Porous Materials, Inc.

The PMI Advanced

Combined Gas Diffusion Permeameter & DMPC

Not just products...solutions!

Applications
(Gas Diffusion Permeameter)

Many applications of porous materials require very low gas permeability through these materials. Such applications are found in many industries including biotech, healthcare, pharmaceutical, food, packaging, environmental, power sources and chemical industries. Determination of the magnitudes of flow rates of multiple gas through materials used in these applications is important for evaluation of products.

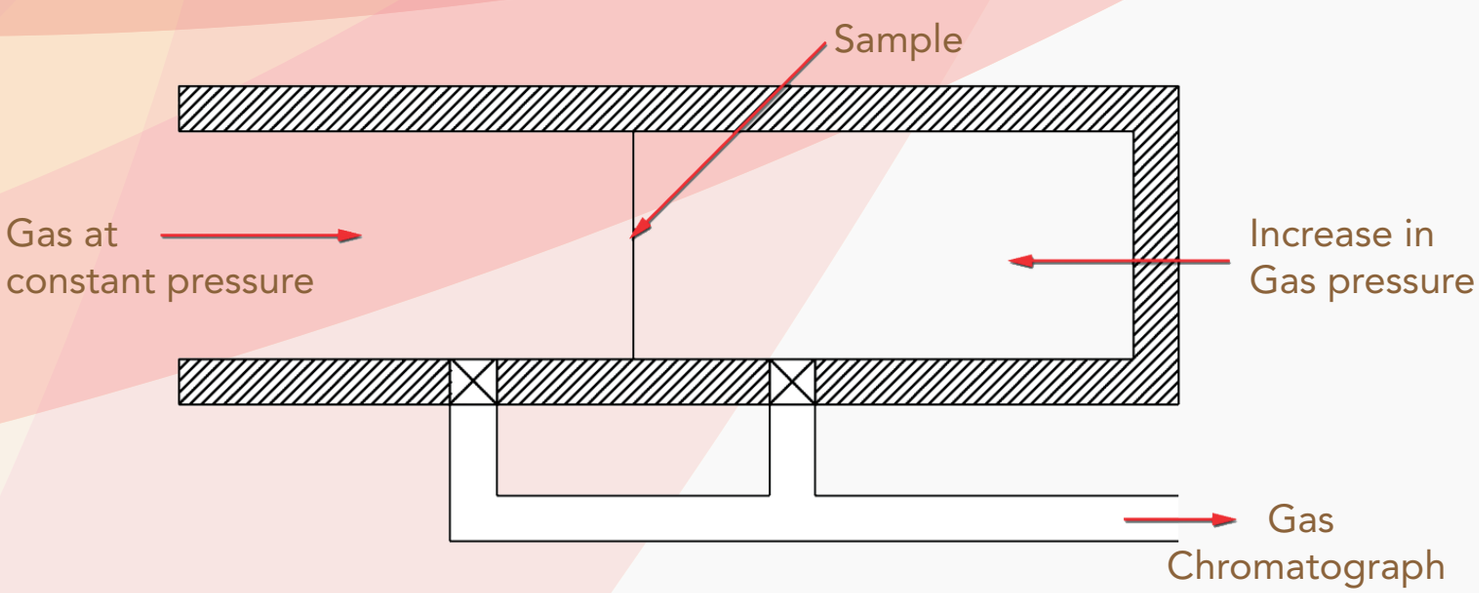
Principles Of Operation
(Gas Diffusion Permeameter)

The basic principle is based on the laws of diffusion.

