

RI&E Nano particles^{*)}

Carried out by:

Faculty: CTW/EWI/TNW

Department:

1. Information Nano material

Product name:	
Chemical name:	
CAS-reg. no.:	
Size distribution of particles of primary particles in product	nm
Are fibrous particles involved:	Yes/No length fibres = nm, diameter fibres = nm.
CMR characteristics of nano material (or parent material) ^{**)}	Carcinogenic Mutagenic Reprotoxic
Density (kg/dm ³)	kg/dm ³
State of aggregation of the nano material	Liquid Solid

2. Health hazard nano material

Danger category	1, 2, 3
<p>1= (Water) soluble nano particles. These are nano particles with a solubility > 100 mg/l <i>Examples: particles of lipids, sucrose, soloxanes ranging from 1-100 nm.</i></p> <p>2= Synthetic, persistent nano materials (non fibrous) <i>Examples: metals (e.g. Ag, Au, Pb, La), metal oxides (e.g. TiO₂, ZnO, CeO₂, CoO), carbon black, fullerenes, nanoclay, polymers, dendrimers ranging from 1-100nm.</i></p> <p>3= fibrous, insoluble nano materials regarding which asbestos-like effects cannot be excluded. <i>Example: SWCNT (=one-sided carbon nano tubes) and MWCNT (=multi-sided carbon nano tubes).</i></p>	

^{*)} If you are asked to choose between options, delete where not applicable.

^{**)} This information is used to assess whether in addition to the control measures described in this manual, extra measures need to be taken to meet the statutory requirements for working with substances with CMR-characteristics: see UT guideline working with carcinogenic, mutagenic and reprotoxic substances.

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3. Activity, risk of exposure in the activity and control category

No.	Activity/purpose activity	Space no.	Exposure category ¹⁾			Control category ²⁾			Amount mg/ml	Release of dust/aerosol possible (yes/no)	Length of time activity (minutes)	Frequency number of times per day (d), week (w) or month (m)	Number of (exposed) staff
			I	II	III	A	B	C					
1													
2													
3													
4													
5													
6													

¹⁾ Exposure category:

I: No free nano particles are released by using a closed system (*e.g. use of glove boxes or fully contained process*).

II: Release of bound nano particles is possible (*e.g. when weighing nano material, when grinding, spraying and polishing nano products*)

III: Release of free nano particles is possible (*e.g. when producing nano particles or research activities*)

²⁾ Control category: From danger category (see previous page point 2) and exposure category the control category can be determined via the decision matrix on the next page:

A: Use what is already accepted to limit risks on workplace and what is required by law.

This means: applying sufficient ventilation of space, possibly exhaust at source and/or protection, supplemented by suitable personal protective gear.

B: Check what extra measures can reasonably be used. *Measures are to be in conformity with the occupational health strategy; all measures that are technically and organisationally feasible are further assessed on their economic feasibility.*

C: Apply the precaution principle. *All steps of the occupational health strategy are successively checked and all solutions that are technically and organisationally feasible are implemented.*

Decision matrix to determine the control category of an activity involving nano materials

	Description danger category of nano material or nano product			
		<i>Danger category 1:</i> (water) soluble nano particles	<i>Danger category 2:</i> Synthetic, persistent nano materials (non-fibrous)	<i>Danger category 3:</i> Fibrous, insoluble nano materials for which asbestos-like effects cannot be ruled out
Risk of exposure to nano particles materials during an activity	<i>Exposure category I:</i> Release of nano particles is minimised by using 100% closed system	A	A	B
	<i>Exposure category II:</i> Release of nano particles (1-100 nm) bound in larger solid or liquid particles up to 100 µm during activity is possible	A	B	C
	<i>Exposure category III:</i> Release of primary nano particles (1-100 nm) during activity is possible	A	C	C

4. Plan of action

No.	Activity	Space no	Control category			Measure	Action by	Date completed
			A	B	C			
1								
2								
3								
4								
5								
6								
7								

In selecting specific control measures the occupational health strategy is conformed to (1. Source measures, 2. Technical measures, 3. Organisational measures and 4. Personal protection gear)

Working out a plan of action with specific control measures requires a creative approach. The next page contains an overview of possible control measures, classified in conformity with the occupational health strategy. This can be a useful tool.

