety precautions must be taken with this method?

- Be careful when handling the metal after heating; it may be hot - allow it to cool for at least 10 mins before touching
- Ensure all electrical equipment is safe (wires insulated etc.)

What does a high specific heat capacity indicate?

What does a high specific heat capacity indicate?

That a material can store a lot of thermal energy (per kg).

What are the units of specific heat capacity?

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$$J/kg°C$$