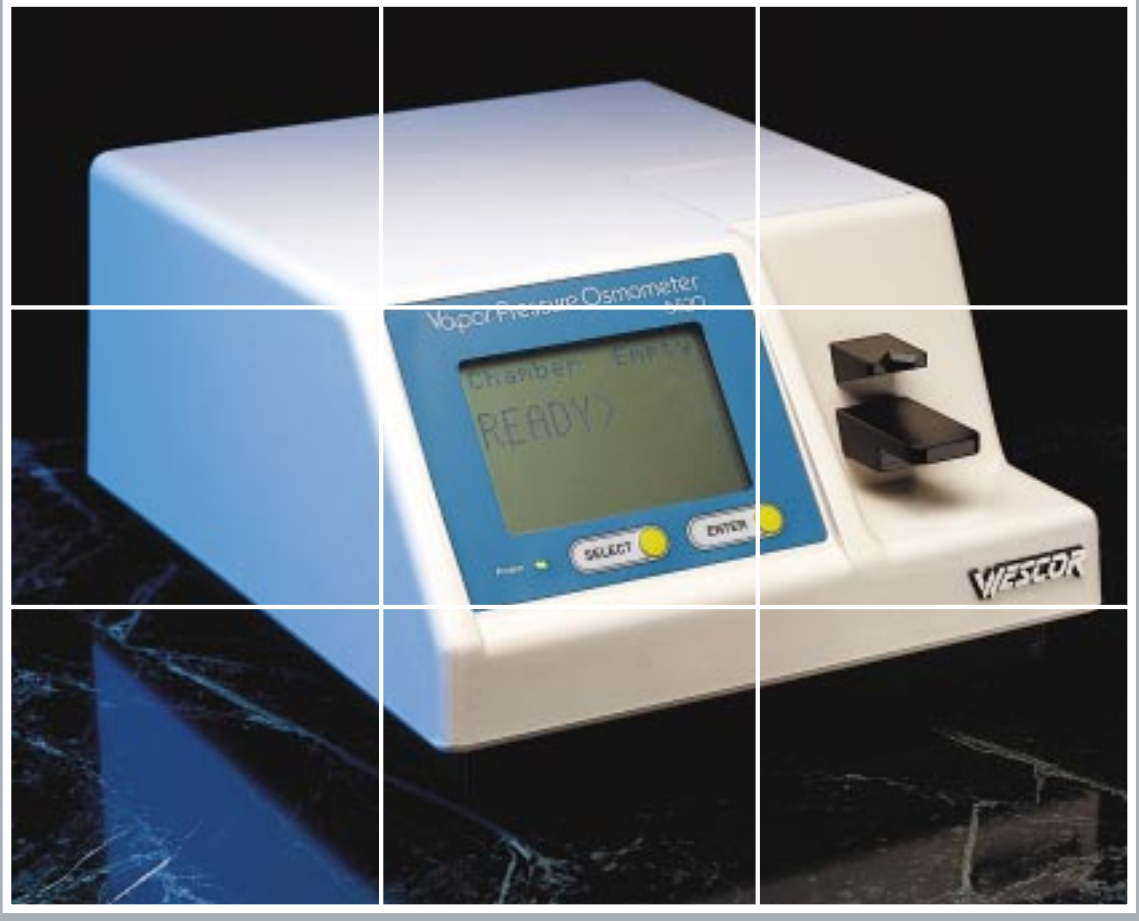
VAPRO®

Vapor Pressure Osmometer

THE LATEST FROM THE LEADER

Model 5520露点渗透压仪



LEADERSHIP IN OSMOMETRY SINCE 1973

WESCOR®

马普科学仪器有限公司

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In 1973 Wescor introduced its first vapor pressure osmometer. Since then, the vapor pressure method has proven itself in thousands of laboratories and myriad applications. Our customers have rendered a clear verdict—vapor pressure osmometry is superior to all other methods:

"Vapor pressure measurement is the fastest and easiest method of determining osmolality, and the thermodynamic limitations of vapor pressure osmometry are least restrictive. For these reasons, vapor pressure osmometry is the method of choice for most fluids in biology and medicine in which water is the solvent."[1]

The fundamental advantages of vapor pressure osmometry are now embodied in the most intelligent osmometer ever produced. Wescor's Vapro® offers an intuitive approach that frees you from intensively "managing" an instrument.