$$F = - M [dp/dx]$$

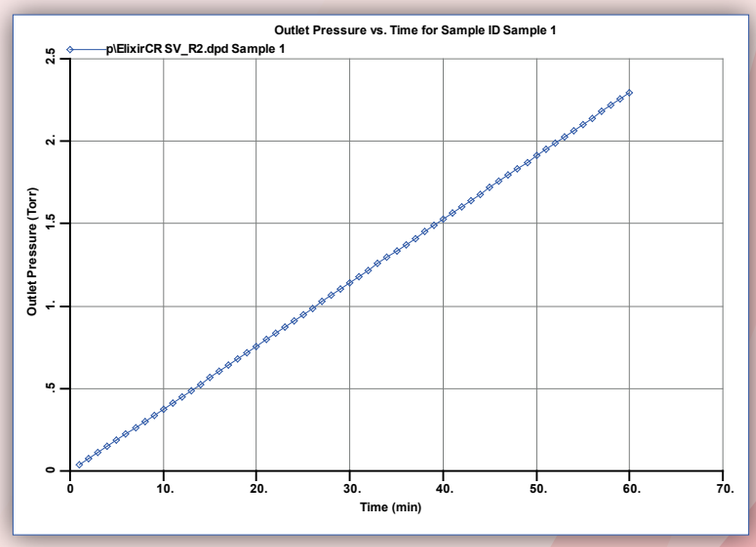
where F is the flux across the sample, [dp/dx] is the pressure gradient across the thickness, and M is a measure of diffusivity. The instrument is designed toaccurately measure pressure and flow rate. The sample chamber is evacuated. Gas pressure maintained at a constant value on one side of the sample is measured and the increase in pressure on the other side is also measured. The data are used to compute flow rate of gas per unit area of the sample per unit time as a function of pressure gradient. The gas flow rate is computed using the following relation:

$$F = \left(\frac{VT}{P_s T_s}\right)\left(dp/dt\right)$$



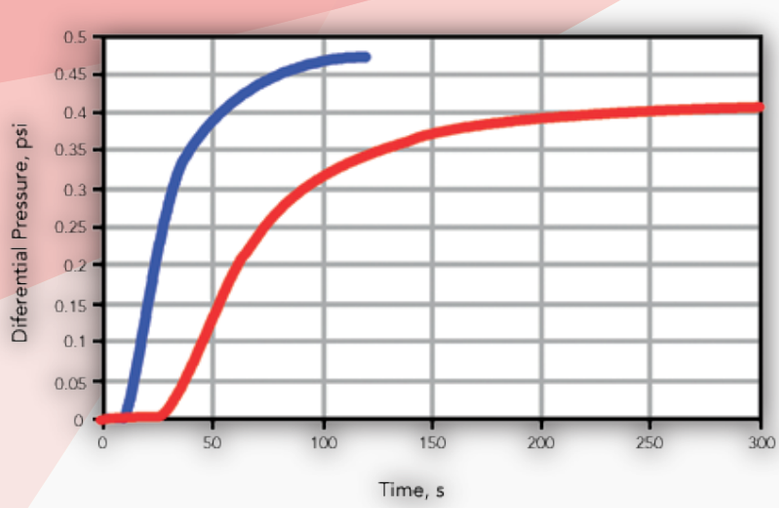
Gas chromatograph is used to find the ratio of different gases coming through

SPECIFICATIONS
(Gas Diffusion Permeameter)



- Permeability Range: from 1 to 10^{-10} darcies
- Sample Size: 1.75" - 2.5" diameter
- Pressure Transducer Range:
  - High Pressure Side: 0 - 100 psi
  - Low Pressure Side: 0 - 10 Torr
  - Accuracy (both): 0.15% of reading
  - Resolution: 1 in 60,000
- Pressure Range: 100 psi maximum differential pressure
- Pressurizing Gas mixture: multiple non-corrosive gas
- Vacuum Pumping System: Vacuum to 0.002 Torr
- Stock Tank: Built in, Low Pressure Sample Cell Size: 50 - 100 cc (specific to machine)
- Weight : 500 lbs (specific to machine)
- Power Requirements : 220 VAC, 50/60 Hz (Others available)

FEATURES
(Gas Diffusion Permeameter)



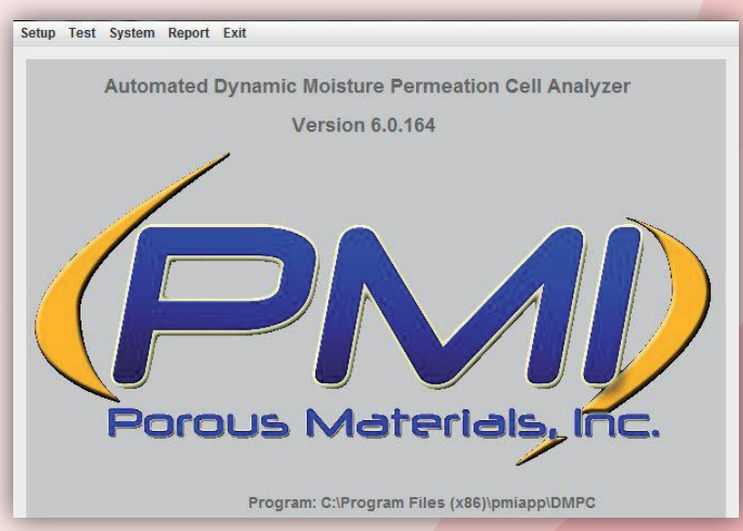
Flow of different gases through membrane

- Fully Automated
- Very little operator involvement
- Robust. Minimal maintenance
- Accuracy of pressure measurement is 0.15% of reading
- The sample chamber is maintained at a constant temperature for yielding reliable & reproducible data.

