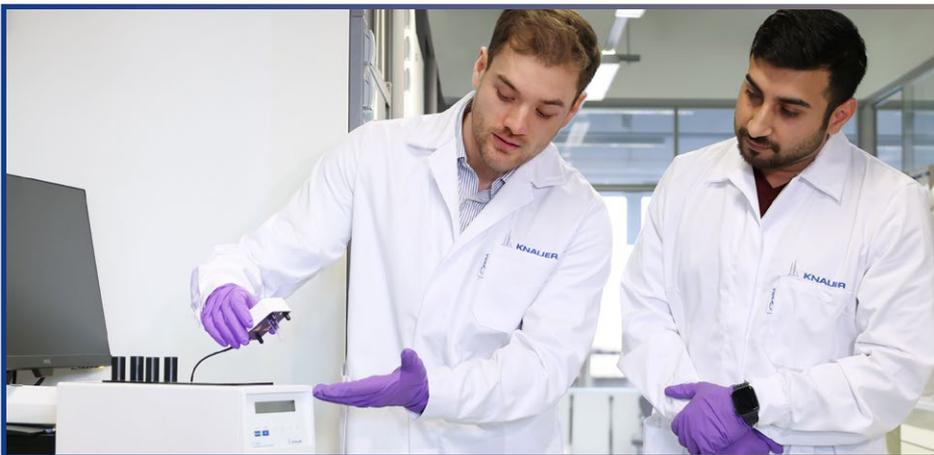


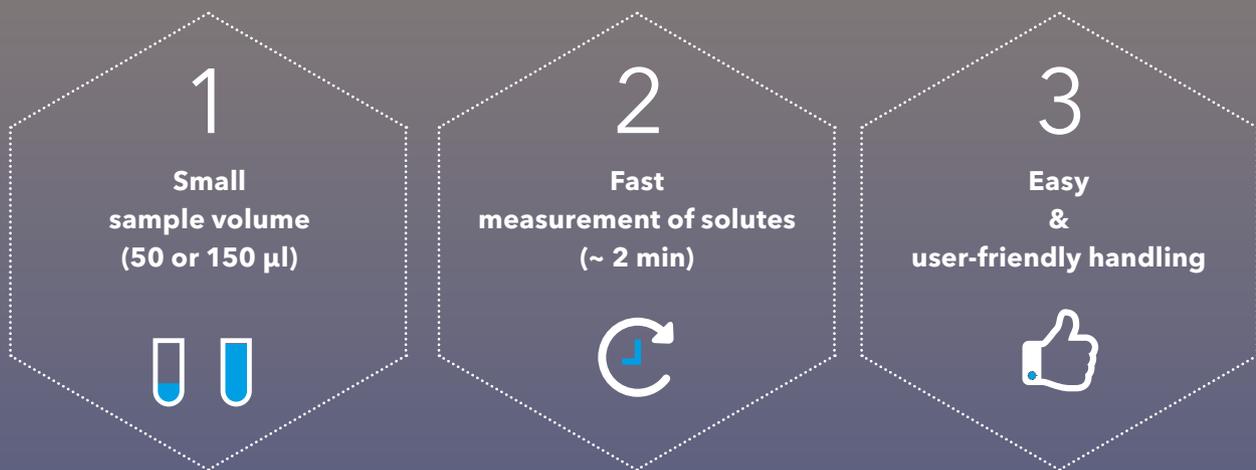
Freezing point osmometry



Easy and fast determination of the osmolality of various aqueous solutions.

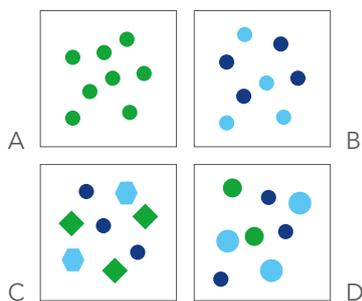
The KNAUER Freezing Point Osmometer

The K-7400S Semi-Micro Osmometer precisely determines the freezing point of aqueous solutions, enabling easy and precise osmolality measurement of a wide range of samples, from pharmaceutical products to soft drinks.