Why Vapor Pressure?

The vapor pressure method determines osmolality at room temperature with the sample in natural equilibrium. This precludes cryoscopic artifacts due to high viscosity, suspended particles, or other conditions that can interfere with freezing point determinations, giving Vapro a much broader range of error-free applications.

Easy Calibration

With the Vapro osmometer, say goodbye to frequent and intricate calibration procedures. Vapro is self-calibrating and exceptionally stable. Calibration is verified using osmolality standards. If recalibration is necessary, simply select the calibration option. Calibration is then performed and verified by the instrument.

Customer Support

Wescor osmometers have established a record of reliability unrivaled by all other osmometers. This is backed by Wescor's strong commitment to customer support. You will always find the help you need from our knowledgeable and friendly customer service staff.

1. Sweeney T. E., and Beuchat, C. A., Limitations of methods of osmometry: measuring the osmolality of biological fluids. Am. J. Physiol. 264 (Regulatory Integrative Comp. Physiol. 33): R469-R480, 1993.

Menu Driven
Functions are selected from a simple and logical menu.

Superb Accuracy
Unsurpassed by any other method, error is less than 1% in the clinical range.

Trouble-free Operation
Few moving parts, no mechanical adjustments, no mechanical breakdowns.

Easy Calibration
A push of a button automatically sets the calibration parameters.

Economical
Low initial cost, no expensive proprietary supplies.

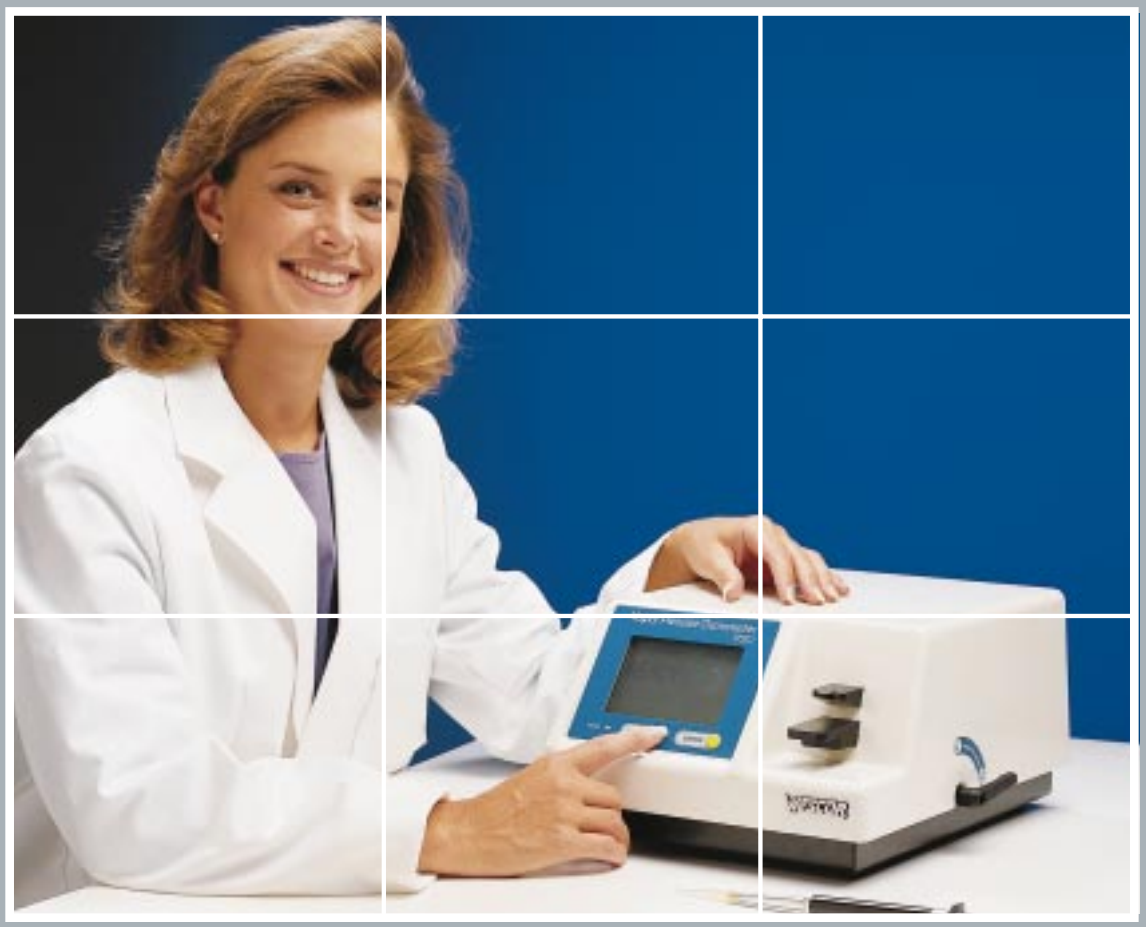
Self-Diagnostic
Built in self-diagnostics alert you to instrument malfunction or procedural error.

