

i Cryometer for Benzene

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Sample volume 150 μ l · Measuring time approx. 1,3 minutes

Simple operation with touch-display and Icon-style · Air cooling
Clear sample identification with built in scanner and time clock
Single-use plastic sample tubes · 3-point variable calibration
Built in printer · Multi level user access



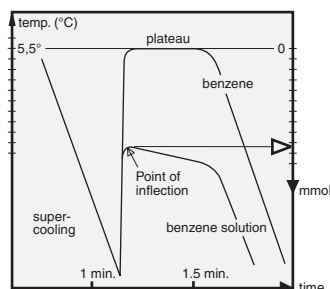
Measuring Principle



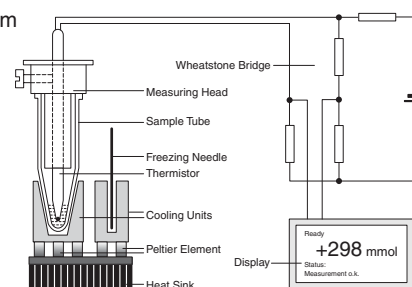
The freezing point of benzene solutions is measured. The depression of freezing point compared to pure benzene is directly related to the

molal concentration. Pure benzene freezes at $+5.5^{\circ}\text{C}$, a benzene solution with a molality of 1 mol/kg benzene at $+0.38^{\circ}\text{C}$.

Typical cooling curves of benzene and benzene solutions



Schematic diagram



Function and Description

The sample is filled in a plastic sample tube and cooled via a Peltierelement. These are semiconductor devices, which become cold on one side and warm on the other when electrical current flows through. The cold side cools the sample whilst the heat from the warm side dissipates into the air by convection.

The Löser-Cryometer transports the warmth via cooling surfaces into the atmosphere, an extra water supply is not necessary. Operation of the instrument requires only an electrical socket. The temperature on the cold side is kept electronically constant.

During the measuring process the temperature of the sample is measured by a thermistor (a temperature dependent resistor). This is part of the measuring head onto which the tube is placed.

The measuring head is attached to guide rods which protect it from accidental damage.

At a defined supercooling the freezing process is started by lowering a needle with ice crystals into the sample tube. The freezing point of the sample is reached.

The method of initiating the freezing process is important for the reproducibility of measurements. Dipping a needle with ice crystals into the sample gives more exact results than stirring with a wire which is constantly dipping into the sample. Because of linear correlation between molality and freezing point the measurement of freezing point is a determination of molality. The results are displayed as mmol/kg C_6H_6 .

Technical Data

Sample volume: 150 μl

Measuring time: approx. 1.3 minutes (150 μl)

Reproducibility: $\pm 1\%/\pm 2 \text{ mmol}$ (150 μl)

Measurement range: 0 ... 1000 mmol/kg C_6H_6

Measurement display changeable (mmol/m $^{\circ}\text{C}$)

Measurement memory: 200 measurements with sample numbers

Data interfaces: USB/RS 232 for PC and RS232 for handscanner

Power supply: 100-230V AC approx. 65 VA

Dimensions: Width 190 mm, height 278 mm, depth 216 mm

Weight: approx. 4.3 kg The Instrument is CE-labelled

Accessories included:

50 plastic tubes, Spare thermistor, spare needle, spare fuses, Cleaning fluid and little funnel for cleaning needle hole, waste bottle with tube, USB/RS232 cables and data transmitting program, operating instructions.

Subject to technical changes (18.09.2017).

Calibration

The zero point is calibrated with pure benzene and a standard point with a standard solution 200 mmol. Occasional checks show that the calibration is very stable. An additional 400 mmol solution can be used to calibrate, whereby the linearity is raised by higher concentrations.

The second and third calibration point could be changed by user to meet other standard concentrations.

Special Features and Advantages

- Touch operation with Icon-style on a wide black & white graphic LC display.
- Selectable languages.
- Multi level user access with passwords and usernames.
- Single use plastic tubes.
- Blocking of measuring tube or needle by freezing in stand-by mode is counteracted by regular automatically defrosting.
- Needle can be rinsed with benzene or water.
- Built in thermoprinter and scanner for sample numbers.
- Integrated real time clock to sort measurements and calibrations.
- Reduced operating costs as no extra water supply is necessary.
- Wide input voltage range 100-230 V AC suitable for all countries.

Operating of the Instrument

- Switch on instrument, wait for ready display (approx. 3 minutes).
- Place 150 μl sample in the sample tube ($\pm 10\%$).
- Place the sample tube onto the measuring head.
- Lower the measuring head. The sample tube is dipped into the cooling slot.
- Enter sample number using the built in scanner or touch-display. These entries can also be made after measurement.
- Supercooling is reached after 1 minute and the needle with the ice crystals is dipped into the sample.
- As freezing point is reached, the display shows the measurement value in mmol/kg and the instrument gives an audible tone. The measurement value is stored in the memory.
- Slide measuring head from cooling slot and remove the sample tube. Result will be printed with the built in printer.
- Wipe the thermistor with a soft tissue.

Extra Accessories:

- Analogue output for XY-plotter

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