Theory of Osmolality

Osmolality is a general measure of the particle concentration in a solute. It does not depend on the nature of the molecules, but solely on their number. Therefore, a two molar solution of a non-dissociating molecule (A) has the same osmolality as a one molar solution of a fully dissociating salt composed of two ions (B). The osmolality of a solution is the same, even when molecules vary in shape (C) as well as in size (D). In other words,, all solutions containing the same number of osmotically active particles – regardless of their chemical properties – exhibit identical osmolality.



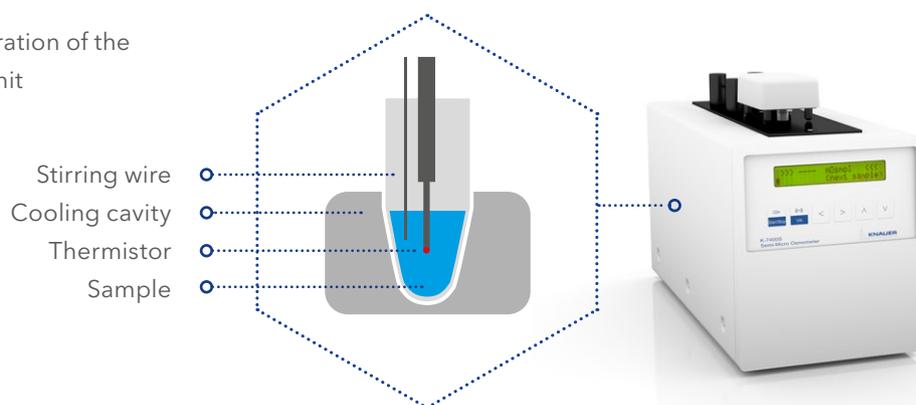
Freezing point osmometry

The measurement principle of the K-7400S Semi-Micro Osmometer is based on the colligative property of freezing point depression.

If a solute is added to a liquid, this leads to a decreased freezing point of the solution. The depression is 1,858 K per 1 mole of an ideally dissolved compound in one liter of water.

This effect depends only on the number of particles in the liquid and not on the physical or chemical properties of the solutes. Because of this linear correlation, the osmolality of a sample can be determined by precisely measuring its freezing point.

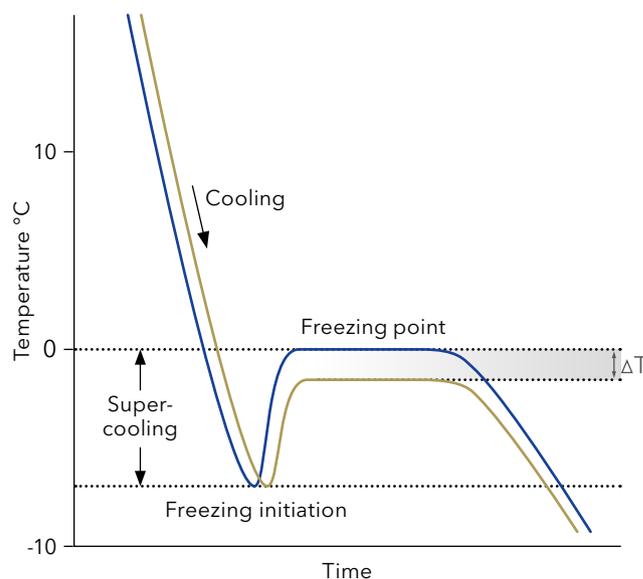
Schematic illustration of the measurement unit



Measuring process

At the beginning of a measurement, the sample is cooled by a microprocessor-controlled Peltier element. During this process, the solution is supercooled below 0 °C while still remaining liquid. At a certain temperature, the freezing process is initiated by rotating the stirring wire. The formation of ice crystals causes the release of thermal energy, which raises the temperature of the sample. After a short period of time, an equilibrium is reached in which melting and formation of ice crystals are balanced and the sample's temperature stays constant. This plateau marks the true freezing point of the sample.

Throughout the entire process, the temperature of the solution is measured by a high-precision thermistor. Thanks to a resolution of 1/1000 K, the freezing point temperature is accurately determined and even small differences in osmolality between two samples can be measured.



