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Particle size analysis - Particle tracking analysis (PTA) method

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Table of Contents

Preface	
Introduction	
1 Scope	1
2 Normative references	1
3 Terms and Definitions	1

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 equivalent to ISO 19430:2016 "Particle Size Analysis Particle Tracking Analysis (PTA)":

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):

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Introduction

Due to regulatory, scientific and commercial needs for the characterization of nanomaterials or the characterization of particle size and counts in suspension, particle tracking

Covering a larger particle size range and being more universal 1), the PTA mentioned in this document covers both NTA and PTA: In this document, PTA is equivalent to at NTA:

Based on laser irradiation, scattered light imaging, particle identification and positioning, single particle tracking and other technical means²⁾, PTA can detect particles in suspension:

Diffusion motion of particles is measured: Suspension here refers to a homogeneous dispersion of particles, air bubbles or other liquid droplets: Stokes-Einstein equation

It is shown that the hydrodynamic diameter of a single particle, droplet or bubble is related to its Brownian motion parameters:

In recent years, academia has made great progress in liposomes and other drug carriers, nanotoxicology, viruses, exosomes, protein aggregation, inkjet inks, and pigment particles:

PTA technology has been used for characterization in the work of particles, cosmetics, food, fuel additives and microbubbles: ASTM has published a

Standard guideline (E2834-12) [10], guidance for nanoparticle tracking analysis NTA measurement of particle size distribution: This document is intended to extend the scope of the specification

And promote the systematization of PTA operation:

This document provides an overview of the theory, basic principles, advantages and disadvantages of particle tracking analysis, as well as instrument configuration, measurement procedures, system validation and

The analysis report and so on are described, and the interpretation and interpretation of the data meaning is one of the important contents: It should be noted that the measured

The measurement result is the number and size distribution of particles, and the meaning of particle size is the hydrodynamic diameter of particles in the sample, which is different from that obtained by other methods:

Particle size is not the same, such as dynamic light scattering method [6] or electron microscopy (static image method) [4]:

1) NTA is the most recognized abbreviation for the techniques described in this document, but particle tracking analysis (PTA) includes NTA in the particle size measurement range:

2) The meaning of "tracking" in this document is "the tracking of the position of the particle in the x and y directions", and the meaning of "trajectory" is "the tracking of the position of

the particle in the x and y coordinates":

Set the determined path":

Particle Size Analysis Particle Tracking Analysis (PTA)

1 Scope

This document describes the use of particle tracking analysis for the measurement of diffusion velocity for liquid dispersions (solids, liquids suspended in liquids):

or gaseous particulate matter) based on the number of particle size distribution methods:

2 Normative references

This document has no normative references:

3 Terms and Definitions

The following terms and definitions apply to this document:

3:1

nanoscale nanoscale

It is about in the size range between 1nm and 100nm:

Note: In this scale range, the main features are not extrapolated from the large size:

[Source: ISO /T S80004-1:2015,2:1]

3:2

nano-object nano-object

object whose one-, two-, or three-dimensional external dimension is at the nanoscale (3:1):

Note: The three-dimensional directions in the external dimensions are perpendicular to each other:

[Source: ISO /T S80004-1:2015,2:5]

3:3

nanoparticle nanoparticle

A nano-object (3:2) whose outer dimensions in all three dimensions are in the nanoscale (3:1):

Note: If the length of the longest axis and the shortest axis of the nano-objects are significantly different (ratio greater than 3), the term nanofiber or nanosheet is used to refer to the nanoparticle:

[Source: ISO /T S80004-4:2011,2:4]

3:4

Particle

Tiny matter with well-defined physical boundaries:

Note 1 to entry: Physical boundaries can also be described as interfaces:

Note 2: Particles can move as a whole:

Note 3: This general particle definition applies to nano-objects (3:2):

[Source: ISO /T S80004-6:2013,2:9]

3:5

Agglomerates agglomerate

An accumulation, aggregate, or mixture of the two of weakly bound particles, whose external area is similar to the sum of the surface areas of its individual particles:

NOTE 1: The forces supporting the aggregates are all weak forces, such as van der Waals forces or simple physical entanglements:

Note 2: Agglomerates are also called "secondary particles", while the source particles are called "primary particles (primary particles)":