Applications

(Dynamic Moisture Permeation Analyzer)

The PMI's Dynamic Moisture Permeation Analyzer is capable of measuring water vapor transmission through porous media such as textiles, leathers, man made materials, membranes, nonwovens, and fabrics used in numerous high technology components and consumer products manufactured by a variety of industries. The instrument has the unique ability to measure vapor transmission rate over a wide range of humidity, temperature, and pressure under gradients of humidity, temperature, and pressure encountered in application environments.



Principles Of Operation

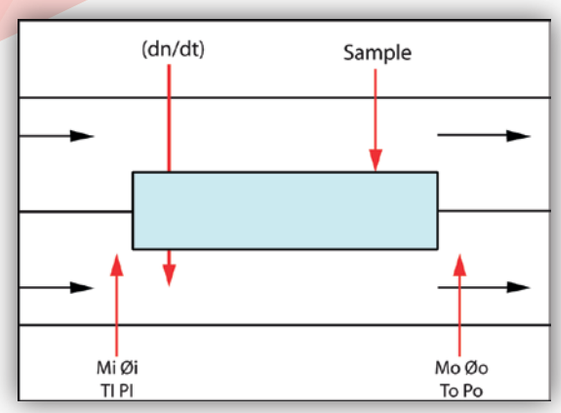
(Dynamic Moisture Permeation Analyzer)

Two independent gas streams are maintained on the two sides of a sample at the desired temperature. Humidity and gas flow rates are measured. The transmission rate through the sample is computed using mass balance.

$$(dn/dt) + [(p_{e,i}\Phi_i / P_i)\, M_i] = [(p_{e,o}\Phi_o / P_o)\, M_o]$$

Where,

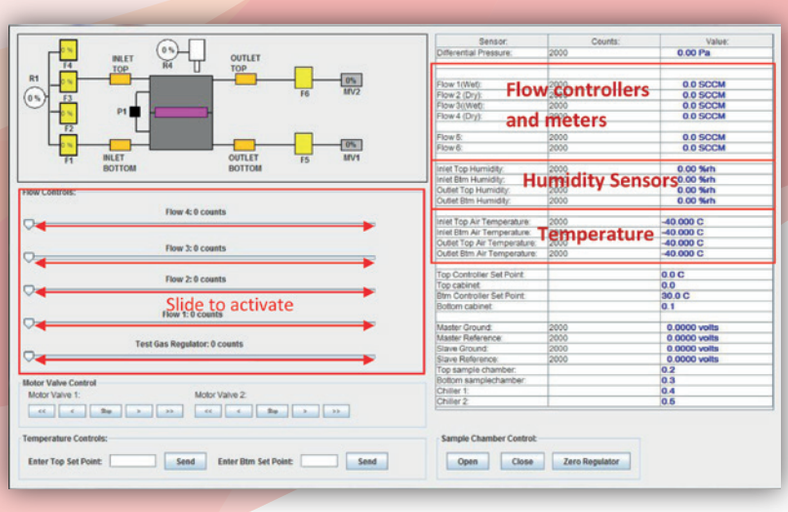
í = inlet
t = time
n = moles
P = total pressure
o = outlet
M = flow rate
Φ = humidity
p = equilibrium vapor pressure



SPECIFICATIONS
(Gas Diffusion Permeameter)

- Humidity (φ) measurement
  Range: 5 - 95%
  Accuracy: ± 2%
- Differential pressure transducers
  Range: 10 torr (10 mm Hg)
  Accuracy: 0.015%
- Temperature
  Range: 10 ° - 40 °C
  Accuracy: 0.4 °C (low φ) - 0.8 °C (high φ) at 0 °C
  Control: ± 2%
- Mass Flow Transducers
  Range: 8 L/min
  Accuracy: 1%
- Humidity (φ) control
  Range: 5 - 95%
  Accuracy: ± 1.5% (φ = 0.5)
  ± 5% (high & low φ)
- Mass Flow Meter
  Range: 8000 cc/min
  Accuracy: 1%
- Mass Flow Controller
  Range: 2000 cc/min
  Accuracy: 1%

