TECHNICAL REPORT

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# Nanotechnologies — Compilation and description of toxicological screening methods for manufactured nanomaterials

*Nanotechnologies — Compilation et description des méthodes de criblage toxicologiques pour les nanomatériaux manufacturés*



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# Contents

Page

# Foreword

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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).

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For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: Foreword - Supplementary information

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



 

# Introduction

This Technical Report provides a compilation of methods intended to aid the process of toxicological screening of engineered and manufactured nanomaterials prior to full-scale toxicological testing, analysis, and risk assessment. Toxicological screening methods focus on providing information and tools that can be used in decision-making processes. For instance, this Technical Report provides information on methods that can be used to screen nanomaterials in order to determine whether to continue development of a nanomaterial itself and/or a product containing a nanomaterial; determine whether to take on the cost of performing the remaining tiers within a complete tiered-testing strategy; or determine whether appropriate controls are in place to continue nanomaterial research in the laboratory.

This Technical Report is not intended to supplant or compete with any existing regulatory requirements regarding nanomaterial testing, use, and disposal, nor does it provide a list of validated tests for this purpose.

The information provided is consistent with other International Standards. For example, its sister document 'Compilation and Description of Sample Preparation and Dosing Methods for Manufactured NMs' is developed in concert and discusses methods used to prepare samples in various relevant media for toxicological studies. ISO 10993-18[1] specifically addresses the evaluation of the chemical characterization of materials used in medical devices, ISO 14971[2] points out that a toxicological risk analysis should take into account the chemical nature of the materials, and ISO/TR 13014[3] addresses issues pertaining to the materials themselves. ISO/TR 13121[4] describes a process for identifying, evaluating, and communicating the potential risks of manufactured nanomaterials and provides guidance on tiered nanomaterial toxicity testing.

# Nanotechnologies — Compilation and description of toxicological screening methods for manufactured nanomaterials



## 1 Scope

This Technical Report provides a compilation and description of *in vitro* and *in vivo* methods that can be useful for the toxicological, including ecotoxicological screening of engineered and manufactured nanomaterials. Toxicological screening tests included in this Technical Report can be used for such purposes as early decision-making in research and product development, rapid feedback on potential toxicological/safety concerns, or for the preliminary assessment of manufactured nanomaterials. This Technical Report is divided between screening assays related to humans and screening assays related to the environment. A screening test is a relatively simple, inexpensive test that can be administered easily and provides an indication of potential adverse outcomes and effects on human health or the environment.

The Technical Report is intended to complement other international efforts that address nanomaterial toxicology by focusing on screening methods suited for preliminary assessment and is not intended to duplicate similar efforts in other international organizations such as the Organization for Economic Cooperation and Development (OECD). If screening provides an early indication of hazard, the guidance will refer to other organizations' approaches for full-scale toxicological assessment or further tiered studies.

## 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/TS 27687:2008, *Nanotechnologies — Terminology and definitions for nano-objects — Nanoparticle, nanofibre and nanoplate*

ISO/TS 80004-1, *Nanotechnologies — Vocabulary — Part 1: Core terms*

## 3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO/TS 27687:2008 and ISO/TS 80004-1 and the following apply.

**3.1**
**agglomerate**
collection of weakly bound particles or aggregates or mixtures of the two where the resulting external surface area is similar to the sum of the surface areas of the individual components

Note 1 to entry: The forces holding an agglomerate together are weak forces, for example van der Waals forces, or simple physical entanglement.

Note 2 to entry: Agglomerates are also termed secondary particles and the original source particles are termed primary particles.

[SOURCE: ISO/TS 27867:2008, 3.2]