

MEASUREMENT OF THE SPECIFIC HEAT CAPACITY FOR A SOLID

Specification reference: A level Component 1.8 – Thermal physics

Theory:

Assuming no energy losses:

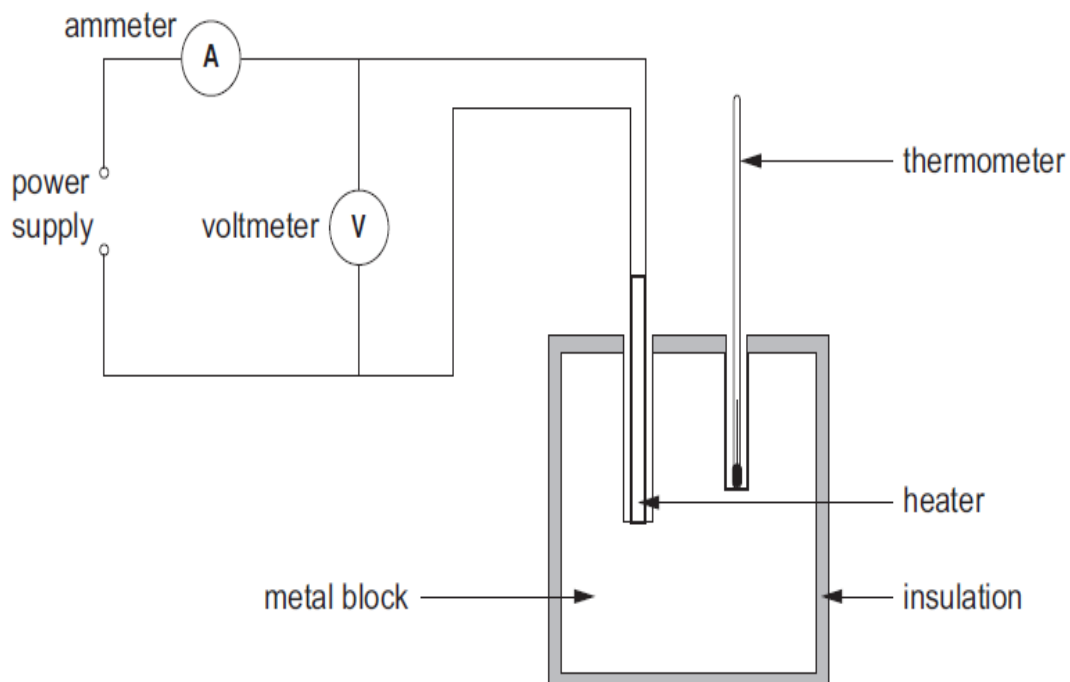
Electrical energy supplied by the heater = heat received by the block

$$ItV = mc(\theta_2 - \theta_1)$$

Where c = specific heat capacity and $(\theta_2 - \theta_1) = 30^\circ\text{C}$. Hence:

$$c = \frac{ItV}{30m}$$

Apparatus:



In addition to the apparatus shown in the diagram a balance and a stopwatch are needed.

Further guidance for technicians:

Blocks pre-drilled and with surrounding insulation can be purchased from most school science suppliers. A few drops of glycerol could be placed in the thermometer hole to improve thermal contact with the block.

Experimental Method:

Use a cylindrical block of the metal to be tested (such as copper or aluminium). The block should be well lagged using an insulator such as polystyrene and it needs two pre-drilled holes, one for a heater and one for a thermometer. Measure the mass, m , of the block and record its initial temperature, θ_1 . Switch the heater on and start the stopwatch. Record the voltmeter and ammeter readings. When the temperature has risen by 30°C switch the heater off and record the time taken, t . The formula can then be used to determine a value for c .

Extension:

By comparing the specific heat capacity to known constants it is possible to determine the type of metal the block is made from.

Practical Techniques:

Use ICT such as computer modelling, or data logger with a variety of sensors to collect data, or use of software to process data.