

Joules Calorimeter

Complete and Insert Only



HL0840-001 Complete



PA0840 Insert Only

Description:

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 diameter socket head terminals, a small heating element of approx. 2 ohm resistance and a plastic stirrer which is captive on the heater support pins.

Heater element: 2 ohm approx. 2 to 8 V.DC. operation (with element immersed).

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).

Joule's Complete	Height: 105mm	Diameter: 55mm	Weight: 96g
Insert Only	Height: 100mm	Diameter: 50mm	Weight: 40g



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Fit a 0° - 50°C. (x0.2°C or x0.5°C) 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 a high temperature. 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. Also, at high temperatures, there will be much higher conductive heat losses in the cup and up the heater support pins and this will make the experiment less accurate.

Depending on the purity of the water used, electrolysis of the support rods may occur, creating a sludge in the calorimeter cup and cause the support rods to discolour.

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.

Replacement Heating Element:

PA0840-003 2 ohms, Wound from 0.32mm Constantan or Eureka wire
(straight length approx.350mm).

Designed and manufactured in Australia