

WJEC Wales Physics GCSE

SP1.8: Specific Heat Capacity

Practical Flashcards

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Outline the basic steps of the practical.



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1. Measure the mass of the metal block being tested.
2. Insert the thermometer and heater into the holes in the block.
3. Record the initial temperature.
4. Record the new temperature every 10 minutes, whilst the heater is on.
5. Repeat for other metals and compare.



Define the 'Specific Heat Capacity' of a substance.



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The amount of energy needed to raise the temperature of 1 kilogram of a substance by 1 degree Celsius.



State the units for Specific Heat Capacity.



State the units for Specific Heat Capacity

$\text{J}/^{\circ}\text{C}/\text{kg}$

Joules/Degree Celsius/Kilogram



State the equation used to calculate the temperature change when a substance is heated. Give appropriate units.



State the equation used to calculate the temperature change when a substance is heated. Give appropriate units.

1. $\Delta E = m c \Delta \theta$

2. E: Energy (J), m: Mass (kg), c: Specific heat capacity (J/kg/°C), θ : Temperature (°C).



If the power of the heater is not given,
how can you calculate it?



If the power of the heater is not given, how can you calculate it?

By connecting it in parallel with a voltmeter and in series with an ammeter. Then applying the equation:

$$P = I \times V$$



Why do the metal blocks used in the experiment have two holes in them?



Why do the metal blocks used in the experiment have two holes in them?

One for the heater and one for the thermometer.



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.



What reading do you record during the experiment and how frequently?



What reading do you record during the experiment and how frequently?

You record the temperature value every 10 minutes from when the heater is inserted and switched on.



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.



How do you calculate the work done by the heater?



How do you calculate the work done by the heater?

Using the equation:

$$\text{Energy} = \text{Power of heater} \times \text{Time}$$

Where energy is equivalent to the work done.



What piece of equipment can be connected to the heater to directly measure the amount of energy that is being transferred?



What piece of equipment can be connected to the heater to directly measure the amount of energy that is being transferred?

A joulemeter.



Once the block has initially warmed up, describe the graph of temperature against work done by the heater that should be obtained.



Once the block has initially warmed up, describe the graph of temperature against work done by the heater that should be obtained.

It should be a linear relationship and so should produce a straight line.



If you start timing from when you switch on the heater, why may the graph not initially be linear?



If you start timing from when you switch on the heater, why may the graph not initially be linear?

There will initially be some thermal inertia whilst the block and heater warm up.



How can you overcome the effects of thermal inertia?



How can you overcome the effects of thermal inertia?

Start heating the block and leave it for 5 minutes before taking the first reading.



What does the gradient of the graph represent?



What does the gradient of the graph represent?

The inverse of the heat capacity for the metal block.



How do you obtain the specific heat capacity for the metal you are measuring?



How do you obtain the specific heat capacity for the metal you are measuring?

Divide the inverse of the gradient by the mass of the metal block used.

$$c = (1 / \text{Gradient}) / \text{Mass}$$



What is the difference between heat capacity and specific heat capacity?



What is the difference between heat capacity and specific heat capacity?

Specific heat capacity is the heat capacity measured **for a mass of 1 kg.**



Why should you wrap insulation around the outside of the metal block?



Why should you wrap insulation around the outside of the metal block?

To reduce the heat loss to the environment and ensure the temperature reading is as accurate as possible.



What safety precautions should be taken when carrying out this experiment?



What safety precautions should be taken when carrying out this experiment?

1. Avoid touching the metal.
2. Use a heatproof mat.
3. Avoid spilling water near the power supply when adding drops to the thermometer hole.

