MEASUREMENT OF THE SPECIFIC HEAT CAPACITY FOR A SOLID

Specification reference: **A2 Unit 3.4 – Thermal physics**

Theory:

Assuming no energy losses:

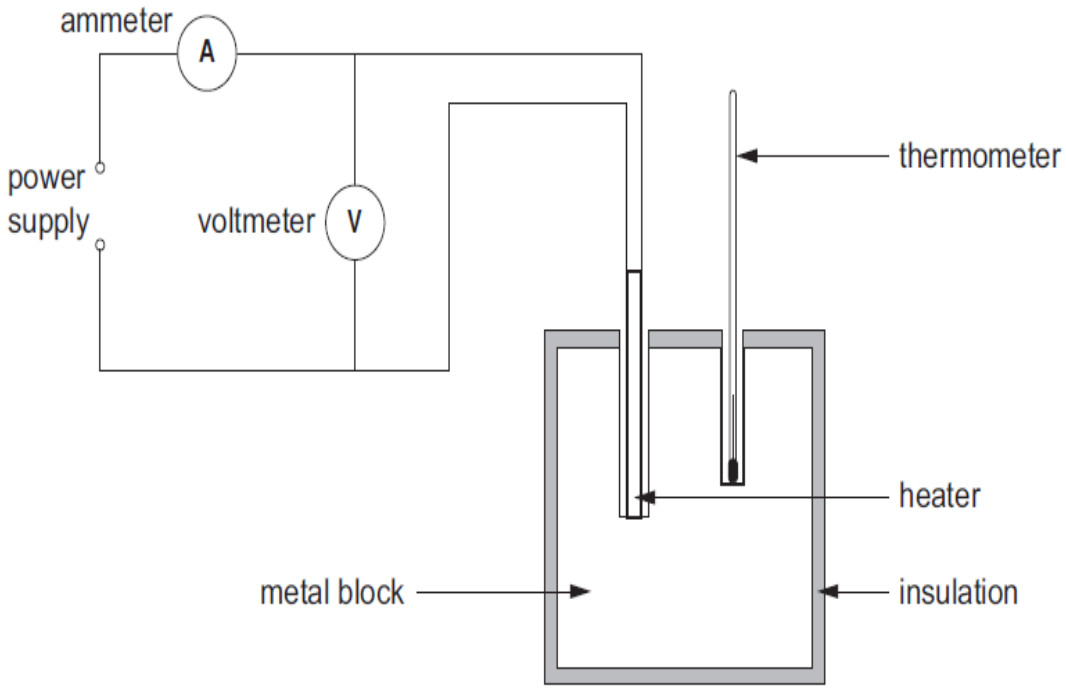
Electrical energy supplied by the heater = heat received by the block

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

Where c = specific heat capacity and $(\theta_2 - \theta_1)$ = 30 °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 ^{o}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.