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

GB/T 16418-2008

Replacing GB/T 16418-1996

Particle system - Vocabulary

颗粒系统术语

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Foreword

This standard replaces GB/T 16418-1996 Particle system - Vocabulary. Compared with GB/T 16418-1996 the main technical differences are the following: for ease of use, the terms have been reclassified according to the system of standards for particle measurement and characterization; Clause 2, terms and definitions, has been revised and reordered, with fifty-eight entries added and twenty-one deleted; and part of the wording has been edited to follow Chinese usage.

This standard was proposed by and is under the jurisdiction of the National Technical Committee on Test Sieves, Sieving and Particle Sizing Methods of Standardization Administration of China (SAC/TC 168).

The previous edition of the standard replaced by this one was GB/T 16418-1996.

1 Scope

The dictionary that the Chinese particle industry argues in. Powders, sprays, aerosols, catalysts, pigments, pharmaceutical granules and battery materials are all particle systems,

and almost every property that matters about them - how big the particles are, what shape, how porous, how dense, how freely they flow - can be defined in more than one defensible way, so a specification that says "particle size" without saying which one is not a specification at all. This standard sets out the special terms used for particle systems and gives each one a definition, with the English equivalent printed alongside the Chinese. It applies to any particle system of solid particles, droplets, bubbles, liquid-solid, gas-solid or gas-liquid. The vocabulary is arranged the way the subject is actually worked: basic particle terms first, then the properties and representations of a particle system, subdivided into particle size, particle shape, pore, density and other properties; then the analysis methods, then the applications of particle systems, then sieving, then preparation, and finally a group of general terms such as bubble, droplet, dust, aerosol, colloid, foam, fog, smoke and haze. Chinese and English alphabetical indexes close the document. The 2008 edition reclassified the terms so that they follow the structure of the particle measurement and characterization standards, revised and reordered the definitions clause, added fifty-eight entries and deleted twenty-one. Anyone writing or reading a Chinese powder specification, test report or particle-sizing standard ends up here.

This standard specifies the special terms used for particle systems.

This standard applies to any particle system of solid particles, droplets, bubbles, liquid-solid, gas-solid or gas-liquid.

2.1 Vocabulary of particle

Particle: a discrete unit of any shape and of differing size, which may be solid, liquid or gaseous in state.

Agglomerate: a number of particles stuck to one another.

Powder: an aggregate of dry particles whose particle size is smaller than the value stated in the standard; also called powder material.

Micron particle, sub-micron particle and nanometer particle: solid particles whose particle size falls in the ranges stated in the standard.

Crystalline particle: the whole region in which the atoms are arranged periodically and which is enclosed by grain boundaries.

2.2.1 Particle size

Particle size: the measure of a particulate material.

Particle size distribution: the percentage of particles of each size class in a material.

Frequency distribution: the proportion of the total that is made up by the amount of particles (in number, volume or mass) falling in a given size range; also called frequency or number-frequency distribution. Volume, mass, number, length, and surface or projected

area distributions are the particle size distributions taken on the basis of particle volume, mass, number, length and surface or projected area respectively.

Median diameter: the particle size corresponding to the point at which the cumulative particle size distribution reaches fifty per cent, written D50. Mode diameter: the particle size corresponding to the highest point of the frequency distribution curve.

Equivalent diameter: the diameter of the sphere equivalent to the particle in a geometric or physical property. Equivalent projected area diameter: the diameter of the circle whose area equals the projected area of the particle. Equivalent surface diameter and equivalent volume diameter: the diameters of the spheres whose surface area, or volume, equals that of the particle. Equivalent Stokes diameter: the diameter of the homogeneous sphere whose free settling velocity in the same fluid under laminar flow equals that of the particle.

Feret's diameter: the distance between the parallel lines tangent to the sides of the projected outline of the particle. Martin's diameter: the length of the chord that divides the projected outline of the particle into two parts of equal area.

Particle hardness: the degree to which a particle resists deformation under a given external force.

2.2.2 Particle shape

Particle shape: the external form of a particle. Spherical particle and non-spherical particle: particles whose external form is, or is not, that of a sphere. Flaky particle: a particle whose external form is flake-like. Granular particle: a particle that approximates a sphere but is irregular in shape. Acicular particle and fibrous particle: particles whose external form is needle-like or fibre-like. Angular particle: a particle with sharp edges or roughly polyhedral in shape. Dendritic particle: a particle whose external form has a branched, tree-like shape.

Shape factor: the degree to which a particle departs from a sphere. Shape index: the external form of a particle expressed by various dimensionless combinations of its dimensions. Aspect ratio: the ratio of two representative diameters in the projected shape of the particle.

Bulkiness factor: the ratio of the projected area of the particle to the area of the smallest circumscribed rectangle. Volume filling factor: the ratio of the volume of the particle to the volume of its circumscribed rectangular solid. Circularity: the degree to which the projection of the particle approaches a circle. Degree of sphericity: the degree to which the particle approaches a sphere.

2.2.3 Pore

Porous solid: a solid having cavities, or having channels that are deeper than they are wide.

Void: the gap between particles. Pore size: the width of a pore, for instance the diameter of

a cylindrical pore or the distance between the two opposite walls of a slit pore.

Surface area: unless otherwise stated, the sum of the external and the gaseous surface areas. External surface area: the area including the protruding parts of the surface and all the cracks that are wider than they are deep. Internal surface area: the surface area of the walls of the internal pores. Specific surface area: the ratio of the surface area of the particles to their mass (or volume). Pore volume: the volume of the pores as measured by a specified method.

Open pore: a pore connected with the surface of the particle. Closed pore: a pore not connected with the surface of the particle. Blind pore: an open pore closed at the end and connected to the external surface by only one route. Ink bottle pore: an open pore with a narrow neck. Interconnected pore: a pore connected with one or more other pores. Through pore: a pore that passes completely through the sample. Macropore, mesopore and micropore: pores whose pore size lies above, between and below the limits stated in the standard.

Open porosity: the percentage of the total volume of a porous body that is made up by open pores and voids. Porosity: the ratio of the measurable pore and void volume in a given quantity of solid (the open pore volume plus the void volume) to the total volume it occupies. Intraparticle porosity: the ratio of the open pore volume inside the particles to the total volume occupied by the solid. Interparticle porosity: the ratio of the void volume between the particles to the apparent volume of the powder.

Adsorption: the enrichment of an adsorbed gas on the external surface, and on the accessible internal surface, of a solid material. Physisorption: an adsorption process in which the bond between adsorbate and adsorbent is not chemical; the process is reversible, non-specific and may be multilayer, and desorption occurs as the pressure falls or the temperature rises. Chemisorption: an adsorption process in which the bond between adsorbate and adsorbent is a chemical bond; the process is irreversible and specific, can only be monolayer, and a higher temperature has to be supplied to break the chemical bond before desorption occurs.

Adsorbate, adsorbent and adsorptive: respectively the substance that is adsorbed, the solid material on which adsorption takes place, and the gas or vapour that can be adsorbed.

Adsorbed amount, volume adsorbed, adsorption isotherm, equilibrium adsorption pressure, monolayer adsorption amount, monolayer adsorption capacity, relative pressure and saturation vapour pressure complete the group.

2.2.4 Density

True density: the mass of the particles divided by the volume of the particles not including the closed and open pores. Skeletal density: the mass of the particles divided by the total volume of the sample including the closed pores but not the open pore volume. Effective