Object of the experiment

1. Investigate the relationship between a rise in the temperature of water and the rise in thermal energy for constant mass

Setup

Settings for Joule and wattmeter:

- Use the *U, I, P* button to set the measured variable to be work and its value to 0.00 kWs.
- Press the button *t* START/STOP such that the red LED comes on.
- If necessary, press the OUTPUT button so that the left-hand LED lights up (no voltage at plug socket).
- Fill the measuring beaker with 0.8 kg of water.

Apparatus

1 Temperature sensor S, NTC	524 044
1 Universal physics measuring instrument	531 835
1 Immersion heater	303 25
1 Plastic beaker	590 06
1 Joule and wattmeter	531 831
1 Stand base, V-shaped, small	300 02
1 Stand rod, 25 cm, 12 mm diam.	300 41
1 Universal clamp, 0...80 mm	666 555
1 Leybold multiclamp	301 01

Procedure

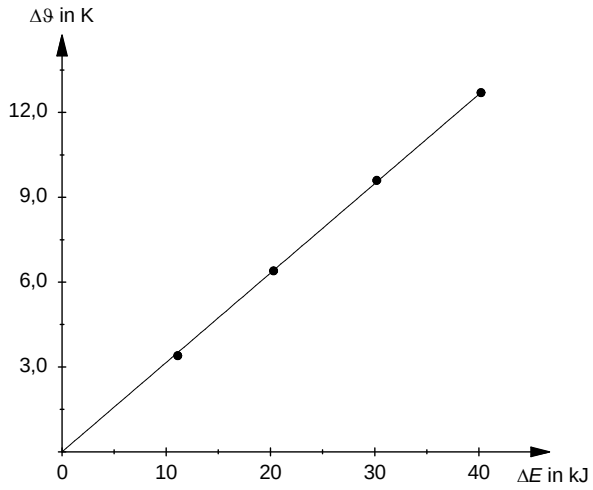
- Determine the temperature of the water ϑ_0 .
- Press the OUTPUT button of the Joule and wattmeter so that the right-hand LED lights up.
- Wait till the immersion heater has done about 10 kWs of electrical work.
- Then press the OUTPUT button of the Joule and wattmeter so that the left-hand LED lights up.
- Briefly stir the water in the measuring beaker with the immersion heater.
- When the system has settled to a constant temperature, read this temperature ϑ from the universal measuring instrument and enter it into the table.
- Press the OUTPUT button so that the right-hand LED lights up.
- Repeat the measurement when the immersion heater has done 20 kWs, 30 kWs and 40 kWs of work.
- Calculate the rise in temperature $\Delta\vartheta$ and plot a graph of the relationship between the thermal energy supplied ΔE and the increase in water temperature $\Delta\vartheta$.

Measuring example

ϑ_0 = 26.2°C, *m* = 0.8 kg

ΔE in kJ	ϑ in °C	$\Delta\vartheta$ in K
11.1	29.6	3.4
20.3	32.6	6.4
30.2	35.8	9.6
40.2	38.9	12.7

Evaluation



The more thermal energy is supplied to water of constant mass, the higher its temperature rises. The following is true: $\Delta E \sim \Delta\vartheta$.

Remark:

The proportionality demonstrated here only applies as long as the water remains in the same aggregate state.

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