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INSTRUMENT

PRODUCT CATALOUGE

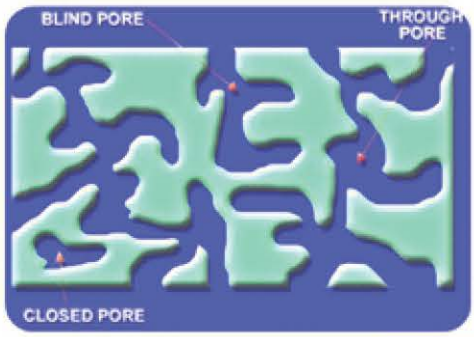
PORETECH INSTRUMENT INC.

PORE SIZE MEASUREMENT WITH EASE

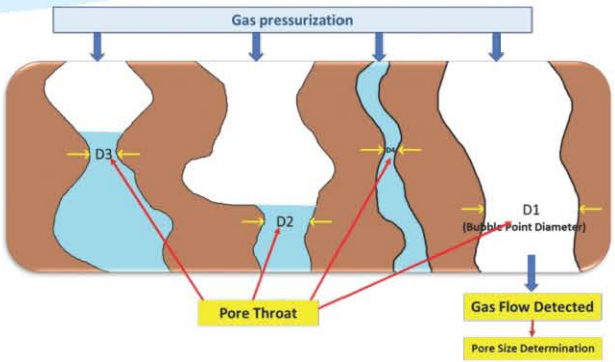
www.poretechinst.com

Introduction

Innova series Capillary Flow Porometer is a through pore size analyzer for porous materials which accurately measures the crucial microporous characteristics such as narrow pore size, maximum pore size, pore size distribution, liquid permeability, gas permeability, and external surface area. Currently, no other measuring instrument is capable to do all the measurements in a single system.The analyzer are designed to have numerous advantages: It can be operated at room temperature and under low pressure conditions. The testing time is extremely short, only single operator is required to produce accurate and repeatable data. The test pressure is from 0 to 500 psi. It can measure pore sizes ranging from 0.013 μm to 500 μm (Innova Capillary Flow Porometer Series), from 2 nm to 500 μm (Innova Ultra Nano Porometer Series).



Porous Material Properties



For effective filtration, the filter medium must have a variety of porous characteristics. For example, a porous material as a filter barrier must have a pore size smaller than that of the particle to be separated. The filtration rate is determined by the permeability of the liquid that passes through the filter medium. The surface area of the medium is crucial; it can control the rate of the reaction and the rate of the filtration of substances such as dust in the air. Therefore, a porous material is suitable for some special applications, as determined by its pore size, pore size distribution, maximum pore size, pore number distribution, gas permeability, liquid permeability, surface area, integrity (through medium permeation), and water pressure (pressure required to force water through the filter medium).

Testing Technique for Pore Characterization

Capillary flow pore size analyzer can measure all relevant pore properties such as narrow pore size, maximum pore size (bubble point), average pore size, throughput pore size distribution, pore number distribution, and liquid and gas permeability. This measurement method utilizes minimum time. Currently, this method is widely used in characterizing flat and hollow filtration membranes. The fundamental theories of capillary flow pore size analyzer are as follows:

a. The sample is soaked in wetting liquid, which completely fills the pores, creating a positive pressure because of the capillary phenomenon.

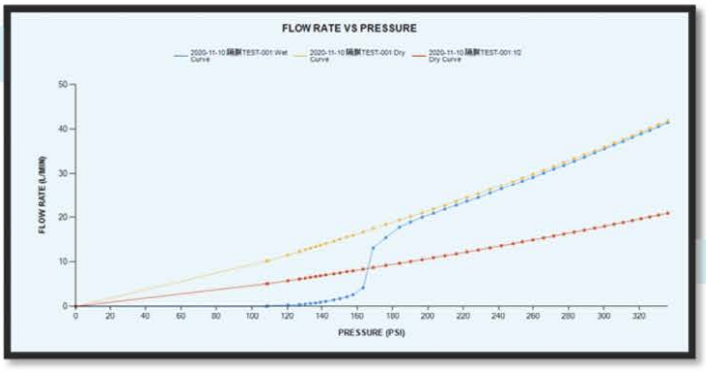
b. The sample is placed in an airtight cell and a gas is introduced into it; the gas pressure causes the liquid to be extruded from the capillary tract.

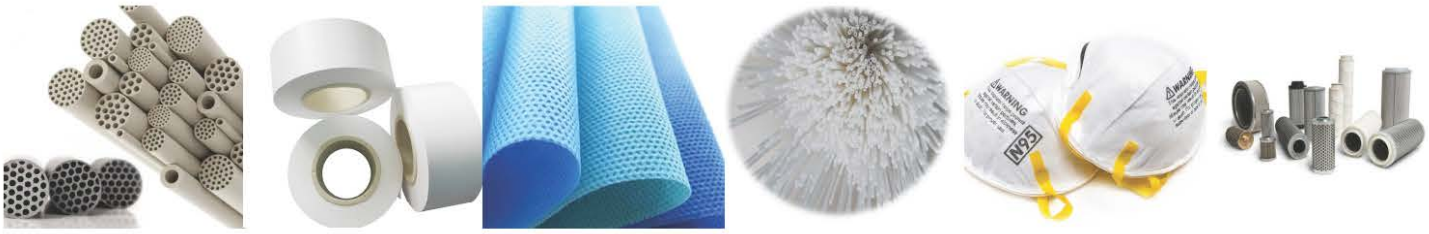
c. At this point, the liquid in a single pore is completely extruded from the capillary tract; the applied pressure and the pore diameter are related according to the Washburn equation:

$$P = [4 \gamma \cos \theta] / D$$

P: pressure **γ:** liquid surface tension **cos θ:** contact angle **D:** pore throat diameter

d. Varying the pressure further continues to cause the liquid extrusion from the pore, leading to gas penetration rates. Then, according to changes in the pressure and flow rate, the pore size and pore size distribution are determined





Innova Series Capillary Flow Porometer

Pore size characterization instrument based on the Gas-liquid (Liquid expulsion method)

This method uses a gas to extrude the liquid from the pore. Depending on different liquid surface tensions, the pressure required to measure the pore size is also different. According to the current technology for measuring a 13 nm pore size, the required pressure is as hig as 500 psi (about 35 bar).

Therefore, when testing hollow fiber ultrafiltration membranes, the surface will be damaged, and the true pore size will not be obtained.

- **Mean Pore Size**
- **Pore Size Distribution**
- **Bubble Point (Largest pore)**
- **Pressure hold Test**
- **Gas Permeability**
- **Cumulative Filter Flow %**
- **Pore size from 13 nm to 500 µm**
- **Available in 4 variants 50 PSI, 100 PSI 200 PSI and 500 PSI**