

## Definitions

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**Titanium dioxide**, is the naturally occurring oxide of titanium (chemical formula  $\text{TiO}_2$ ). Three natural crystalline structures are identified: rutile, anatase and brookite. Among them only rutile and anatase are commonly used due to their stability and their natural abundance. Anatase is mainly used at the nano-scale for its remarkable photocatalytic properties for anti-microbial and self cleaning material applications while rutile nanomaterials are mainly used for their optical properties (e.g.: UV-block for sunscreen and paint).

**Silicon dioxide**: also known as silica, is an oxide of silicon (chemical formula  $\text{SiO}_2$ ). Crystalline silica is naturally widely abundant in sand and soils, rocks (sandstone, granite), minerals (quartz). Amorphous silica is far less abundant in nature (this form is called diatomite) but is commonly manufactured and called SAS by industry for Synthetic Amorphous Silica. In the Nanogenotox Joint Action,  $\text{SiO}_2$  or silica only refers to the nanometric SAS (micronised agglomerates of SAS nanoparticles). Nanometric SAS have been mass produced since 1950 and widely used for a large range of industrial applications (flow agents, anti-caking agents and flavor carriers in food, polishing agents in toothpastes, flattening agents and thickeners in paints, etc.).

**Carbon nanotubes**: cylindrical tube-like structures elaborated from graphite sheets. Some exhibit remarkable properties including: mechanical properties (strength, rigidity, flexibility, etc.), physiochemical properties (good thermal or electrical conductivity, etc.). Carbon nanotubes are typically a few nanometres in diameter and several micrometres to centimetres long. Different types of CNT are produced according to the wrapping of the graphite sheet(s). A carbon nanotube that has only one layer of graphite is called a single walled carbon nanotube (SWCNT) and nanotubes that consist of multiple layers (concentric tubes) of graphite are called multiwalled carbon nanotubes (MWCNT).

**Nanometer**: one billionth of a meter ( $1/1,000,000,000$  or  $1 \cdot 10^{-9}$  m). Abbreviation for nanometer: nm.

**REACH**: Registration, Evaluation, Authorisation of Chemicals. REACH is the new EC regulation no. 1907/2006 that has been in force since June 1, 2007.

**Genotoxicity**: describes a harmful action on a cell's genetic material affecting its integrity. Genotoxic substances are known to be potentially mutagenic or carcinogenic, specifically those capable of causing genetic mutations and of contributing to the development of tumors. This includes certain chemical compounds but also certain types of radiation.

**Mutagenic**: that can cause modifications in the nucleic acid sequence (DNA). Mutations can be natural, but can also be caused by mutagenic agents and can be responsible for cancers.

**Carcinogenic**: capable to induce, promote or aggravate cancers.

**Micronucleus test:** used to detect agents which modify the chromosome structure and /or segregation, in such a way so as to lead to the formation of an additional nucleus (micronucleus) during cellular division (mitosis or meiosis).

**Comet assay:** also called Single Cell Gel Electrophoresis (SCGE) is a rapid, simple, visual, and sensitive technique for measuring and analysing DNA breakage in individual cells.

**Round robin test:** also called ring test, is a test (measurement, analysis, or experiment) performed independently several times. For example in the NANOGENOTOX JA, it involves multiple independent scientists performing the same test with the use of the same protocols in different laboratories. The aim of the round robin tests is to evaluate the robustness of the developed methodology by using different equipment and apparatus

**SOPs:** Standard Operating Procedures: A set of instructions covering those features of operations which lend themselves to a definite or standardized procedure without loss of effectiveness.

**ADME parameters:** set of parameters used in pharmacokinetics, a branch of pharmacology dedicated to the determination of the fate of substances administered to a living organism. Pharmacokinetics is divided into several areas which includes the extent and rate of Absorption, Distribution, Metabolism and Excretion. This is commonly referred to as the ADME scheme. Pharmacokinetics describe how the body affects a specific drug after administration. The site of administration and the concentration in which the drug is administered could affect its pharmacokinetic properties.

**Clastogenic effect:** effect that can cause breaks in the chromosomes.

**Aneugenic effect:** action affecting cellular division and inducing an abnormal separation of the chromosomes, resulting in the formation of cells with an abnormal number of chromosomes (aneuploidy).

**Stakeholders:** in the JA, this term describes an individual or a group that is concerned or stands to be affected – directly or indirectly – by NANOGENOTOX's work.

**Nanoscale :** size range from approximately 1 nm to 100 nm.

Note 1: Properties that are not extrapolations from a larger size will typically, but not exclusively, be exhibited in this size range. For such properties the size limits are considered approximate.

Note 2: The lower limit in this definition (approximately 1 nm) is introduced to avoid single and small groups of atoms from being designated as nano-objects or elements of nanostructures, which might be implied by the absence of a lower limit. (ISO TS 27687:2008)

**Nanomaterial :** material with any external dimension in the nanoscale or having internal or surface structure in the nanoscale.

Note: Generic term covering both nano-object and nanostructured material. (ISO/CD TS 80004-1, under publication).

**Manufactured nanomaterial (MN):** nanomaterial intentionally produced to have specific properties or composition (ISO/CD TS 80004-1, under publication).

**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 The forces holding an agglomerate together are weak forces, for example van der Waals forces, or simple physical entanglement.

Note 2: Agglomerates are also termed secondary particles and the original source particles are termed primary particles. (ISO TS 27687:2008).

**Aggregate particle:** comprising strongly bonded or fused particles where the resulting external surface area may be significantly smaller than the sum of calculated surface areas of the individual components.

Note 1: The forces holding an aggregate together are strong forces, for example covalent bonds, or those resulting from sintering or complex physical entanglement.

Note 2: Aggregates are also termed secondary particles and the original source particles are termed primary particles. (ISO TS 27687:2008).

**Nanoparticle :** nano-object with all three external dimensions in the nanoscale.

Note: If the lengths of the longest to the shortest axes of the nano-object differ significantly (typically by more than three times), the terms nanofibre or nanoplate are intended to be used instead of the term nanoparticle. (ISO TS 27687:2008).

**Nano-object :** material with one, two or three external dimensions in the nanoscale. Note: Generic term for all discrete nanoscale objects. (ISO TS 27687:2008).