Overview of possible control measures to make activities involving the use of nano materials safer; classified in accordance with the occupational health strategy

Measures at source:

- o B1. Check whether the nano material can be replaced by non-nano material or by nano material in a lower danger category;
- o B2. Use nano materials if in powder form or in the gas phase in a closed system as much as possible;
- o B3. Transport nano material in sealed packaging;
- o B4. Do not use more material than required;
- o B5. Try looking for applications that can be supplied ready-made and do not require mixing on the workplace;
- o B6. Use the particles where possible in a matrix (e.g. dispersion, suspension, paste, pallet form or contained);
- o B7. Choose processing methods that produce little dust or aerosol: cutting instead of sawing; brushing/rolling instead of spraying.

Technical measures

- o T1. Nano particles distribute like a gas. Try to work in a closed system as much as possible;
- o T2. If possible work in a fume cupboard, glove-box to avoid spreading nano materials to surrounding spaces;
- o T3. Use an effective exhaust at source when using nano materials. Exhaust at source is effective if the distance from the exhaust opening to the source of nano particles does not exceed the diameter of the exhaust opening;
- o T4. Avoid recirculation of air that is possibly contaminated with nano materials and make sure that the exhaust air is not brought into another space;
- o T5. Provide the ventilation systems with HEPA filters to capture the nano particles;
- o T6. Nano particles can easily escape from any leaks in ventilation systems. Repair leaks and poor sealing immediately;
- o T7. Prevent unwanted spreading of particles after use and fixate them in a resin, liquid, etc. Discharge the particles as chemical waste;
- o T8. Clean spaces where nano materials are used frequently by using wet cleaning only (scrubbing machine) or use an industrial vacuum cleaner with a special HEPA filter.

Organisational measures

- o O1. Consult with the manufacturer/supplier of nano materials about the possibilities for supplying the nano materials in a packaging that is suitable for the activities to be carried out (e.g. a water soluble packaging);
- o O2. Ask the supplier to stick a warning on the packaging such as for example: to be opened in a controlled environment by addressee/user of this package only;
- o O3. Limit the number of actions to be performed with the product (weighing, pouring over, mixing, etc.);
- o O4. Screen off the workplaces where nano materials are processed;
- o O5. Limit the access to workplaces where materials are processed;
- o O6. Use disposable tools as much as possible and discharge these as chemical waste. Also any remainders are to be discharged as chemical waste. Even better: include them in a matrix before discharge (e.g. in a resin).
- o O7. Provide staff with adequate information and instructions about the safe use of nano materials.
 - The information to be provided should involve:
 - possible risks of working with nano materials;
 - recognising the nano materials used;
 - the safe use, storage and discharge of the materials used;
 - any limiting values for nano materials;
 - the correct use and maintenance of the personal protection gear prescribed;
 - the correct use and maintenance of the technical facilities prescribed;
 - what to do in the event of spillage and other incidents.
- o O8. Arrange for adequate periodical maintenance of the exhaust system.

Personal protection gear

- o P1. Give staff proper user instructions about the safe and correct use of the personal protection gear prescribed.
- o P2. Use disposable gloves. Preferably no woven cotton gloves. Gloves considered suitable are for example nitrile, latex and neoprene.
- o P3. Use safety goggles when activities involve substances that may spread.
- o P4. Working clothes should preferably not be woven, but Tyvek, for example.
- o P5. Use at least FFP3- respiration protection (with a protection factor (NPF) of 30 or higher).

RI&E Nano Particles

Seen and approved Head of department

Name:

Date:

Signature: