We hope you are enjoying your break at the SPE's Foams 2004 conference sponsored by Quantachrome Instruments.

Open? Closed? Or Just Plain Dense?

Open Cell %
Closed Cell % ?

Helmet Ear Padding for Sound Absorption.

Closed Cell %
Open Cell % ?

Shoulder Padding for Shock Absorption.

Percent Porosity Solution!

Ultrafoam Pycnometer uses ASTM method D6226

Find the solution to the open/closed measurement problem in FREE tech notes from the instrument specialists, and learn about breakthrough analytical technologies targeted at porous materials. Our staff at Quantachrome Instruments are experts in polymeric solids characterization. We understand your needs and problems. Not only are we leading manufacturers of research and QA/QC instruments, we also set industry standards in both our lab services and scientific advancement.

For answers to foam product characterization related questions, or to speak to a consultant about Quantachrome products that can help you, email us at:

QC.foams@quantachrome.com

Meeting the foam product industry needs for porous and powdered materials characterization.

Quantachrome INSTRUMENTS

UltraFoam™

Automatic Gas Pycnometer for the Characterization of Foams

A complete sytem for the automatic measurement of:

- **Open Cell Content**
- **Closed Cell Content**
- **ASTM Method D6226**
  (with or without correction for cut cells)

With special pressure related functions for the automatic analysis of:

- **Cell Compressibility**
- **Cell Fracture**

Featuring interchangeable sample cells, automatic reporting and PC archiving of data.

As seen at the SPE's Foams 2004 Conference

The cell content of porous materials correlates with performance attributes such as strength, fluid exclusion (or acceptance) and insulating properties. Closed cells impart water resitance, thermal insulation, buoyancy and resilience. Open cells determine properties related to filtration, acoustics and wicking.

To such ends, the analysis of cell content in porous materials is best performed by gas displacement...gas pycnometry. The gas, usually nitrogen or helium, quickly conditions the sample by carrying away blowing agents, moisture, air, etc. as it probes all cell cavities connected to the surface. Single or multiple measurements can be automatically performed, each taking but one or two minutes.

The standard technique used by the UltraFoam™ pycnometer is that of gas expansion from a calibrated sample chamber into a reference volume. The solid and closed cell volume of the sample is calculated from the relationship of the calibrated cell volumes and the pressures before and after expansion. The closed cell percentage is calculated from the solid volume and the measured geometric volume of a rectangular or cylindrical sample. Open cell % is calculated by difference (open cell % = 100% - closed cell %). Density is calculated from mass (weight)/volume and is reported as grams/cm^3.

ADVANCED METHODS FOR DIFFERENT APPLICATIONS:

Correction For Cut Cells

In ASTM D6226, a corrected percentage of open cells is estimated by remeasuring the volume of a cube *after sectioning into eight parts*. The UltraFoam pycnometer programming provides a convenient way to automate this procedure. The printed report then gives both the Open Cell % and the Corrected Open Cell % values.

Cell Compressibility

The UltraFoam pycnometer offers a convenient feature that extends its range of usefulness for less rigid foams. By automatically increasing pressure stepwise, the resulting series of Compression % data provides a rational basis to determine:
1. Compression profile/ characteristics for quality control,
2. If there is an optimum pressure for the most accurate Open Cell % and Closed Cell% readings.

Cell Fracture

In a similar manner, the UltraFoam pycnometer has the important analytical ability for rigid foams that have fragile cell walls. In this mode, each step of increasing pressure is tested to see if the pressure change caused a *permanent* decrease in Closed Cell %. The data series of Fracture % versus pressure thus presented provides a rational basis to determine:
1. Cell fracture profile/ characteristics for quality control,
2. If there is an optimum pressure for best accuracy.

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