Pore Size Analysis
By Gas Sorption, Mercury Porosimetry, Flow Porometry and Electroacoustics
Pore Size Analyzers
- Filters
- Membranes
- Textiles
- Non-Woven
- Ceramics
- Paper

Visit www.quantachrome.com for more detailed instrument specifications and downloadable brochures.

AUTOSORB® iQ Series
Premier, high performance, 1-to-3 port surface area and expanded-range pore size analyzer. Very small micropore range possible by virtue of high-vacuum, turbomolecular system and precision low-pressure transducers. MP model has 1000, 10, and 1 torr transducers; MP-XR model uses 1000, 10, and 0.1 torr transducers. Metal O-rings and gaskets in critical measurement zones assure ultra-low pressure capability. Very low surface area materials can be analyzed as standard (ASiQ-MP/MP-XR only); already krypton-enabled, no upgrade necessary. Accuracy is assured by a dedicated reference (saturation) pressure transducer. Includes up to 4 independent and built-in (to save cost and bench-space) preparation (degassing) ports. Degassing is optimized by the inclusion of a vapor cold-trap, intelligent PC control, and access to a patented, oil-free high vacuum system. Leading-edge data analysis software included as standard, for demanding research applications (DFT, NLDFT, QSDFT, GCMC, and classical methods). Available as standard (but upgradeable) surface area/mesopore size analyzer with non-turbo vacuum system (Autosorb iQ-AG). Additional options are available for specific applications.

AUTOSORB® 6iSA
High throughput surface area and pore size analyzer, bench top or floor-standing. Maximum flexibility thanks to six independent sample ports - different sample types and analyses can be accommodated at one time. Dedicated equilibration pressure transducers and Po cells are present on each station. Intelligent operating algorithms automatically adapt to different samples to maximize productivity. Automatic data logging, calculation of results and report generation are performed by intuitive, powerful PC software. A range of accessories and preparation units to match individual lab needs is available.

QUADRASORB™-evo- MP/Kr
Versatile four-port surface area and pore size analyzer. Operates in both patented helium-free and classical modes, even at the same time on different ports! Sample independence is assured by individual transducers and coolant baths, unique analysis types and even different start-times. Optional krypton capability (for very low surface area materials) and micropore range are possible by virtue of a high-vacuum turbo pump system, precision low-pressure transducer, and metal to metal seals where appropriate. Also, 2 and 3 station versions are available. As with other instruments, a range of accessory sample preparation units to match your individual lab needs is also available.

POROMETER 3G™ Series
The Porometer 3G series of capillary flow porometers includes three models to best fit the widest range of through-pore size and bubble point applications. Automatic measurements of filters, membranes, woven, and non-woven textiles, papers, etc., in a compact yet powerful table-top unit. Pressure capabilities of 0.015 to 500 psi represent a pore size range extending from over 500 μm to 0.02 μm and lower. Available options include liquid permeability, in-plane porometry, and more.
NOVAtouch™ Series

The NOVAtouch™ provides the next generation of NOVA analyzer performance and features. It delivers performance improvements along with a touch-sensitive, multi-functional color screen. Performance gains are offered in two configurations: the Standard and the Advanced LX models. Each model is available in 1-to-4 analysis station versions and compatible with multiple gases. Increased speed results from new dosing algorithms and additional pressure transducers. Continuous Po measurements improve precision and resolution for detailed pore size analyses. Cold zone volume minimization yields superior analysis sensitivity using an advanced level sensor. Sample degassing capabilities now include full PC control and programming of multiple ramp rates and hold times. Also, the new touchscreen provides real time data displays and gives easy access to all instrument functions.

NOVA®e Series

High speed surface area and pore size analyzers for quality control and research applications. Meets different throughput needs with single or multi-port (two, three or four sample stations) models. Flexible operation can be run as stand-alone or PC-based. 21 CFR part 11 compatible version is also available. The optional NOVAWin™ software package can allow the instrument to be controlled directly from a PC without the need to transfer the data obtained from the instrument. This software also doubles as data reduction software which enables users to interpret data, obtain results, and generate custom reports with an easy to use interface. NOVA’s small footprint even includes built-in sample preparation stations! Operates in classical or patented and cost-effective helium-free (NO-Void-Analysis) mode.

POREMASTER®/POREMASTER GT

Automatic pore size and pore volume distribution analyzers using the classical mercury intrusion / extrusion technique. Pore size range measured safely and quietly from 1000 μm to less than 3.5 nm in the 60,000 psi capable units, and 6.5 nm in the 33,000 psi models. Both versions have two built-in low pressure analysis ports (for pore sizes above 4 μm) which also automatically evacuate and correctly fill sample cells with mercury and enable mercury density and porosity determinations. The high pressure cavity, for pore sizes smaller than 4 μm, holds one sample cell in the standard unit, and two cells in the GT model for greater throughput. Designed to enhance operator safety and comfort, both models include cold traps, provisions for venting, and automatic mercury transfer from a closed reservoir to the low pressure ports.