Average Mode
Displays the average and standard deviation of several samples.

Clean Test
Gives a precise indication of thermocouple cleanliness (uses a 100 mmol/kg standard).

NO BETTER METHOD
NO BETTER INSTRUMENT

Wescor's Vapro is the most advanced, easy-to-use vapor pressure osmometer ever developed.



The Vapro osmometer brings unprecedented simplicity, convenience, and accuracy to the routine determination of osmolality to help meet the demands placed on today's clinical laboratory.

Auto-calibration, self-diagnostics, statistical analysis, and computer interface / printout capabilities increase the utility of this instrument for any busy laboratory. Small sample requirement allows you to assay hard-to-get or expensive samples using the superior characteristics of the vapor pressure method.

Since solution concentration, or osmolality, is fundamental to all physiochemical processes in the body involving diffusion of solute or transfer of fluids through membranes, knowledge of the various body fluid osmolalities is fundamentally useful in prognosis, evaluating water / solute balance, and in monitoring I.V. therapy.

Osmolality measurements on serum or whole blood detect any departure from the narrow range of normality (270 to 290 mmol / kg) maintained in homeostasis. Abnormal blood osmolality occurs in association with shock and shock / trauma, water intoxication, anomalies in body sodium balance, increased glucose levels (ketogenic or nonketogenic diabetes), increased urea concentration (renal failure), and burns.

Sweat osmolality has been shown to be diagnostic of cystic fibrosis.[1, 2]

Osmolality measurements of laboratory reagents and of various solutions for enteral or parenteral administration provide valuable quality control data.[3]

Regardless of the application, you will find Vapro to be a remarkable partner in the laboratory.

1. Webster, H.L., and Barlow, W.K., New approach to cystic fibrosis diagnosis by use of an improved sweat induction/collection system and osmometry. Clinical Chemistry 27, 385, (1981).

2. Carter, E.P., Barrett, A.D., Heeley A.F., and Kuzemko, J.A. Improved sweat test method for the diagnosis of cystic fibrosis. Archives of Disease in Childhood 59, 919-922. (1984).

3. Ferrett, K.A.,and Giudici, R.A., Osmolality determinations of concentrated enteral nutrition formulas. Nutritional Support Services 2, 6 (1982).

Clinical Applications Include:

Emergency Room
a. Burn patients
b. Trauma, head injury, and shock
c. Coma
d. Diabetic coma

Prognosis
a. Serum osmolality and osmolal discriminant
b. Renal function

Monitoring
a. Stool analysis
b. Body fluids
c. Surgery
d. ADH therapy
e. Renal dialysis
f. Post operative
g. Burn therapy
h. Insulin therapy
i. Fetal maturity
j. Hyper/hyponatremia

Diagnosis
a. Cystic Fibrosis diagnosis by osmolality assay of sweat.
b. Differential diagnosis of diabetes insipidus
c. Differential diagnosis of polyuria or oliguria

Quality Assurance
a. Blood bank assessment of residual glycerol in final cell suspensions.
b. Enteral and parenteral nutrition preparations
c. Physiological infusion solutions.
d. Monitoring infant formulas.
e. Reagent and standard solutions.

FOR THE CLINICAL LABORATORY:

No compromise in accuracy or convenience

Vapro is the latest vapor pressure osmometer from the undisputed leader in the field of research osmometry.

