



JOULE'S CALORIMETER

Cat: HL0840-001 Joule's Calorimeter PA0840-002 Joule's Insert only

Heater element resistance: 2 OHM approx.

2 to 12 V.DC. operation (with element under water).

The IEC Joule's Calorimeter insert may be fitted to any standard 50mm diam x 75mm deep copper calorimeter cup. It is used for heating liquids (usually water) to determine the electrical equivalent of heat required to raise the temperature of a given weight of water a given number of degrees. The unit consists of an insulated top plate, two 4mm diam. socket head terminals, a small heating element of approx. 2 ohm resistance and a plastic stirrer which is captive on the heater support pins.

HL0840-001



PA0840-002



Physical size:

Weight: kg

Size:

Weight: kg

USING THE JOULE'S INSERT:

Place exact weight of water into a calorimeter cup and place the cup into an insulating jacket. Position the Joule's insert, taking care that the heater is definitely fully under the water. Set a power supply to say 4V.DC. but do not turn on.

Connect a voltmeter across the terminals of the Joule's insert and an ammeter in series with one of the leads from the power supply so that a measurement of volts and amps can be made (for later calculation of Watts).

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Fit a 0° - 50° C. ($\times 0.2^{\circ}$ or $\times 0.5^{\circ}$) thermometer into the central hole in the lid and support it so that it does not quite touch the heating element or the bottom of the cup. Take the stirrer handle and move up and down to stir the water. After a short time, take a careful reading of the 'initial temperature' of the water. Take a stopwatch and, at the time of starting it, turn on the power supply. Whilst the time is proceeding, take a careful measurement of volts and amps. Stir the water constantly and observe the thermometer. When the water has increased its temperature by about 10° C., stop the stopwatch and turn off the power source. Continue to stir and read the thermometer to find the maximum temperature attained. Note that temperature.

NOTES:

It is important that the temperature is read accurately and that all the heat has had time to enter the water and that the thermometer has had time to respond to the heating. Therefore always heat the calorimeter slowly (low electrical power) and always continue to stir the water after the power supply has been turned off so that you are sure to read the absolute MAXIMUM temperature attained.

Do not operate the Joule's insert when not immersed in water. If you do, the heating element will be very hot and can give a bad burn. If the voltage is too high, the heating element may burn out and will be permanently destroyed. Do not use a voltage higher than necessary for the experiment.

Do not heat the water too quickly and do not heat the water to high temperatures. A suitable voltage is between 2 and 8 volts (depending on the volume or weight of the water). If the water temperature is too high: It can boil and will therefore be dangerous. Excessive conductive heat losses in the cup and up the heater support pins will make the experiment less accurate.

The information gained from the experiment is as follows: Weight of water. Initial temperature. Final temperature. Therefore the calculated temperature change. Time of heating. Watts of electrical power dissipated by the heater, Electrical energy passed into the water.

Perform your calculations as required by your experiment.

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