WAVE™ 3805, 2305 & 1905

The Wave series consists of three analyzers that use electronic methods of pore characterization: electro-acoustics for pore size and zeta potential, and conductivity for porosity. The WAVE 3805 can measure all three pore-related properties from a single control module. Pore size analysis and three-in-one capability of the 3805 represents the newest, and probably the most unique pore characterization system available in the market today. The WAVE 2305 offers measurement of pore zeta potential and porosity. The WAVE 1905 is dedicated to the rapid determination of just porosity for those customers who are most interested in that parameter.

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## Powder and Porous Solid
### Pore Size Analysis
By Gas Sorption, Mercury Porosimetry, Flow Porometry and Electroacoustics

**Comparison of Pore Size Analysis Equipment at a Glance**

<table>
<thead>
<tr>
<th>Instrument Model</th>
<th>Analysis Stations</th>
<th>Built-in Sample Preparation Stations</th>
<th>Pore Size Range(b) [nm]</th>
<th>Significant Features/ Capabilities(c)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Autosorb-iQ</td>
<td>1- to-3</td>
<td>2- to-4</td>
<td>Lower Bound 0.3, Upper Bound 500</td>
<td>Micro-Porosity √, Meso-Porosity √, Macro-Porosity √, Fluid Intrusion --, Flow-Through --, H₂O-Filled Pores --, Chemisorption √</td>
</tr>
<tr>
<td>Autosorb 6iSA</td>
<td>6</td>
<td>--</td>
<td>0.3, 500</td>
<td>Micro-Porosity √, Meso-Porosity √, Macro-Porosity √, Fluid Intrusion --, Flow-Through --, H₂O-Filled Pores --</td>
</tr>
<tr>
<td>Quadrasorb evo</td>
<td>2- to-4</td>
<td>--</td>
<td>0.3, 500</td>
<td>Micro-Porosity √, Meso-Porosity √, Macro-Porosity √, Fluid Intrusion --, Flow-Through --, H₂O-Filled Pores --</td>
</tr>
<tr>
<td>NOVAtouch(a)/ NOVAe</td>
<td>1- to-4</td>
<td>2- to-4</td>
<td>Lower Bound 0.3, Upper Bound 500</td>
<td>Micro-Porosity √, Meso-Porosity √, Macro-Porosity √, Fluid Intrusion --, Flow-Through --, H₂O-Filled Pores --</td>
</tr>
<tr>
<td>PoreMaster GT</td>
<td>1 or 2</td>
<td>2</td>
<td>3, 10⁶</td>
<td>Micro-Porosity √, Meso-Porosity √, Macro-Porosity √, Fluid Intrusion --, Flow-Through --</td>
</tr>
<tr>
<td>Porometer 3G</td>
<td>1</td>
<td>a</td>
<td>20, 5x10³</td>
<td>Micro-Porosity √, Meso-Porosity √, Macro-Porosity √, Fluid Intrusion --, Flow-Through --</td>
</tr>
<tr>
<td>Wave</td>
<td>1</td>
<td>a</td>
<td>10, 5x10³</td>
<td>Micro-Porosity √, Meso-Porosity √, Macro-Porosity √, Fluid Intrusion --, Flow-Through --</td>
</tr>
</tbody>
</table>

\(a\) Sample preparation performed in-situ.
\(b\) Measured values often exceed stated limits.
\(c\) By IUPAC convention, micropores <2 nm; mesopores: 2-50 nm; macropores: >50 nm.
\(d\) Detailed pore size distribution by CO₂ adsorption at non-cryogenic temperatures and modern NLDFT/GCMC statistical mechanics methods.
\(e\) Includes advanced algorithms for speed enhancements and operator access to real-time data and functions via a touch-sensitive color screen.

### Selected International Standards Applicable to Pore Size Analysis

**ASTM UOP964-11**
Surface Area, Pore Volume, Average Pore Diameter, and Pore Size Distribution of Porous Materials by Nitrogen Adsorption.

**ASTM D4404-10**

**ASTM UOP578 - 11**
Automated Pore Volume and Pore Size Distribution of Porous Substances by Mercury Porosimetry.

**ASTM F316-03(2011)**
Standard Test Methods for Pore Size Characteristics of Membrane Filters by Bubble Point and Mean Flow Pore Test.

**ASTM D4284-12**

**ASTM D4641-12**

**ASTM UOP874 - 88**
Pore Size Distribution of Porous Substances by Nitrogen Adsorption Using a Quantachrome Analyzer.