Unlike the cryogenic method, it handles samples of elevated viscosity and complex physical form. This provides biology researchers with data not previously obtainable, particularly in invertebrate physiology.

The noninvasive aspect of vapor pressure osmometry makes measuring osmolality feasible on the fluids associated with thin slices of plant and animal tissue. Such studies have been reported by Tornheim[1] (brain tissue) and Knepper[2] (kidney tissue). The instrument is also valuable for investigating multi-solvent solutions, whose properties are generally more complex than single solvent solutions, or when investigating biological and other fluid phenomena.[3]

Small sample size capability allows you to reliably assay samples as small as 2 µL using special procedures. This is an important feature considering the high cost of certain samples.

The Vapro osmometer adds convenience to its other capabilities with a host of features to help you get more done with less fuss. The instrument is truly simple to operate, and its internal diagnostics alert you to the need for sensor cleaning. All functions of the instrument can be selected from a simple menu.

1. Tornheim, P.A. Use of a vapor pressure osmometer to measure brain osmolality. J. Neuroscience Methods, 3, 21(1980).

2. Knepper, M.A., Measurement of osmolality in kidney slices using vapor pressure osmometry. Kidney International 21, 653 (1982).

3. Draviam, E.J., Custer, E.M. and Schoen, I. Vapor pressure and freezing point osmolality measurements applied to a volatile screen. Am. J. Clin. Path. 82, 6, 706 (1984).

Research applications include:

- Veterinary medicine
- Botany
- Plant physiology
- Electron microscopy
- Genetic research
- Food and beverage processing
- Pharmacology
- Marine biology
- Cancer research
- Molecular weight determinations (0-10,000 g/mol)
- Tissue culture
- Ophthalmology
- Transplantation and embryology
- Chemical industry
- Soil physics
- Agriculture
- Toxicology
- Pharmaceutical manufacturing and research
- Cell biology

THE LEADER IN RESEARCH OSMOMETRY

In most solutions, changes in concentration are accompanied by linear and proportional changes in the cardinal colligative properties of the solvent—vapor pressure, freezing point, and boiling point. Measuring any of these properties provides an indirect indication of osmolality, but among them, only vapor pressure can be determined passively without a forced change in the sample's physical state.

In the Vapro osmometer, vapor pressure is determined thermometrically by a fine wire thermocouple suspended in a small vapor space above the specimen in a sealed sample chamber. During a measurement cycle, the thermocouple undergoes a series of microprocessor-controlled temperature changes. The complete cycle is illustrated on the right.

STEP 1

After sample insertion, temperature and vapor pressure naturally equilibrate in the sealed chamber. The thermocouple senses the exact temperature of the air above the specimen, and the microprocessor sets this value as the null, or reference point for the measurement (T_A).

STEP 2

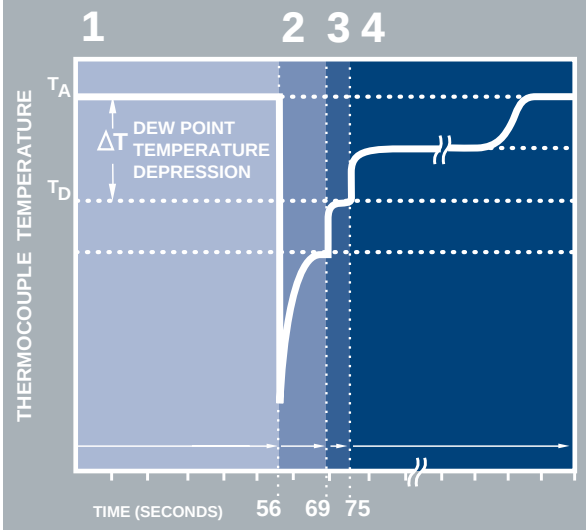
Next, the thermocouple is Peltier-cooled below the dew point temperature (T_D). Microscopic water droplets begin to condense upon the thermocouple surface.

STEP 3

The microprocessor then allows the thermocouple temperature to be controlled exclusively by the water condensing upon it. The heat of condensation causes the thermocouple temperature to rise, converging upon the exact temperature at which condensation ceases. This stable condition is achieved approximately one minute after sample insertion.