Technical data

Sample volume	50 or 150 μ l
Osmolality range	0–2 000 mOsmol/kg
Resolution	1 mOsmol/kg
Test time	~ 2 min
Precision	SD \leq 4 mOsmol/kg [0–400 mOsmol/kg], RSD \leq 1 % [400–2 000 mOsmol/kg]
Linearity	\pm 1 % [0–1 500 mOsmol/kg] \pm 1.5 % [0–2 000 mOsmol/kg]
Calibration	Two-point calibration (0 mOsmol/kg and one free selectable osmolality), optional: Three-point calibration (0 Osmol/kg and two free selectable osmolalities)
Interfaces	RS-232 port
Control	Keypad (LC display, 2 rows with 24 characters) Optional: EuroOsmo 7400 software
Power supply	100–240 V, 50–60 Hz, 70 W
Dimensions	160 \times 182 \times 340 mm (W \times H \times D)
Weight	5.3 kg
Ambient conditions	10–35 $^{\circ}$ C, 20–80 % relative humidity (noncondensing)

EuroOsmo 7400 control software

Additional data management with
a user-friendly interface

The K-7400S Semi-Micro Osmometer is a stand-alone device. Therefore, all functions of the instrument are accessible via the keypad. For additional storage and data management functions, users can work with the EuroOsmo 7400 software. It offers a user-friendly interface to control the K-7400S Semi-Micro Osmometer via a PC. Measurement parameters can easily be changed and sent to the instrument via the software. For each sample, a temperature curve is displayed to visualize the measurement process.

Samples can be named individually and the measurement results can be saved for archiving. The data can also be exported in different file formats (e.g. *.xls, ASCII or Tab delimited text files). Thus, the import into laboratory information management systems (LIMS) is also possible. By supporting the use of a barcode scanner, sample identification can be transferred automatically, reducing the risk of incorrect sample assignment.

Features



Change settings
more easily



Visualization of the
measurement



User-friendly
interface

○ **Sample & result list**

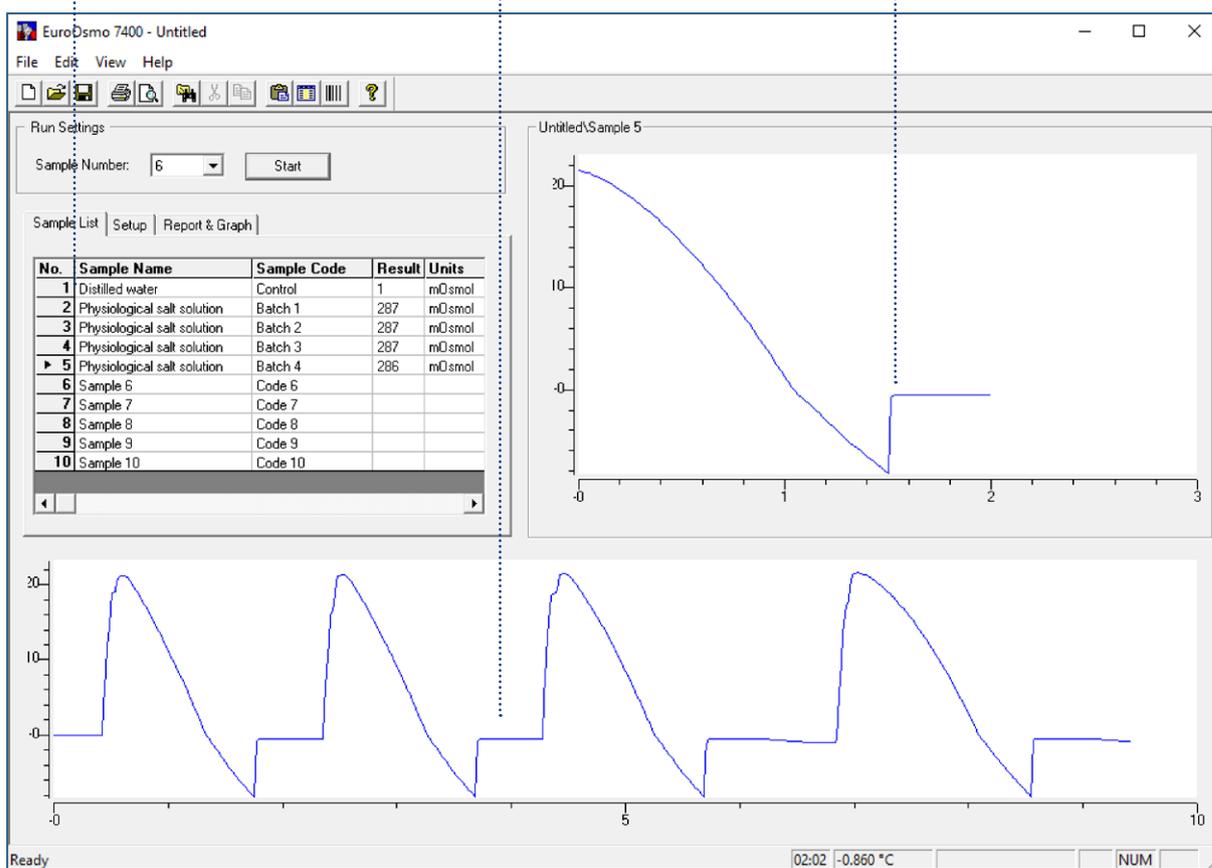
Individual naming of samples and overview of test results.

