



GENERAL DESCRIPTION

Density measurements can be carried out by several techniques, like liquid displacement, mercury intrusion or gas displacement. All of these consist in intruding a fluid in the pores of the material to fill completely the pore volume. In this way it is possible to measure the real volume occupied by the solid phase. Gas displacement pycnometry is however the technique of choice since a gas will permeate even the smallest pores, allowing for the determination of the true/skeletal density of a material. This density is the ratio of the mass of the material divided by the volume occupied by the solid phase, including closed pores. In this technique, the true volume of solid materials is determined by combining the Archimedes' principle of a fluid (gas) displacement and the technique of gas expansion (Boyle's law). Additionally, gas pycnometry shows the benefit of being non-destructive.

Measurements can be carried out under Helium, or Nitrogen in case of low-density polymers where Helium permeability could occur through the material.

Gas Pycnometry

KEY-INFORMATION :

- Skeletal density
- Total porosity
- Composition / presence of impurities
- Quality control

Combination of Mercury intrusion (Bulk density, see corresponding section) with Gas pycnometry provides information on the total pore volume or void fraction of the material.

DOMAINS OF APPLICATION

- Pharmaceuticals
- Food and food additives
- Construction materials
- Heterogeneous catalysts
- Textiles
- Powder metallurgy
- Blending of materials
- Additive manufacturing
- Fertilizers
- Powder of film coatings
- Insulating materials
- ...

REPORTING

A measurement will consist in determining the volume, and so the density, of a material over a given number of runs that fulfill the maximum allowed deviation or tolerance (to be specified according to the sample nature and available volume), with a maximum of 50 runs. Each measurement will be repeated 3 times.

A standard report will provide the sample mass, measured skeletal volume and calculated density.



PRACTICAL INFORMATION

Measurements can be carried out on powders, granules, fibers, fabrics and monolithic pieces.

The sample cells available have the following volumes: 0.3, 1.8 and 4.5 cm³ (UltraMycopyc) and 4, 20, 40 and 60 cm³ (Pycnomatic ATC).

Measurements on small volumes of materials are carried out on a Quantachrome UltraMicropyc 1000e, operating at controlled temperature (external thermostatic bath with circulator).

Measurements on larger volumes of materials are carried out on a ThermoScientific Pycnomatic ATC, operating at controlled temperature (internal Peltier device). Standard measurements are carried out with Helium at 20°C. Tests under Nitrogen or at other temperatures can be supplied on demand.

PRICING

Contact us for a quotation adapted to your needs.