STEP 4

The point of temperature stability is the dew point temperature (T_D). The final readout on the instrument display is proportional to the dew point temperature depression with a resolution of 0.0003° C. Because dew point temperature depression is an explicit function of vapor pressure, the instrument can be calibrated to report results directly in Standard International units of osmolality, mmol/kg.



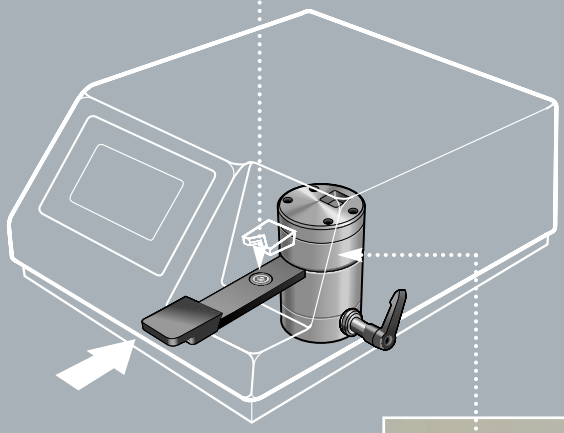
STEP 1: Sample equilibration

STEP 2: Thermocouple cooling/condensation

STEP 3: Dew point convergence

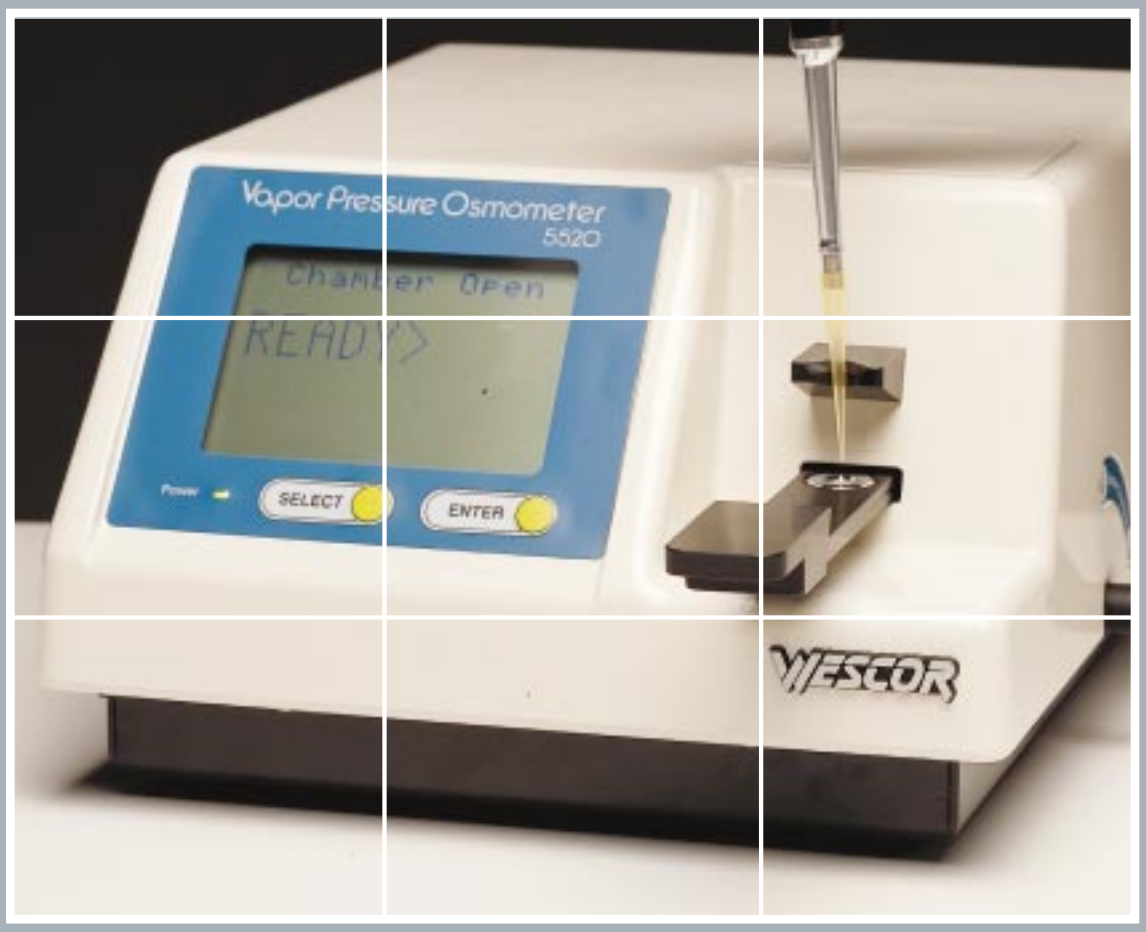
STEP 4: Read out

Pipette solution onto sample disk in the sample holder



Thermocouple sensor magnified approximately 200 times

HOW THE VAPRO OSMOMETER WORKS



Like the Vapro osmometer, Wescor's new Opti-mole™ glass-encapsulated osmolality standards are the result of our continuing commitment to technological innovation.

Reliability

Strict quality controls give our standards uncompromising accuracy to satisfy even the most stringent laboratory requirements. We guarantee the accuracy of Opti-mole calibration solutions.

Value

In terms of calibration cost per shift, Opti-mole beats all competitors. Each ampule contains 0.4 mL of solution, the optimum amount for an 8-hour shift. Why pay for more solution than you need?

Safety

Opti-mole standards are easy and safe to open. The long neck keeps your fingers safely away from the scored breaking point and requires less force to break. Each ampule pack comes with a safety breaker sleeve for added protection. An available ampule organizer simplifies ampule breaking and keeps them upright and handy.

Convenience

Opti-mole's simple and clear packaging concept keeps you in control of your osmolality standards inventory. To prevent mixups, lot numbers, expiration dates, and osmolality values are clearly visible and verifiable. No matter how you look at it, you will know what you have.

Ordering information:

OA-010 100 mmol/kg (60 Ampules)
