



**NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

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**Determination of density by volumetric displacement - Skeleton
density by gas pycnometry**

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Foreword

This document is in accordance with the provisions of GB/T 1.1-2020 "Guidelines for Standardization Work Part 1. Structure and Drafting Rules of Standardization Documents" Drafting.

The translation method used in this document is equivalent to the ISO 12154.2014 "Skeleton Density Measurement Gas Volume Replacement Method".

The Chinese documents that have consistent correspondence with the normatively cited international documents in this document are as follows.

---GB/T 19587-2017 Gas adsorption BET method to determine the specific surface area of solid materials (ISO 9277.2010, IDT);

---GB/T 21650.3-2011 Determination of pore size distribution and porosity of solid materials by mercury intrusion method and gas adsorption method Part 3. Gas

Analysis of micropores by volume adsorption method (ISO 15901-3.2007, IDT).

This document was proposed and managed by the National Technical Committee on Particle Characterization and Sorting and Screen Standardization (SAC/TC168).

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Introduction

The true density of a solid material is defined as the ratio of the mass to the volume occupied by the mass. Therefore, when calculating the true density, the particle

The corresponding volume occupied by pores or inter-particle voids and inter-particle gaps (such as granular or highly dispersed samples).

If the material has no pores, as long as the test liquid does not react with the material, it can be measured by measuring the volume of the solid discharged from the liquid.

Get the true density. The accuracy of this method depends on the accuracy of the liquid volume measurement. However, usually the test liquid will not penetrate completely easily

Enter the pores, cracks, and fissures of the material. In these cases, if the material does not contain closed pores that cannot be penetrated by the analysis gas, gas can be used instead of liquid.

The volume measures the true density of the material. Therefore, the density measured by the gas densitometer method is usually called the material skeleton density, which is equivalent to the solid without closed cells.

The true density of the state material.

The device used to measure the volume of solids is usually called a gas density meter, derived from the Greek "pyknos", which means thick or dense, gas density

The meter can also analyze materials with irregular shapes.

After determining the volume and mass of the solid framework of the sample, the framework density can be easily calculated.

Skeleton density measurement gas volume displacement method

1 Scope

This document specifies a method to quickly and effectively determine the skeleton density of solid material samples with regular or irregular shapes by the gas densitometer method.

Degree methods include powder or whole single-piece samples.

2 Normative references

The contents of the following documents constitute the indispensable clauses of this document through normative references in the text. Among them, dated quotations

Only the version corresponding to that date is applicable to this document; for undated reference documents, the latest version (including all amendments) is applicable to

This document.

ISO 9277 Gas adsorption BET method to determine the specific surface area of solid matter (Determination of the specific surface area of

solids by gas adsorption-BET method)

ISO 14488 Particle Sampling and Sample Separation Method for Determination of Particle Characteristics (Particulate materials-Sampling

and sample splitting for the determination of particulate properties)

ISO 15901-3 Determination of pore size distribution and porosity of solid materials by mercury intrusion method and gas adsorption method Part 3. Analysis by gas adsorption method

Microporous

(Pore size distribution and porosity of solid materials by mercury porosimetry and gas adsorption-Part 3. Analysis of micropores by gas adsorption)

3 Terms and definitions

The following terms and definitions apply to this document.

3.1

Density

The ratio of the mass of the sample to the volume occupied by the mass.

3.2

True solid state density

The ratio of the mass of the sample to the volume of the dense solid framework of the sample, excluding open and closed pores, internal voids of particles, and coarse particles or height

The volume of the gap between the dispersed particles.

3.3

Skeleton density

The ratio of sample mass to sample volume, where the volume includes the volume of closed pores that may exist, but does not include the volume of open pores and bulk samples

The volume of the inter-particle gap.

3.4

Closedpore

A hole that is completely closed by the hole wall, does not communicate with other pores, and cannot enter any fluid.

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