FEATURES
(Gas Diffusion Permeameter)



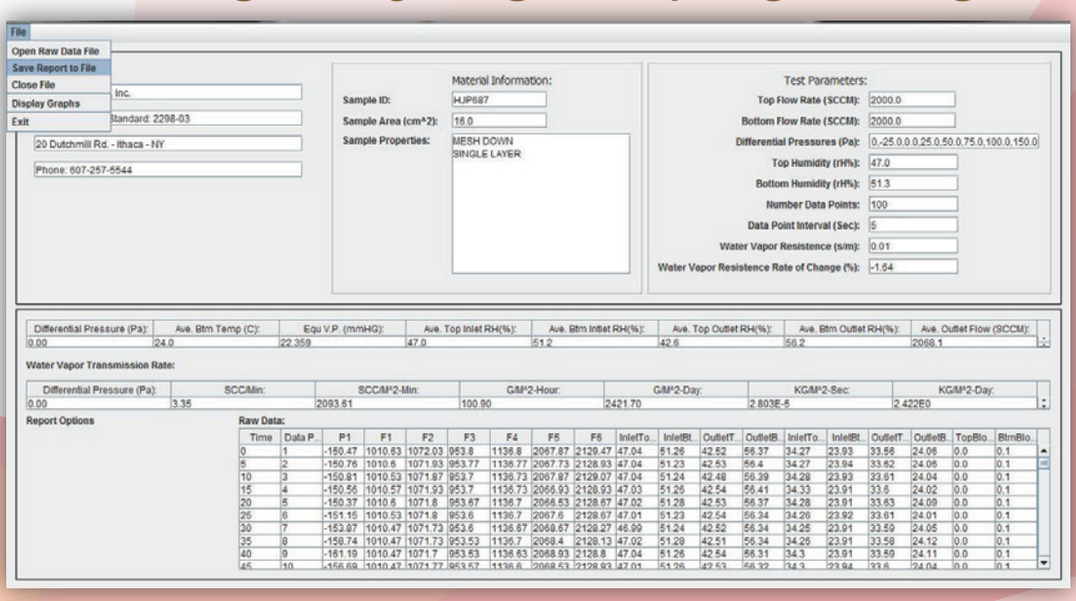
- Humidity on any side can be maintained between 5 and 95%
- Any desired pressure gradient can be maintained between 0 -10 Torr
- Any desired test temperature can be achieved between 10° – 40°C
- Simultaneous pressure and humidity gradients can be maintained
- Flat samples in a wide range of sizes can be accommodated
- It is used for measuement of comfort of medical gowns and other medical textiles.
- Completely automated
  - Test execution
  - Data acquisition
  - Data storage
  - Data reduction

INSTRUMENT

(Dynamic Moisture Permeation Analyzer)

The sample is enclosed in a sample chamber. A part of the gas flowing through each independent stream is allowed to go through bubblers while the other part bypasses the bubblers and mixes with the gas passing through the bubblers. For maintaining constant humidity in the inlet gas stream, the flow rate in each part of the gas stream is controlled. The gas pressure is controlled by the valve at the end of each gas flow line. The valves automatically control and maintain either zero differential pressure or a finite definite pressure difference. Absolute pressure remains close to the standard pressure. The inlet and outlet flow rates and humidity are measured. The water vapor transmission rate through the sample is computed using the following relation.

$$(dn/dt) = [(p_e/P)\Phi_o - (p_e/P)\Phi_i]M_o/[1-(p_e/P)\Phi_i]$$



SALES & SERVICES

We at Porous Materials Inc., have dedicated sales team helping thousand's of our customers identify the right solution for their scientific problems. We are also proud to offer customized instruments for your unique needs. Our service and applications team is committed to effective support with short response times, we offer comprehensive range of solutions from new and customized systems, calibration and maintenance to testing services.

Explore more about us at www.pmiapp.com

Customize your machine today!

Disclaimer : Other specifications of this product are also available.
Design subject to change without notice.

The most advanced, accurate, easy to use and reproducible Combined Permeameters in the world.

Celebrating

of solutions

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