ICS 19.120
CCS A 28

NATIONAL STANDARD OF THE PEOPLE'S REPUBLIC OF CHINA

GB/T 38431-2019

Particulates - Dispersion stability analysis - Static multiple light scattering method

颗粒 分散体系稳定性评价 静态多重光散射法

Issued on: December 31, 2019 **Implemented on: March 1, 2020**

Issued by: State Administration for Market Regulation;
Standardization Administration of the PRC

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Foreword

This standard was drafted in accordance with the rules given in GB/T 1.1-2009. This standard is proposed and managed by the National Technical Committee for Particle Characterization and Sorting and Screen Standardization (SAC/TC168). This standard was drafted by: China Academy of Metrology, Beijing Powder Technology Association, Shenzhen Defang Nanotechnology Co., Ltd., Beijing Daxianxing Technology Industry Co., Ltd., Beijing Physical and Chemical Analysis and Test Center, Institute of Process Engineering, Chinese Academy of Sciences, China Machine Productivity Promotion Center Xin, South China Normal University, Zhuhai Truth Optical Instrument Co., Ltd., Beijing Coast Hongmeng Standard Material Technology Co., Ltd., Zhejiang Doppler Environmental Protection Technology Co., Ltd., China Jiliang University, Hangzhou Wahaha Group Co., Ltd., Shanghai Chuangyuan Cosmetics Co., Ltd., Zhejiang Xinan Chemical Group Co., Ltd., Beijing Landison Technology Co., Ltd., National Nanoscience Center, Changsha Leyuan Chemical Technology Co., Ltd. The main drafters of this standard. Zhang Wenge, He Wei, Shang Weili, Zhou Henghui, Gao Yuan, Li Zhaojun, Zhou Lan, Wang Yuanhang, Zhou Suhong, Yu Fang, Han Peng, Zhang Fugen, Li Li, Zou Zongyong, Yu Mingzhou, Jiang

Xiaorui, Gao Jie, Zhu Xiaoyang, Liu Junjie, Han Yuan, Peng Li, Wu Weidu, Qian Zhigang, Zeng Sili, Huang Kaibing, Wu Fenxia.

A dispersion system is a mixed system formed by dispersing one or more substances into another substance, including emulsification of liquid-liquid dispersion Liquid, solid-liquid dispersed suspension and gas-liquid dispersed foam. The dispersion system has unique physical and chemical properties and is widely used in petroleum, chemical, food, pharmaceutical, ceramics, coatings, pigments, electricity Almost all industrial fields such as pools and vaccines. The dispersion system is a thermodynamically unstable system, as particles of the dispersed phase (liquid particles, solids Particles or bubbles) after being dispersed into the continuous phase, there will be weak physical interaction between the particles and the continuous phase, or between the particles and the particles. Strong charge attraction action, thereby forming flocculation or coalescence; while the specific gravity of different substances in the dispersion system is different, it is affected by gravity for a long time Placed between, there will be precipitation or floating of particles. These instability phenomena will have a significant impact on the final quality of the product, affecting the storage of the product between. Therefore, under the actual storage conditions, it is very important to quickly determine the long-term stability of the dispersion system in the shortest time. Static multiple light scattering (SMLS) technology can qualitatively and quantitatively analyze the instability of dispersion systems without diluting samples Such as floating, sedimentation, flocculation, coalescence, etc., by detecting the initial changes of these instability phenomena to shorten the time of the stability test [1], It is very important to predict the shelf life of products and infer the mechanism of system instability. This technology can achieve direct measuring. Evaluation of stability of particle dispersion system Static multiple light scattering

1 Scope

China's national method for analysing dispersion stability by static multiple light scattering. It specifies the terms and definitions, the symbols and abbreviations, and the principle. The question it answers is whether a suspension will stay suspended - which decides the shelf life of a paint, an ink, a cosmetic, a pharmaceutical suspension or a food emulsion. The traditional way to find out is to leave a sample on a shelf and look at it in six months. Static multiple light scattering does it in hours by measuring what the eye would eventually see, long before it becomes visible: a near-infrared beam is scanned along the height of an undisturbed sample tube, and the transmitted and backscattered light is recorded repeatedly over time. Particles settling out show as a change at the bottom, creaming shows at the top, and aggregation shows as a change in backscatter throughout. The instrument detects those movements at the scale of microns.

This standard specifies the method for evaluating the stability of dispersion systems using the principle of static multiple light scattering, including principles and methods,

measurement systems, Measurement system verification and calibration, measurement and test reports. This standard applies to dispersion systems with a particle size of 50 nm to 1 mm, a volume fraction of 0.01% to 60%, and dispersions of other concentrations Department can refer to the implementation.

2 Terms and definitions

The following terms and definitions apply to this document.

2.1 Disperse system A mixed system is formed by dispersing one or more particulate materials into a fluid material. The former substance is called dispersion Phase, the latter substance is called continuous phase or dispersion medium.

2.2 Dispersion system stability The dispersion state of the particles in the dispersion system changes with time.

2.3 Static multiple light scattering When the light enters the sample containing the dispersion system, the dispersed particles are scattered multiple times.

Note. The particles in the sample can be solid particles, droplets, bubbles and other substances.

2.4 Photon mean free path The average distance between two particles where two adjacent scattering occurs.

2.5 Photonpropagationmeanfreepath The average free path in anisotropic media.

2.6 Instability index A measure of the stability of a dispersion system.

Note. The change intensity is the most stable when it is 0, the larger the change value, the more unstable.