SLOVENSKI STANDARD
SIST-TS CEN ISO/TS 19590:2019

01-maj-2019

Nanotehnologije - Granulometrijska sestava in koncentracija anorganskih nanodelcev v vodnih medijih z masno spektrometrijo z induktivno sklopljeno plazmo (ISO/TS 19590:2017)

Nanotechnologies - Size distribution and concentration of inorganic nanoparticles in aqueous media via single particle inductively coupled plasma mass spectrometry (ISO/TS 19590:2017)

Nanotechnologien - Größenverteilung und Konzentration anorganischer Nanopartikel in wässrigen Medien durch Massenspektrometrie an Einzelpartikeln mit induktiktiv gekoppeltem Plasma (ISO/TS 19590:2017)

Nanotechnologies - Distribution granulométrique et concentration de nanoparticules inorganiques en milieu aqueux par spectrométrie de masse à plasma induit en mode particule unique (ISO/TS 19590:2017)

Ta slovenski standard je istoveten z: **CEN ISO/TS 19590:2019**

ICS:

07.120	Nanotehnologije	Nanotechnologies

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TECHNICAL SPECIFICATION

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TECHNISCHE SPEZIFIKATION

CEN ISO/TS 19590

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English Version

Nanotechnologies - Size distribution and concentration of inorganic nanoparticles in aqueous media via single particle inductively coupled plasma mass spectrometry (ISO/TS 19590:2017)

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
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European foreword

The text of ISO/TS 19590:2017 has been prepared by Technical Committee ISO/TC 229 "Nanotechnologies" of the International Organization for Standardization (ISO) and has been taken over as CEN ISO/TS 19590:2019 by Technical Committee CEN/TC 352 "Nanotechnologies" the secretariat of which is held by AFNOR.

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Endorsement notice

The text of ISO/TS 19590:2017 has been approved by CEN as CEN ISO/TS 19590:2019 without any modification.

TECHNICAL SPECIFICATION

ISO/TS 19590

First edition
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Nanotechnologies — Size distribution and concentration of inorganic nanoparticles in aqueous media via single particle inductively coupled plasma mass spectrometry

Nanotechnologies - Distribution de taille et concentration de nanoparticules inorganiques en milieu aqueux par spectrométrie de masse à plasma induit en mode particule unique

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Foreword

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This document was prepared by ISO/TC 229, *Nanotechnologies*.

Introduction

This document was developed in response to the worldwide demand of suitable methods for the detection and characterization of nanoparticles in food and consumer products. Products based on nanotechnology or containing engineered nanoparticles are already in use and beginning to impact the food-associated industries and markets. As a consequence, direct and indirect consumer exposure to engineered nanoparticles (in addition to natural nanoparticles) becomes more likely. The detection of engineered nanoparticles in food, in samples from toxicology and in exposure studies therefore becomes an essential part in understanding the potential benefits, as well as the potential risks, of the application of nanoparticles.

Single particle inductively coupled plasma mass spectrometry (spICP-MS) is a method capable of detecting single nanoparticles at very low concentrations. The aqueous sample is introduced continuously into a standard ICP-MS system that is set to acquire data with a high time resolution (i.e. a short dwell time). Following nebulization, a fraction of the nanoparticles enters the plasma where they are atomized and the individual atoms ionized. For every particle atomized, a cloud of ions results. This cloud of ions is sampled by the mass spectrometer and since the ion density in this cloud is high, the signal pulse is high compared to the background (or baseline) signal if a high time resolution is used. A typical run time is 30 s to 200 s and is called a “time scan.” The mass spectrometer can be tuned to measure any specific element, but due to the high time resolution, typically only one m/z value will be monitored during a run (with the current instruments).

The number of pulses detected per second is directly proportional to the number of nanoparticles in the aqueous suspension that is being measured. To calculate concentrations, the transport efficiency has to be determined first using a reference nanoparticle. The intensity of the pulse and the pulse area are directly proportional to the mass of the measured element in a nanoparticle, and thereby to the nanoparticle’s diameter to the third power (i.e. assuming a spherical geometry for the nanoparticle). This means that for any increase of a particle’s diameter, the response will increase to the third power and therefore a proper validation of the response for each size range of each composition of nanoparticle is required. Calibration is best performed using a reference nanoparticle material; however, such materials are often not available. Therefore, calibration in this procedure is performed using ionic standard solutions of the measured element under the same analytical condition.

The data can be processed by commercially available software or it can be imported in a custom spreadsheet program to calculate the number and mass concentration, the size (the spherical equivalent diameter) and the corresponding number-based size distribution of the nanoparticles. In addition, mass concentrations of ions present in the same sample can be determined from the same data.

The interested reader can consult References [1] to [4] for further information.