

Product Information

Notes to explain why laboratory thermometers can appear inaccurate when used in schools for the boiling water experiment

Water boils at 100°C only under controlled laboratory conditions.

To test a thermometer at 100°C in our UKAS Laboratory, we use an oil bath controlled by a calibrated master platinum resistance thermometer, and control environmental issues such as ambient temperature, pressure and humidity with air conditioning and conversion tables.


This situation is impossible to replicate when using boiling water in a beaker in the classroom environment.

- Tap water contains impurities which will elevate or depress its boiling point.
- Atmospheric pressure has a similar effect.
- It is necessary to know whether the thermometer is a partial or total immersion model and to use it correctly; for instance, the emergent stem of a partial model when exposed to steam will be heated inappropriately and consequently over-read.

Thermometers are designed to be at their most accurate at the mid range position. Therefore, if 100°C is the important temperature, the appropriate model would be one covering -10/150°C or -10/200°C, rather than the usual -10/110°C types found in schools.

In practice, rather than attempting to prove that water boils at 100°C, we believe that teachers should use the visible discrepancy apparent during classroom experiments, to illustrate the effects of the factors listed above.

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Thermometer accuracy

All measuring instruments have an accuracy tolerance. A glass laboratory thermometer or digital probe thermometer for educational use will typically have an accuracy of +/- 1.0°C or 1.5°C, please always check the product data sheet.

Storage

- Always use and store the thermometer in a vertical position
- Not to be stored horizontally
- Not to be stored upside down
- Not to be banged about, ensure packed correctly when stored and if in transit
- Thermometers should not experience sharp sudden changes in temperature
- Store at room temperature, always bear in mind the range of your thermometer