○ **Monitor view**

Overview of the last measurements to allow quality control of the analysis.

○ **Measurement view**

Visualization of the current measurement.



Operating systems:

- Windows 7
- Windows 8
- Windows 10
- Windows 11

PC hardware:

The system requirements for installing the software are very low. In general, EuroOsmo 7400 runs on any PC that supports one of the listed operating systems. One RS-232 port is required for the connection to the instrument.



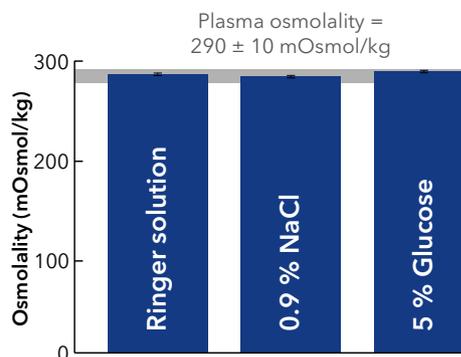
Applications of freezing point osmometry

Freezing point osmometry is a fast and reliable method to determine the osmolality of various solutions.

In combination with the small sample size required and the simple measurement procedure, it is a preferred method for laboratory analysis in industry and academia.

Quality control of pharmaceutical solutions

The osmolality of solutions used in the clinical and pharmaceutical field is an important issue that requires regular monitoring. Especially infusion solutions, but also solutions for external use, such as eye drops and rinsing solutions, have to be isotonic to ensure the physical well-being of the patient. Therefore, strict quality control is needed. The K-7400S enables a quick analysis of such solutions and provides reliable results even with small sample volumes. Thanks to the broad measurement range, high osmolality solutions can also be analyzed.



Analysis of isotonic infusion solutions

Three commonly used infusion solutions were analyzed with respect to their osmolality. All of them were in the range of human plasma (290 ± 10 mOsmol/kg) and thus are suitable for therapy. Physiological saline solution is also used for inhalation, rinsing, or as an eye drop solution. The correct osmolality is crucial for these treatments as well.

European Pharmacopoeia

The K-7400S Semi-Micro Osmometer complies with the European Pharmacopoeia for osmolality (Ph. Eur. 2.2.35).



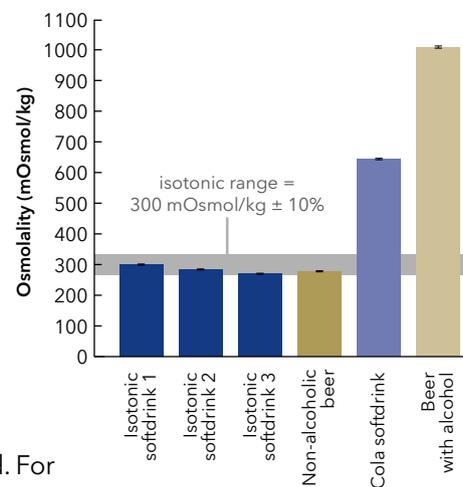


Analysis of isotonic drinks

Isotonic drinks are becoming increasingly popular among professional and amateur athletes. Due to their special composition, the contained nutrients and minerals can be rapidly resorbed and thus can allow a fast recovery after intense sports activity. In contrast, non-isotonic drinks, such as normal cola or beer, need to be diluted in the intestine prior to adsorption. Thus, these beverages tend to have a dehydrating effect. Since the osmolality of the solution is the critical feature in this context, an

exact test method is needed. For this determination, the K-7400S Semi-Micro Osmometer is perfectly suited because it works independently of sample composition. Therefore, drinks as diverse as sugar-containing softdrinks, their sugar-free counterparts, as well as alcoholic and non-alcoholic beers and many more can easily be analyzed. This makes it a fast and reliable method for both quality control and for comparing different drinks with respect to their potential beneficial effect.

