SLOVENSKI STANDARD
oSIST prEN ISO 17200:2019

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Nanotehnologija - Nanodelci v obliki prahu - Karakteristike in mere (ISO/DIS 17200:2019)

Nanotechnology - Nanoparticles in powder form - Characteristics and measurements (ISO/DIS 17200:2019)

Nanotechnologien - Nanopartikel in Pulverform - Eigenschaften und Messung (ISO/DIS 17200:2019)

Nanotechnologies - Nanoparticules sous forme de poudre - Caractéristiques et mesures (ISO/DIS 17200:2019)

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Nanotechnology — Nanoparticles in powder form — Characteristics and measurements

Nanotechnologies — Nanoparticules sous forme de poudre — Caractéristiques et mesures

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

The committee responsible for this document is ISO/TC 229 *Nanotechnologies*.

This document cancels and replaces ISO/TS 17200:2013.

Introduction

As is commonly noticed for every technology concerned with the development of new materials, and for nanotechnology in particular, communication and mutual understanding of material characteristics are important among consumers, regulators and industries. In the case of nanoparticles, the stakeholders' basic interest is in the characteristics, if any, of nanoparticles in a material, i.e. whether or not nanoparticles are included, what nanoparticles are present and what the size distribution of nanoparticles is. Such identification of nanoparticles in a material can be facilitated by the development of standards for nanoparticle characteristics and their measurement methods.

This International Standards (IS) provide with standardized techniques for identifying nanoparticles in a particle sample in powder form. Such standards, however, have been developed for specific materials as ISO Technical Specifications, i.e. ISO/TS 11931 and ISO/TS 11937 for calcium carbonates and titanium dioxides, respectively. This IS is a generic document instead being applicable to nanoparticles of general chemical compounds and metals, including calcium carbonates and titanium dioxides.

This IS will facilitate communication and mutual understanding among consumers, regulators and industries about the characteristics of nanoparticles. It will support consumers in purchasing and using nanoparticles-containing products, regulators in establishing legislative frameworks, and industries in setting up voluntary risk control systems.

Nanotechnology — Nanoparticles in powder form — Characteristics and measurements

1 Scope

This International Standard (IS) specifies fundamental characteristics to be measured of an engineered nanoparticles sample to determine the size, the chemical composition and the specific surface area of nanoparticles in powder form. This IS is applied to both particles that have a covering material on the surface of a core material and that do not have it. The IS also specifies measurement methods for determining each of these characteristics.

Excluded in this IS are characteristics that pertain to industrial applications of nanoparticles in powder form and detailed measurement protocols as well as characteristics related to health, safety, and environmental issues.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 3262-1:1997, *Extenders for paints — Specifications and methods of test — Part 1: Introduction and general test methods*

ISO 591-1:2000, *Titanium dioxide pigments for paints — Part 1: Specifications and methods of test*

ISO 21079-2:2008, *Chemical analysis of refractories containing alumina, zirconia, and silica — Refractories containing 5 percent to 45 percent of ZrO2 (alternative to the X-ray fluorescence method) — Part 2: Wet chemical analysis*

ISO 9298:2017, *Rubber compounding ingredients — Zinc oxide — Test methods*

ISO 312:1986, *Manganese ores — Determination of active oxygen content, expressed as manganese dioxide — Titrimetric method*

ISO 9286:1997, *Abrasive grains and crude — Chemical analysis of silicon carbide*

ISO 21068-1:2008, *Chemical analysis of silicon-carbide-containing raw materials and refractory products — Part 1: General information and sample preparation*

ISO 17947:2014, *Fine ceramics (advanced ceramics, advanced technical ceramics) — Methods for chemical analysis of fine silicon nitride powders*

ISO 17942:2014, *Fine ceramics (advanced ceramics, advanced technical ceramics) — Methods for chemical analysis of boron nitride powders*

ISO 2561:2012, *Plastics — Determination of residual styrene monomer in polystyrene (PS) and impact-resistant polystyrene (PS-I) by gas chromatography*

ISO 9276-1:1998, *Representation of results of particle size analysis — Part 1: Graphical representation*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO/TS 80004-1:2015 and ISO/TS 80004-2 and the followings apply.

3.1
transmission electron microscopy
TEM
method that produces magnified images or diffraction patterns of the specimen by an electron beam which passes through the specimen and interacts with it

[SOURCE: ISO29301:2010]

3.2
X-ray diffraction
XRD
method to obtain crystallographic information about a sample by observing the diffraction pattern due to an X-ray beam hitting a sample

[SOURCE: ISO/TS 80004-6:2013]

3.3
specific surface area
absolute surface area of the sample divided by sample mass

[SOURCE: ISO 9277:2010, 3.11]

Note 1 to entry: In this International Standards, the absolute surface area is estimated by measuring the amount of physically adsorbed gas using the BET method.[14]

3.4
feret diameter
distance between two parallel tangents on opposite sides of the image of a particle

[SOURCE: ISO13322-1:2004]

3.5
primary particle
original source particle of agglomerates or aggregates or mixture of the two

Note 1 to entry: Constituent particles of agglomerates or aggregates at a certain actual state may be primary particles, but often the constituents are aggregates.

[SOURCE: ISO/TS 80004-2 2015, 3.2]

3.6
nanoparticle
nano-object with all external dimensions in the nanoscale where the lengths of the longest and the shortest axes of the nano-object do not differ significantly

Note 1 to entry: If the dimensions differ significantly (typically by more than 3 times), terms such as nanofiber or nanoplate may be preferred to the term nanoparticle.

[SOURCE: ISO/TS 80004-2 2015, 4.4]

3.7
engineered nanoparticle
nanoparticle designed for specific purpose or function

[SOURCE: ISO/TS 80004-1:2015, 4.1, modified]

Note 1 to entry: The powder material containing engineered nanoparticles and provided for the measurement is called nanoparticles sample in this document and may be abbreviated to sample.

3.8
particle size distribution
distribution as a function of particle size