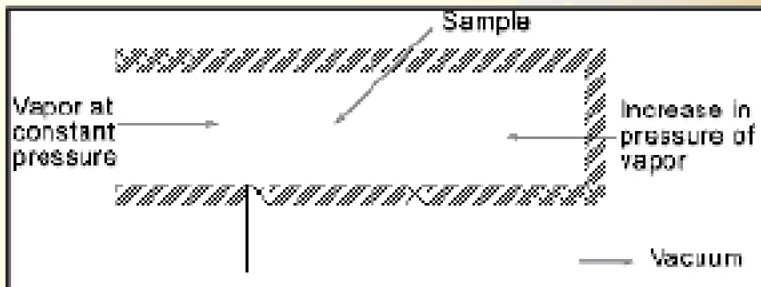
Differential Gas Diffusion Porometer

Applications

Pore structure characterization of membranes containing very small pores can be performed. Delicate membranes sensitive to pressure can also be tested. Pore diameter as well as flow rates are measurable.

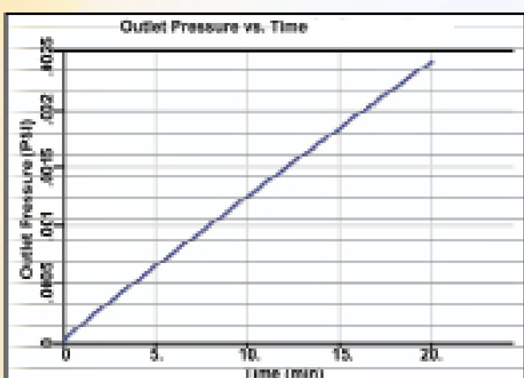
Principle



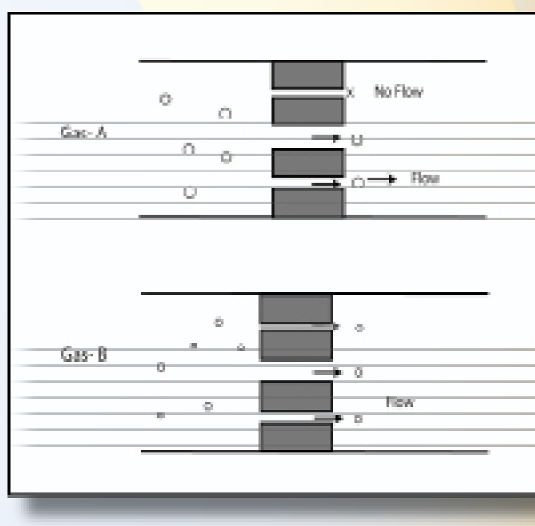
The flow rate of a gas is measured as a function of applied differential pressure across the sample. The gas flows through all the pores larger than the pore diameter of the gas molecule. The test is repeated using gases having different molecular diameters. The flow rates are usually very small. The sample is loaded, the system is evacuated, and the inlet chamber is maintained at a constant pressure. Time rate of pressure increase in the outlet chamber is measured. The flow rate, F, through the sample in volume at standard temperature and pressure is computed.

$$F = [V_o T_s / p_s T] (dp/dt)$$

where p is gas pressure on the outlet chamber, t is time, V_o is volume of the outlet chamber, T_s is standard temperature, T is test temperature and p_s is standard pressure. Flow rate as low as 10^{-4} cm^3/s is measurable.



Change of outlet gas pressure with time for a sample



Measurable Characteristics

- Pore throat diameter
- Bubble point & Mean flow pore diameter
- Flow Distribution

For samples having very small pores, mean free path of gas is greater than pore diameter and gas flow is primarily by diffusion through pores larger than the molecular diameter of gas.

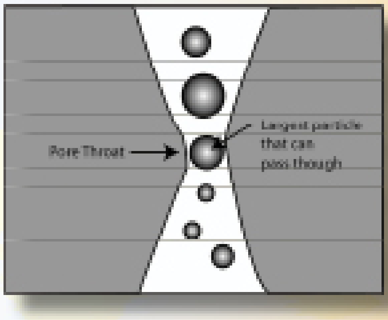
$$[F(M)^{1/2} / \Delta p] = (1/6p_s/l)(2\pi RT)^{1/2} \sum D^3$$

F= flow rate at p_s and T, M= molecular weight of gas, D= pore diameter, Δp = pressure drop, l = thickness, R= gas constant

Distribution function; f

$$f = - dF'/dD$$

where F' is cumulative flow function, $[F(M)^{1/2} / \Delta p]$



Features

- Throat diameters of through pores measurable
- Very small pore diameters measurable
- Flow rates through the small pores measurable
- Flow distribution measurable
- Usable over wide pressure and temperature intervals employing a wide variety of gases
- No damage to product
- Fully automated, very little operator involvement and robust

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
Vacuapore
Water Intrusion Porosimeter (Aquapore)

BET Liquisorb
BET Sorptometer
Gas Pycnometer
Mercury Pycnometer

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