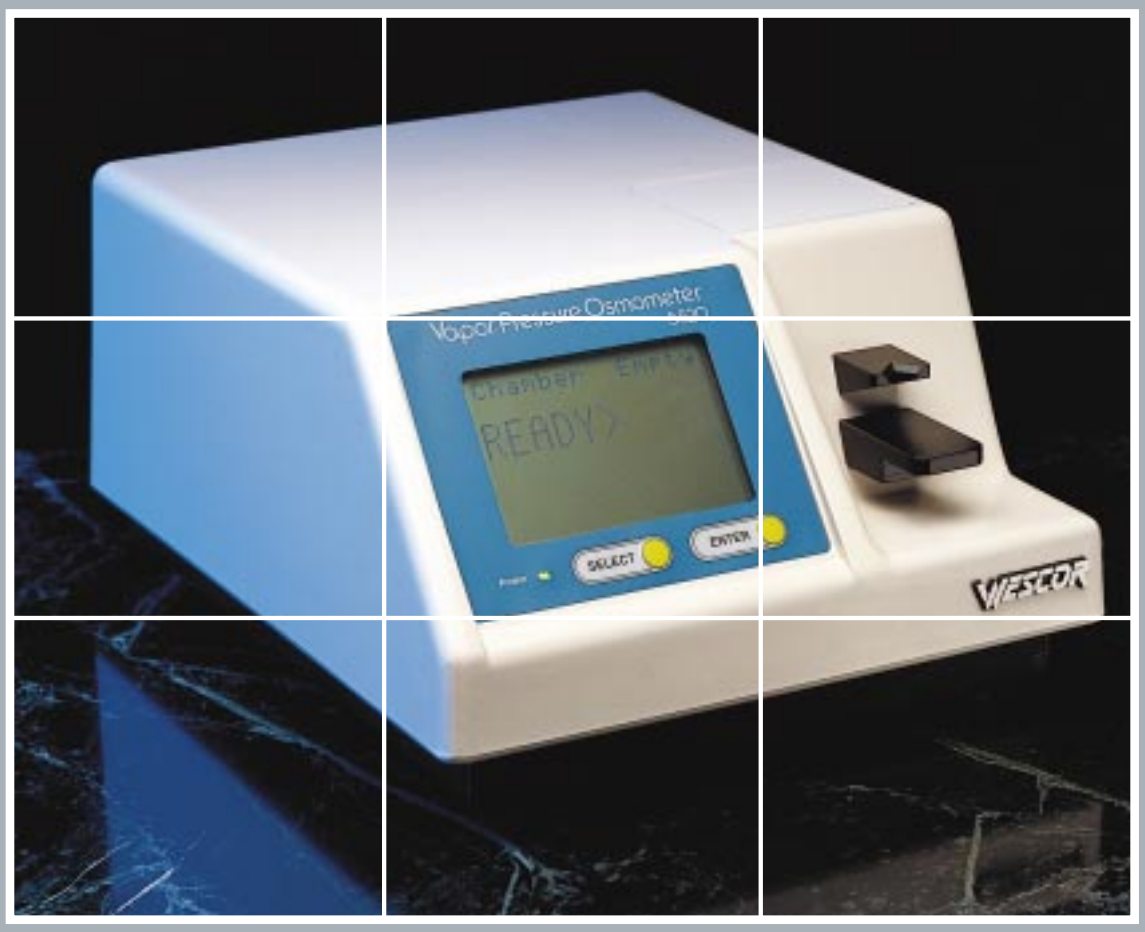
VAPRO®

Vapor Pressure Osmometer

THE LATEST FROM THE LEADER



LEADERSHIP IN OSMOMETRY SINCE 1973

WESCOR®

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.

SALES AND SERVICE WORLDWIDE

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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

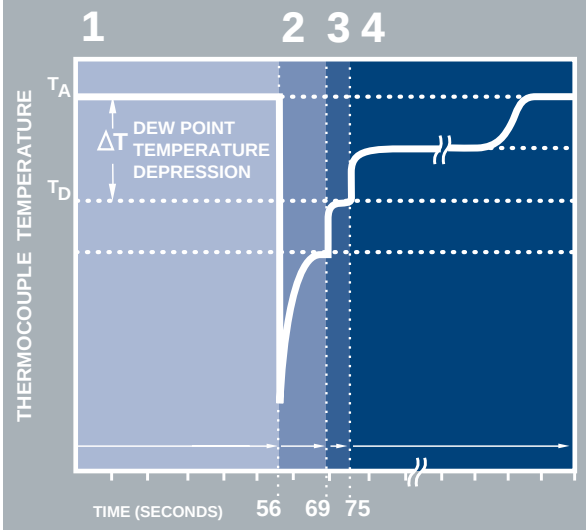
Next, the thermocouple is Peltier-cooled below the dew point temperature (T_D). Microscopic water droplets begin to condense upon the thermocouple surface.

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.



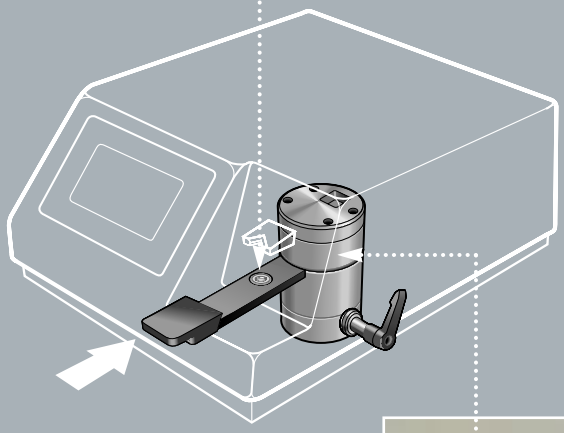
STEP 1: Sample equilibration

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

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).