

# Directory

Powder & Porous Materials Characterization Equipment

## SURFACE AREA ANALYZERS

### HIGH THROUGHPUT

- ▶ Novae 4000
- ▶ Quadrasorb-SI
- ▶ Autosorb-6B

### VERY LOW AREA

- ▶ Autosorb-iQ-MP (shown)
- ▶ Autosorb-6B-Kr
- ▶ Quadrasorb-SI-Kr



### ECONOMICAL

- ▶ Novae 2000
- ▶ Monosorb

## PORE SIZE ANALYZERS

### MACROPORE

- ▶ PoreMaster Macro

### MESOPORE/MACROPORE

- ▶ PoreMaster 33
- ▶ PoreMaster 60
- ▶ PoreMaster GT33
- ▶ PoreMaster GT60 (shown)



### MESOPORE

- ▶ Autosorb iQ Series
- ▶ Novae Series
- ▶ Quadrasorb-SI Series

### MESOPORE/MICROPORE

- ▶ Autosorb-iQ-MP, iQ2-MP
- ▶ Autosorb-6B-MP

## WATER SORPTION ANALYZERS

### MANOMETRIC

- ▶ Hydrosorb
- ▶ Gravimetric Aquadyne DVS

## DENSITY ANALYZERS

### AUTOMATIC GAS PYCNOMETERS

- ▶ Pentapyc 5200e
- ▶ Ultrapyc 1200e
- ▶ Ultrafoam 1200e



### ECONOMICAL

- ▶ Multipycnometer
- ▶ Stereopycnometer

### TAPPED POWDER DENSITY/ GEOMETRIC DENSITY

- ▶ Dual Autotap
- ▶ Autotap

For More Information: Contact us at [QC.sales@quantachrome.com](mailto:QC.sales@quantachrome.com) or visit us on our website at [www.quantachrome.com](http://www.quantachrome.com).



# INSTRUMENT DIRECTORY: & Powders & Porous Materials

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Selecting the correct instrument to characterize your powders and porous ceramics can be a daunting task. Use this directory and selection guide for easier and more streamlined decision making. The focus of this article is on those physical properties whose measurement is often overlooked, but that are no less important than e.g. particle size! Sometimes different techniques can do (at least at first glance) much the same thing. See Pore Size Analyzers (below) for example; in this case you will be guided primarily by the range of pore sizes of interest. The listing given at left is not exhaustive, but combine it with the descriptions below and you will be off to a confident start to secure that new addition to your lab inventory.

### SURFACE AREA ANALYZERS

If you want to minimize footprint and conserve bench space, it should have on-board degassing (preparation) station(s). Helium-free operation simplifies setup and reduces operating costs. It is usually possible to analyze with N<sub>2</sub> as low as 1m<sup>2</sup> available area... less than that might require krypton capability. If it does, demand an oil-free vacuum system (and for degassing too).

### DENSITY ANALYZERS

True (solid) density is measured by gas pycnometry. Multiple station pycnometers are available, complete with balance interface, printer port and PC data archiving, plus optional temperature control. You'll need a different (mechanical) device for tapped powder bulk density; easily automated, even on two samples at one time. The same tap density analyzers can even measure geometric (envelope) density, at remarkably low cost.

### PORE SIZE ANALYZERS

Micropores require gas sorption technology: look for analyzers with advanced techniques like CO<sub>2</sub> and argon adsorption combined with state-of-the-art DFT (Density Functional Theory) calculation models. Most mesoporous materials can be analyzed by either gas sorption or mercury porosimetry. The latter offers much more rapid analysis however. The most up-to-date porosimeters have automatic purging of the hydraulic system, and vapor traps. Macropore sizes extend well above the upper limit of gas sorption and so must be measured by mercury intrusion. On the right instrument it is possible to measure, as a standard feature, up to 900 μm pore diameter.

### WATER SORPTION

Speed, automation and robustness are offered in manometric (volumetric) systems. It is now possible to measure complete moisture uptake isotherms at temperatures from 12°C to 85°C.

### SUMMARY

Help in matching state-of-the-art instruments to lab throughput and budgetary needs is available... you are already started down the right track. If you need more assistance in finding just the right instrument to meet your R&D needs or to help solve your particle performance problems, do not hesitate to contact the specialists below. ■

For more information about related measurement instruments, contact Quantachrome Instruments by phone: (561) 731.4999, fax: (561) 732.9888, email: [QC.sales@quantachrome.com](mailto:QC.sales@quantachrome.com) or visit [www.quantachrome.com](http://www.quantachrome.com).



## Particle Size Analysis?

Is the entire size distribution represented in the small scoopful you just put into your analyzer? Probably not, unless you split the original sample on a Rotary Riffler. Reduce variability in your particle size results... make your next sample a representative one.

Ask about Rotary Rifflers from Quantachrome at [QC.sales@quantachrome.com](mailto:QC.sales@quantachrome.com).