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Nanotechnologies — Lung burden mass measurement of nanomaterials for inhalation toxicity tests

bsi.

National foreword

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Foreword

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

Any feedback or questions on this document should be directed to the user’s national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

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Introduction

Inhalation is a primary route of exposure to aerosolized nanomaterials and therefore appropriate inhalation toxicity tests are required to address risk assessment needs for these materials. For this reason, the Organisation for Economic Cooperation and Development (OECD) recently updated its inhalation toxicity test guidelines 412 (subacute) and 413 (subchronic) to make them applicable to nanomaterials.[1][2] These revised test guidelines require post-exposure lung burden measurements to be undertaken when a range-finding study or other relevant information suggests that inhaled test nanomaterials are poorly soluble with low dissolution rate and likely to be retained in the lung. The measurements of lung burden inform on pulmonary deposition and retention of nanomaterials in the lung. At least three lung burden measurements are needed to evaluate clearance kinetics.

This document gives information on how to derive clearance kinetic parameter values using lung burden measurement data. This document complements OECD TG 412[1] and OECD TG 413[2]. As References [1], [2] and [3] only provide limited information on methods for lung burden measurement for nanomaterials or the derivation of lung clearance kinetics, this document provides useful supporting information for conducting inhalation studies based on OECD TG 412[1] and OECD TG 413[2].

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Nanotechnologies — Lung burden mass measurement of nanomaterials for inhalation toxicity tests

1 Scope

The document provides information on the measurement of nanomaterial mass in tissue after inhalation exposure, which can inform on lung clearance behaviour and translocation.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 80004 (all parts), *Nanotechnologies – Vocabulary*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in the ISO 80004 series and the following apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

3.1
aerodynamic diameter
diameter of a spherical particle with a density of 1 000 kg/m^3 that has the same settling velocity as the particle under consideration

Note 1 to entry: Aerodynamic diameter is related to the inertial properties of *aerosol* (3.2) particles and is generally used to describe particles larger than approximately 100 nm.

[SOURCE: ISO/TR 27628:2007, 2.2[4]]

3.2
aerosol
metastable suspension of solid or liquid particles in a gas

[SOURCE: ISO/TR 27628:2007, 2.3[4]]

3.3
mass median aerodynamic diameter
MMAD
calculated *aerodynamic diameter* (3.1) which divides the particles of a measured *aerosol* (3.2) distribution in half based on the mass of the particles where fifty percent of the particles by mass will be larger than the median diameter and fifty per cent of the particles will be smaller than the median

[SOURCE: EPA IRIS Glossary[11]]

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