
**Determination of the specific surface area
of solids by gas adsorption — BET
method**

*Détermination de l'aire massique (surface spécifique) des solides par
adsorption de gaz — Méthode BET*



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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

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The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 9277 was prepared by Technical Committee ISO/TC 24, *Particle characterization including sieving*, Subcommittee SC 4, *Particle characterization*.

This second edition cancels and replaces the first edition (ISO 9277:1995), which has been technically revised.

Determination of the specific surface area of solids by gas adsorption — BET method

1 Scope

This International Standard specifies the determination of the overall (see Note) specific external and internal surface area of disperse (e.g. nano-powders) or porous solids by measuring the amount of physically adsorbed gas according to the Brunauer, Emmett and Teller (BET) method (see Reference [1]). It takes account of the International Union for Pure and Applied Chemistry (IUPAC) recommendations of 1984 and 1994 (see References [7][8]).

NOTE For solids exhibiting a chemically heterogeneous surface, e.g. metal-carrying catalysts, the BET method gives the overall surface area, whereas the metallic portion of the surface area can be measured by chemisorption methods.

The BET method is applicable only to adsorption isotherms of type II (disperse, nonporous or macroporous solids) and type IV (mesoporous solids, pore diameter between 2 nm and 50 nm). Inaccessible pores are not detected. The BET method cannot reliably be applied to solids which absorb the measuring gas.

A strategy for specific surface area determination of microporous materials (type I isotherms) is described in Annex C.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 8213, *Chemical products for industrial use — Sampling techniques — Solid chemical products in the form of particles varying from powders to coarse lumps*

ISO 14488, *Particulate materials — Sampling and sample splitting for the determination of particulate properties*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1

adsorption

enrichment of the adsorptive gas at the external and accessible internal surfaces of a solid material

[ISO 15901-2:2006^[2], 3.4]

3.2

physisorption

weak bonding of the adsorbate, reversible by small changes in pressure or temperature

[ISO 15901-3:2007^[3], 3.13]