Object of the experiment

1. Investigate the relationship between the change in thermal energy and the mass of water at constant temperature

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 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).

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

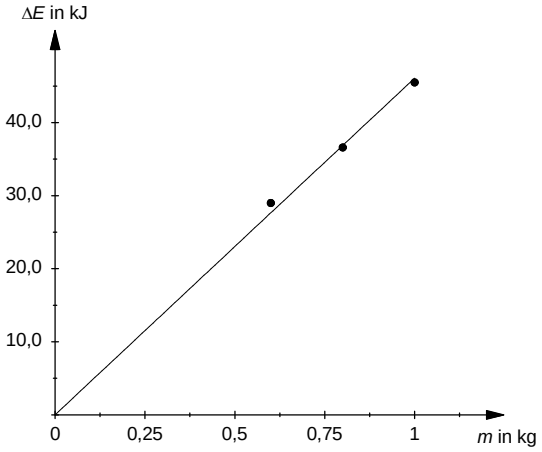
- Fill the measuring beaker with 0.6 kg (600 ml) of water.
- Determine the temperature of the water ϑ_0 .
- Start measuring by pressing the OUTPUT button of the combined Joule and wattmeter.
- While you are measuring, keep the water in the measuring beaker well stirred with the immersion heater.
- When the temperature has risen by about 9 K, stop the Joule and wattmeter measuring by pressing the OUTPUT button again.
- Stir the water in the beaker thoroughly again and wait until the temperature settles down to a constant level.
- Read off the measurements from the Joule and wattmeter and from the universal physics measuring instrument. Enter the results into the table.
- Set the display of the Joule and wattmeter back to zero by pressing the *t* START/STOP button twice.
- Now repeat the measurement with 0.8 kg (800 ml) and 1 kg (1000 ml).
- Plot a graph of the relationship between the supplied thermal energy ΔE and the mass of water *m*.

Measuring example

m in kg	ϑ_0 in °C	ϑ in °C	* $\Delta\vartheta$ in K	* ΔE in kJ
0.6	26.2	36.4	10	28
0.8	26.8	37.0	10	36
1.0	26.0	36.1	10	44

*Rounded values

Evaluation



The greater the mass of water, the larger the amount of thermal energy that needs to be supplied in order to obtain a constant rise in temperature. The following is true: $\Delta E \sim m$.

Remark:

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

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