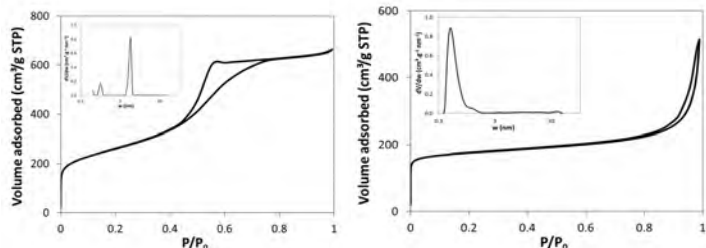




GENERAL DESCRIPTION

Gas adsorption, usually performed with Nitrogen at 77K, is a technique of choice for characterizing the pore texture, in particular the specific surface area, of micro-, meso- or macroporous materials. This technique also provides information about the pore volume and the pore sizes of micro- and mesoporous materials. Being non-destructive, its principle is based on the reversible physisorption of molecules on the surface of a substrate. The specific surface area is obtained upon multiplying the quantity of probe molecules that form a monolayer covering the whole substrate by the area of one such a probe molecule. The micropore volume is determined by assessing the quantity adsorbed at very low pressures, whereas the total pore volume corresponds to the quantity adsorbed at saturation. As such, gas adsorption rapidly provides useful information about the porous nature of the sample, since the shape of the isotherm or the hysteresis loop already tell a lot about the type of porosity (micro-, meso- or macroporous) and the pore geometry.

Gas adsorption



Example of a nitrogen adsorption-desorption isotherm of a micro-mesoporous carbon and corresponding pore size distribution (type I+IV isotherm).

Example of a nitrogen adsorption-desorption isotherm of a micro-macroporous carbon and corresponding pore size distribution (type I+II isotherm).

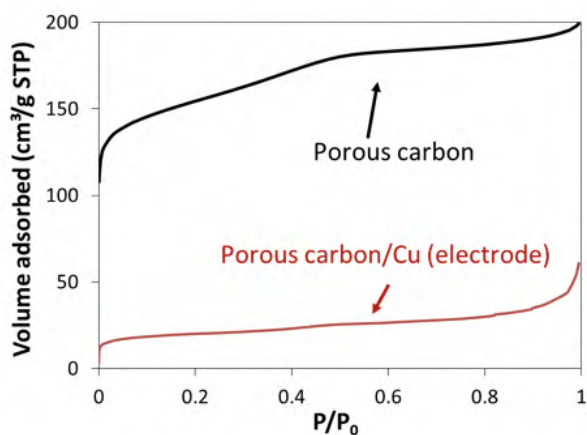
DOMAINS OF APPLICATION

N₂ adsorption at 77 K

- Heterogeneous catalysts
- Catalyst supports
- Adsorbents
- Medical implants (ex. Bones)
- Films and coatings
- Clays and Cements
- Petrol exploration
- Pharmaceuticals (controlled drug delivery, tableting)
- Food additives
- Filters
- Polymers
- Electrodes for batteries or fuel cells
- ...

Additional CO₂ adsorption at 273 K (optional)

- Activated carbons (purification, adsorption)
- Fuel cell electrodes
- Supercapacitor/Battery electrodes
- Carbon black additives
- Energetic materials
- ...



Example of nitrogen adsorption isotherms of a porous carbon (black curve) and the same carbon processed on a Cu foil as an electrode for Li-ion batteries (red curve).

KEY-INFORMATION :

- Shape of the isotherm
- Shape of hysteresis loop
- Pore volume
- Specific surface area (BET or NLDFT)
- Pore size distribution

Information about narrow micropores that are not accessible by N₂ adsorption can be further obtained by using CO₂ as adsorbate at 273 K, allowing for the characterization of micropores down to 0.3 nm. Such type of analysis is particularly useful for carbon-based materials that display a high level of microporosity. Both isotherms can be simultaneously fitted to obtain complete information about the porosity accessible by gas adsorption.

Combination of Gas adsorption with Mercury intrusion (see corresponding section) provides information on the pore size distributions from micropores up to macropores.

REPORTING

Data treatment is performed via the latest version of Microactive® software from Micromeritics. Advanced 2D-NLDFT data treatment for pore size distributions can optionally be performed via the SAIEUS® software from Micromeritics. Graphs are produced with Excel®.

A standard report will provide the most pertinent data such as isotherm type and shape, BET and NLDFT specific surface area, micro- and mesopore volume and mesopore size distribution.

Optionally, deep micropore analysis with micropore size distribution can be provided after a CO₂ adsorption analysis at 273K. The raw data will be supplied on demand as an Excel® file.

PRACTICAL INFORMATION

- Measurements can be carried out on powders and monolithic pieces.
- Max. volume for analysis: 8 cm³.
- Max. sample diameter : 5 mm.
- Minimum developed absolute surface area : 30 m².
- Accurate data require the sample to be outgassed prior to analysis. This step is carried out immediately before the run. For that purpose, the thermal stability of the material needs to be known or determined beforehand (TG-DSC measurement for instance, see corresponding section).
- Measurements are carried out either on a Micromeritics ASAP 2420 or on a ThermoScientific Sorptomatic 1990, both equipped with a high-vacuum turbomolecular pumping system.

PRICING

Contact us for a quotation adapted to your needs.