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

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**Determination of particle size distribution - Centrifugal liquid
sedimentation methods - Part 2: Photo centrifuge method**

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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 for Standardization Documents"

drafting:

This document is the second part of GB/T 42342 "Liquid Phase Centrifugal Sedimentation Method for Particle Size Distribution": GB/T 42342 has issued the following

part:

--- Part 2: Photoelectric centrifugation:

This document is equivalent to ISO 13318-2:2007 "Determination of Particle Size Distribution by Liquid Centrifugal Sedimentation Part 2: Photoelectric Centrifugal Method":

The following minimal editorial changes have been made to this document:

--- In order to coordinate with existing standards, change the name of the standard to "Particle Size Distribution Liquid Phase Centrifugal Sedimentation Method Part 2: Photoelectric Centrifugation Method":

Please note that some contents of this document may refer to patents: The issuing agency of this document assumes no responsibility for identifying patents:

This document was proposed and managed by the National Particle Characterization and Sorting and Sieve Mesh Standardization Technical Committee (SAC/TC168):

This document is drafted by: ROHM (Jiangsu) Instrument Co., Ltd., China Machinery Productivity Promotion Center Co., Ltd., Anhui Dingheng Industrial Group Co., Ltd:

Co., Ltd., China Jiliang University, Changxing Xuri Powder Technology Co., Ltd:

Introduction

Centrifugal sedimentation method for particle size analysis has a history of decades, widely used in various academic research and industrial applications, and has published many

Multinational and international standards:

Although various new techniques for particle characterization have been developed over the past 20 years, due to technological advances (e.g: multi-wavelength characterization) and sedimentation techniques are

Sedimentation, the most primitive method of particle characterization based on directional motion (migration) in gravity or a centrifugal field, has been somewhat reinvigorated:

With the advancement of computer technology, the sedimentation and diffusion channels of nanoparticles (such as protein aggregates, quantum dots) can be determined and analyzed

by sedimentation method:

Quantities, and one experiment can characterize the two-dimensional properties of particles: Some measurement techniques also provide quantification of total and fractional particle concentrations

possible:

Centrifugal sedimentation technology is similar to gravity sedimentation technology, by deducing concentration-related signal changes with time and/or radial coordinates along the centrifugal field:

Guide, measured particle settling velocity or velocity distribution: The corresponding calculations do not require necessary prerequisites (such as the validity of Stokes' law),

Assumptions about particle properties (such as shape, refractive index, or density) and liquids, and the sedimentation coefficient (the ratio of sedimentation velocity to centrifugal acceleration): Shen

The distribution of these two parameters, the falling velocity and the sedimentation coefficient, constitute the main results of the analytical centrifugation, from which the particle size distribution can be calculated:

As a classification technique, sedimentation analysis helps to distinguish different particles with close to sedimentation velocities and their corresponding equivalent Stokes

diameter: The particle size distribution can be resolved very finely, which is an advantage over spectral integration techniques: Furthermore, if the diffusive flux of the particle

In the order of sedimentation flux, some centrifugation techniques facilitate the multidimensional characterization of granular systems, that is, the simultaneous determination of multiple distribution quantities (e.g:

particle size and density or shape factor):

GB/T 42342 "Particle Size Distribution Liquid Phase Centrifugal Sedimentation Method" is to determine the particle size by accelerating the migration of particles in the liquid by centrifugal sedimentation method

Methods of sedimentation velocity, sedimentation coefficient and particle size distribution of materials: The direction of motion depends on the density difference between the dispersed and continuous (liquid) phases

(also known as density contrast):

GB/T 42342 mainly measures particle velocity distribution, which is converted into particle size distribution according to centrifugal field sedimentation theory: Described in GB/T 42342

The measurement technique is suitable for liquid dispersions such as suspensions and emulsions: The measurable particle size range depends on the material properties: For aqueous samples, usually

Often ranging from a few nanometers to 100 μ m, and the migration speed can be quantified as 10nm/s~1mm/s: Sediment analysis for low particle concentrations

For analysis, the allowable concentration range depends on the measurement technique and analysis theory, usually the volume fraction is not higher than 0.5%:

GB/T 42342 is proposed to be composed of three parts:

--- Part 1: General principles and guidelines: The purpose is to give the terms and definitions related to dispersion system and particles, and the technical methods of particle size detection:

method and the analysis and processing method of detection data; describe the superposition of sedimentation and diffusion of nanoparticles, and determine the

possibility of particle concentration; given that some techniques pass a settling flux when the diffusive flux of particles is of the same order as the settling flux

Experiments can obtain multidimensional information on particle size and density or particle shape parameters:

--- Part 2: Photoelectric centrifugation: The purpose is to measure particle size distribution by liquid phase centrifugal sedimentation method: The sample suspension was placed in

In the cuvette or disk of the photoelectric centrifuge, the concentration of the sample is determined by monitoring the change of the light signal at a known radius: some systems

Allows measurement of the distribution at the large particle end in gravimetric mode and at the small particle end in centrifugal mode: due to geometric optics

Inapplicability of the law, the use of light to determine the particle size distribution requires the application of a calibration factor when the particle size approaches the wavelength of light:

--- Part 3: X-ray centrifugation: The purpose is to give the determination of the particle size of homogeneous granular materials by X-ray centrifugal sedimentation method in liquid phase

method of distribution: The particle concentration is determined by the attenuation of the X-ray beam, and the resulting signal is converted into a particle size distribution:

The first part of GB/T 42342 gives the basic principles and guidelines of the centrifugal sedimentation method, and the second and third parts respectively give two

different measurement methods: