PYCNOMETERS

Quantachrome

PYCNOMETERS true density analysis of powders, foams and bulk solids

Multipycnometer[™]

Stereopycnometer™



VENT RATE



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GAS PYCNOMETRY

"Pycnometry" is derived from the Greek word puknos which has long been identified with volume and density measurements. The pycnometers from Quantachrome are specifically designed tomeasure the true volume of solid materials by employing Archimedes' principle of fluid displacement and gas expansion (Boyle's Law).

A gas is used as the displacing fluid since it penetrates the finest pores assuring maximum accuracy. For this reason helium is recommended, since its small atomic dimension enables entry into crevices and pores approaching 0.2 nm. Its behavior as an ideal gas is also desirable. Other gases such as nitrogen can be used, often with no measurable difference.

Applications

Pycnometers are currently used for research and quality control in such diverse industries as ceramics, catalysts, cements, nuclear fuels, petrochemicals, soils, fertilizers, carbon blacks, charcoals, fibers, minerals, pharmaceuticals, cosmetics, powdered food, desiccants, powdered metals, ion exchange resins, silica, alumina, titania, rigid foams and many others.

General Information

The Stereopycnometer[™] and the Multipycnometer[™] are manually operated instruments. They are designed to measure the true volume of powders and other solid materials. From this volume, density is easily determined by dividing into the weight of the sample. All models feature a digital display and fine adjustment controls for both pres- Features surization and venting rates. A complete density analysis can be done in as little as a minute. An optional RS232 port and PC software provides storage of calibration data, data capture and calculation of volume and density with average and standard deviation.



Calibration spheres.

Stereopycnometer™



The Stereopycnometer offers a choice of two interchangeable sample cells used in conjunction with a single reference volume. A sample is placed in the sample cell and degassed by purging with a flow of dry gas, by vacuum, or by a series of pressurization cycles. An analysis is performed by pressurizing the sample cell quickly and easily, and recording the value. The expansion valve is opened to allow the gas into the reference or added volume and the new (lower) pressure is recorded. From these two readings, the sample volume can be quickly and accurately calculated.

If samples are compressible foams, the cell-to-reference pressure sequence of the Stereopycnometer is the preferred method over that employed by the Multipycnometer.

- \triangleright Sample size range from ~5 cm³ to 135 cm³.
 - $(135 \text{ cm}^3 \text{ volume } \times 5 \text{ cm diameter } \times 7.5 \text{ cm length})$ $(20 \text{ cm}^3 \text{ volume } \times 2.5 \text{ cm diameter } \times 3.8 \text{ cm length})$
- ▶ Two interchangeable stainless steel sample cells.
- Adjustable gas flow rates.
- Easy to read display.

Read all about our automatic gas pycnometers, featuring data archiving to PC (ethernet or USB), printing capabilities and more. Visit www.quantachrome.com or call your local representative at 1.800.989.2476.



GAS PYCNOMETRY

- Multipycnometer™



The Multipycnometer is the more versatile model. Its multiplevolume feature offers three sizes of interchangeable sample cells. In addition, three different calibrated, internal, reference volumes provide optimized performance for each cell size. The operating sequence is reversed from that of the Stereopycnometer, that is, pressurizing the reference volume first, then expanding the gas into the sample cell. This arrangement minimizes dead volume in the sample chamber leading to increased accuracy on measurements of small samples.

Features

- > Sample size range from \sim 5 cm³ to 135 cm³.
 - (135 cm³ volume x 5 cm diameter x 7.5 cm length)
 - ($20 \text{ cm}^3 \text{ volume } \times 2.5 \text{ cm diameter } \times 3.8 \text{ cm length}$)
 - ($4.5 \text{ cm}^3 \text{ volume } x 1.6 \text{ cm diameter } x 2.5 \text{ cm length}$)
- Three interchangeable stainless steel sample cells.
- Three matching reference volumes.
- Adjustable gas flow rates.
- Easy to read display.



Sample cells.

manually operated gas pycnometers

Gas Recommendations:

Ultrahigh purity compressed gas at pressure up to 20 psig.

Helium is standard. Nitrogen or SF6 are alternative gases for helium permeable materials.

Precision:

Digital pressure display resolution of 0.001 pounds per square inch (psi).

Accuracy:

Better than 0.2% (when properly prepared, thermally equilibrated, and sample occupies greater than 75% of nominal sample cell volume).

Calibration:

- \blacktriangleright 4.5 cm³ Cell: 2 spheres, 1.0725 cm³ each
- ▶ 135 cm³ Cell: 1 sphere, 56.5592 cm³



- ► Gas regulator assembly
- Vacuum pump
- N.I.S.T. certification of a sphere diameter
- RS232 port with PC software in English and German
- Non-elutriating cells for fine powders
- Aluminum cells
- Fiber/film winding spool. Fits 20 cm³ cell

Physical:

 Weight
 10.9 kg / 24 lbs.

 Width
 30 cm / 11.8 in.

 Depth
 47 cm / 18.5 in.

 Height
 18 cm / 7.1 in.

Power:

100/240 v; 50/60 hz
 120 watts.

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JAPAN

Gas Sorption Isotherms

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Tapped Density

Pore Size, Pore Size Distribution

Porosity, Pore Zeta Potential

Chemisorption, TPR/TPO/TPD Water Sorption Behavior

Quantachrome is also recognized as

an excellent resource for authoritative

analysis of your samples in our fully

equipped, state-of-the-art powder

characterization laboratory, LabQMC

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(www.labgmc.guantachrome.com,

Surface Area

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