OA-029 290 mmol/kg (60 Ampules)
OA-100 1000 mmol/kg (60 Ampules)
AC-061 Ampule Organizer

OPTI-MOLE™

THE NEW STANDARD OF QUALITY

VAPRO®
VAPOR PRESSURE OSMOMETER MODEL 5520
SPECIFICATIONS

Sample Volume		**10 µL nominal (Larger samples or samples as small as 2 µL can be measured reliably with special procedures)**
Measurement Range		**Typically 0 to 3200 mmol/kg @ 25° C ambient (up to 3800 mmol/kg with extended range option)**
Measurement Time		**75 seconds**
Resolution		**1 mmol/kg**
Repeatability		**Standard deviation = 2 mmol/kg**
Linearity		**2%of reading from 100 to 2000 mmol/kg**
Readout		**10 X 6.8 cm LCD**
Operating Temperature		**15 to 37° C ambient (instrument should be at stable temperature before calibrating)**
Calibration		**Automatic using Opti-mole™ osmolality standards (non-battery memory backup system)**
Serial Output		**RS-232 (ASCII format)**
Electrical		
	Line Voltage	**100 to 120 V or 220 to 240 V nominal, 50 to 60 Hz (set at factory, user-selectable with fuse change)**
	Power	**Less than 5 watts**
	Fuses	**1/8 amp time-delay type for 100/120 volts (2 required) 1/16 amp time-delay type for 220/240 volts (2 required)**
Size		
	Height	**17 cm (6.6”)**
	Width	**29 cm (11.5”)**
	Depth	**34 cm (13.5”)**
Weight		**3.6 kg (8 lbs)**

Underwriters Laboratories Listed, Electrical Equipment for Laboratory Use, UL 3101-1 (IEC 1010-1)

Buyer’s Specifications

The osmometer shall be a Wescor model 5520 or equivalent and shall operate on the vapor pressure depression principle. The osmometer shall be capable of routine osmolality determinations on sample volumes of 10 microliters and shall perform the measurement automatically once the sample has been loaded. The osmometer shall be capable of routine osmolality determinations on whole blood. The osmometer shall consume no more than 5 watts of electrical power and shall weigh less than 4 kg. The osmometer shall not require any routine maintenance other than periodic cleaning of the thermocouple sensor assembly.