Freezing point osmometry



Analysis of several isotonic and non-isotonic drinks

Six different samples of isotonic and non-isotonic drinks were analyzed using the K-7400S Semi-Micro Osmometer. All beverages advertised as isotonic had osmolality values within the range of 300 mOsmol/kg \pm 10% (grey bar). Thus, they met the specifications for isotonic drinks defined by the European Food Safety Authority. In contrast, a typical softdrink or an alcoholic beer showed much higher osmolalities.

PHARMACEUTICS
For quality control of infusion solutions, inhalation, rinsing solutions and eye drops.

INDUSTRY
For process monitoring and quality checks of reagents and chemicals.

BEVERAGES & FOOD

For analysis and quality control of beverages such as isotonic drinks and beer.

ACADEMIA

For research on plant sap and insect haemolymph and testing of nutrient solution and cell culture media.

A tradition of osmometry

KNAUER is one of the pioneers in the field of osmometry

In many laboratories, the accurate concentration of solvated molecules in a liquid is essential for daily work routines.

The KNAUER K-7400S Semi-Micro Osmometer is ideally suited for this task, since most solutes in a liquid can be measured. The determination of total particle concentration, or osmolality, becomes fast and simple.

KNAUER is one of the pioneers in the field of osmometry and is known for its reliable and user-friendly instruments for many decades. In 1962, the company founder Dr. Herbert Knauer invented the company's first freezing point osmometer. Since then, the measurement technology has been continuously adapted and advanced. The latest development in this line of products is the K-7400S. Based on proven KNAUER freezing point technology, this new device features a small footprint, robustness, and silent operation compared to its popular predecessor, but has been significantly improved in its specifications.



Today



2006



1993



1962

Ordering information

Product	Art. No.	
	A0006AC	K-7400S Semi-Micro Osmometer with measuring head, incl. calibrating solutions (400, 850 mOsmol/kg), plastic sample tubes and IQ (OQ is available on request); RS-232 connection cable, lint-free cleaning tissues
Accessories & spare parts		
	A0840-2	Measuring head, 150 µl; compatible with the K-7400 and the K-7400S Semi-Micro Osmometer
	A0840-4	Measuring head, 50 µl; compatible with the K-7400 and the K-7400S Semi-Micro Osmometer
	A01242	100 mOsmol/kg calibration solution (12 vials)
	A01240	300 mOsmol/kg calibration solution (12 vials)
	A01241-1	400 mOsmol/kg calibration solution (12 vials)
	A01250	850 mOsmol/kg calibration solution (12 vials)
	A01248	2000 mOsmol/kg calibration solution (12 vials)
	A02721	Plastic sample tubes*, 100 pcs
	A0272	Plastic sample tubes*, 500 pcs
	A0720	Plastic sample tubes*, 1 000 pcs
	A02330	Cleaning tissue, lint free
	A3711	Plain paper printer for the K-7400S Semi-Micro Osmometer with power supply and RS-232 printer cable (optional for stand-alone use)
	A7013	Paper roll (60 m); spare part for printer
	A7014	Ribbon tape; spare part for printer
	A3705	EuroOsmo 7400; recommended software package for the K-7400S Semi-Micro Osmometer (optional)
	A13120	Computer for EuroOsmo 7400 incl. monitor and English Windows operating system
	A13270	Barcode scanner for EuroOsmo 7400 (optional)

* Sample tube characteristics can impact osmometry results significantly. The plastic sample tubes offered by KNAUER are tested suitable for freezing point osmometry.

(U)HPLC • Prep. LC • FPLC • SMB • LNP • Osmometry



Innovation

Own hardware and software development



Customized solutions

Pumps, detectors, valves and systems adapted to your needs



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think **LC.** think **KNAUER.**

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