Capillary Condensation Flow Porometer

Applications

The PMI Capillary Condensation Flow Porometer has the unique ability to measure gas permeability and flow rate distribution in addition to measuring pore diameter of nanopore samples without using any toxic materials or extreme pressures and temperatures. No other instrument has such capabilities. It is utilized for characterization of porous membranes used in many industries such as biotech, pharmaceutical, filtration, food and environmental without any fear of harmful effects of high pressures and extreme temperatures on samples. Fragile samples with small pores can be easily evaluated by this technique.

Principle

At a given temperature, a vapor at a pressure less than the pressure, Po, of vapor in equilibrium with its liquid can condense in pores of a material. Kelvin equation gives the diameter of the pore in which condensation can occur at the relative vapor pressure, (P/ Po).

$$\ln (P/ Po) = - [(4 g V \cos Q) / (D R T)]$$

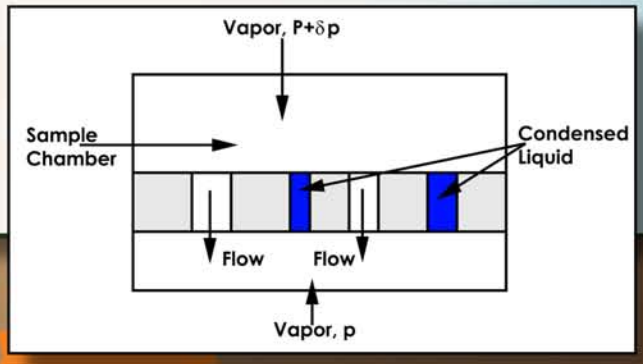
where g is the surface tension of condensed liquid, V is the molar volume of condensed liquid, Q is the contact angle of the liquid with the pore surface, D is the pore diameter, R is the gas constant, and T is the absolute test temperature. At the lowest relative vapor pressure, (P/ Po), condensation occurs in the smallest pore. On increase of relative vapor pressure condensation occurs in larger pores.

Features

- Fully automated, simple to use, & very little operator involvement
- Highly reproducible & accurate
- Pressure required is very small.
- Normally liquid nitrogen temperatures are not required
- A wide variety of samples can be investigated
- No toxic material like mercury is used. No health hazard. No disposal related cost.

Operation

The instrument is maintained at the desired temperature. Vapor is introduced in to the sample chamber of known volume. The vapor pressure is monitored until the system comes to equilibrium. From the final pressure, the diameters of pores in which condensation occurs are computed. A small amount of vapor is added to one side of the sample in the sample chamber so as to raise the pressure on that side by about 10 %. The decay of pressure is monitored as a function of time. Gas flow rates through the pores of the sample which do not contain condensed liquid at the maintained pressure of the vapor are computed from the time rate of pressure change. From repeated determination of flow rates at a number of vapor pressures, the flow rate distribution is computed.



Specifications

- Pore size range: 0.2 – 0.0005 mm
- Pressure: 15 psi
- Accuracy: 0.15% of reading
- Resolution: 1 in 60,000
- Flow rate: As low as 10 -4 cm3/s
- Power: 110/220 VAC, 60/50 HZ

Other Products

Average Fiber Diameter Analyzer
Bubble Point Tester
Capillary Flow Porometer
Capillary Condensation Flow Porometer
Complete Filter Cartridge Analyzer
Clamp-On Porometer
Compression Porometer
Custom Porometer
Cyclic Compression Porometer
Envelope Surface Area Analyzer
Filtration Media Analyzer
High Flow Porometer
Integrity Analyzer
In-Plane Porometer
Microflow Porometer
Nanopore Flow Porometer
QC Porometer
Diffusion Permeameter
Gas Permeameter
Liquid Permeameter
Vapor Permeameter
Water Vapor Transmission Analyzer
Liquid Extrusion Porosimeter
Mercury/Nonmercury Intrusion Porosimeter
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Water Intrusion Porosimeter (Aquapore)
BET Liquisorb
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06/08