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Two examples for the guidelines

Safety data sheet (SDS) for synthetic nanomaterials

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This document is available in German, French, Italian and English.

Cover image: various nanoproducts (photo: L. Bergamin Strotz/ SECO)

Contents

Safety data sheet (SDS): Guidelines for synthetic nanomaterials:

Two examples of safety data sheets

The guidelines for nano SDS outline responsibility for and the safe handling of synthetic nanomaterials in order to protect human health and the environment. It complements the general guidelines on the making of an SDS (www.bag.admin.ch/anmeldestelle/13604/13871/14235). The legal framework conditions apply to all materials, whether or not they contain nanomaterials. As a basic rule, an SDS should therefore be aligned to the specific properties and potential hazards of the material.

These guidelines were produced to help identify relevant information regarding synthetic nanomaterials. It states in which form and in which section they are to be set out in the SDS. A hierarchy is also established for the importance of the nanospecific information that is to be supplied. Text examples for the integration of nanospecific information are also provided. These guidelines are available at www.infonano.ch.

To clarify the nanospecific information given in the guidelines, this document provides example safety data sheets for two imaginary products, showing how nanospecific information can and should be attached to the corresponding SDS sections. The hypothetical products have been called "NANO-BLOGGO" and "SECOKAT".

nano

The nanospecific information has been added to the usual data in the individual sections of the sample SDSs. To make it easier to identify, the nanospecific information has been written in blue and is clearly marked with a curly bracket and the word "nano" on the left-hand side of the page.

This visual aid is not to be used in genuine data sheets.

SDS example 1: NANO-BLOGGO

NANO-BLOGGO surface-finisher:

Product: "NANO-BLOGGO"
Safety data sheet as per ChemO Annex 2

Printed: 25 September 2016 Version as of 24 September 2016

Section 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product data:
Trade name: NANO-BLOGGO

1.2 Intended use:

nano { Surface finishing to produce a water and soil-resistant beading-off layer.
The nanoparticles contained alter the surface structure.

1.3 Producer / supplier data:
Producer / supplier: BLOGGO AG / Milchstrasse / 8000 Zürich

Information on safety data sheet: Health protection and the environment department (Tel: 044 111 11 11, auskunft@bloggo.gsu.com)

Emergency number (company) Tel: 044 000 00 00

Emergency information: Swiss Toxicological Information Centre (STIC) Tel 145

Section 2: Hazard identification

2.1 Indication of danger:
As per Regulation (EC) No 1272/2008 (CLP[1] Regulation)


GHS02 Warning


GHS07 Warning

2.2 Particular dangers for humans and the environment
Hazard statements (H-phrases):
GHS02 Flam. Liq. 2 **H225** Highly flammable liquid and vapor
GHS07 Eye Irrit. 2: **H319** Causes serious eye irritation
STOT SE 3: **H336** May cause drowsiness or dizziness

Precautionary statements (P-phrases):
P233 Keep container tightly closed.
P210 Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking. *(Producer/supplier must indicate applicable ignition sources)*
P262 Do not get in eyes, on skin, or on clothing.

P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses if present and easy to do – continue rinsing.

nano { The product contains functionalised nanoparticles. Aerosols containing nanomaterials are created when the products are sprayed. It cannot currently be fully assessed as to whether this entails specific hazards. Avoid inhaling aerosols.

[1] Classification, Labelling and Packaging

Section 3: Composition/information on ingredients

3.1 Chemical characterisation (preparation):

nano Aqueous dispersion of alcohol and functionalised nanoparticles

3.2 Dangerous ingredients:

Substance	**Ethanol**	**Isopropanol**
Content	40 - 60%	25 - 30%
CAS no.	64-17-5	67-63-0
Hazard category	Flam. Liq. 2, Eye Irrit. 2	Flam. Liq. 2, Eye Irrit. 2, STOT SE 3
H-phrases	H225, H319	H225, H319, H336

nano The product contains < 1% functionalised (silanised) nanoparticles based on technical pyrogenic silica, SiO_2 (CAS no. 7631-86-9).

Section 4: Description of first aid measures

In case of inhaling: Breathe in fresh air
In case of contact with the skin: Wash immediately with soap and water. Remove affected clothing.

In case of contact with the eyes: Immediately rinse thoroughly (15 minutes), spreading eyelids wide. Protect the unaffected eye and remove any contact lenses. Consult a doctor if necessary.

In case of swallowing: Drink water immediately. Notify a doctor in the event of discomfort.

Section 5: Firefighting measures

5.1 Suitable extinguishing agent:
Carbon dioxide, foam, extinguishing powder

5.2 Particular dangers with firefighting:
Combustible substance; vapours are heavier than air and spread over the ground. In case of fire, dangerous gases and vapours may be produced. Explosive mixtures with air are already possible at normal temperature. Do not extinguish with a direct water jet. When fighting the fire, only approach the danger area when equipped with breathing apparatus which is not dependent on circulating air.

5.3 Further information: Cool the closed containers which are near the fire with spray and

nano empty them where necessary. Do not allow the extinguishing water to pour into the surface or groundwater. No increased flammability is to be expected of the nanoparticles contained.

Section 6: Accidental release measures

6.1 Personal protection measures:
Avoid contact with the substance.
Make sure that there is enough fresh air. Do not inhale vapours / aerosols.

6.2 Environmental protection measures:
Do not empty into sewers.

6.3 Cleaning procedures:
Use liquid-absorbent material (e.g. Chemizorb®). Carry out the disposal and clean afterwards.

Section 7: Handling and storage

7.1 Handling:
Hints on safe handling: Do not inhale vapours unnecessarily.

Note on fire and explosion protection: Keep away from open flames, hot surfaces and sources of ignition.

7.2 Storage:
Further data on storage conditions: Keep container away from sources of ignition and heat, tightly closed and in a cool, well-ventilated place between 5° and 30°C.

Section 8: Exposure controls/personal protection

8.1 Components with occupational exposure limits
(TLV values and STEL values of the ingredients from SDS section 3**)**

Description of substance: Ethanol
CAS no.: 64-17-5
STEL (threshold value list by SUVA – Swiss Accident Insurance Fund):1000ml/m^3 or 1920 mg/m^3
TLV (SUVA – Swiss Accident Insurance Fund, 2012): 500ml/m^3 or 960 mg/m^3

Description of substance: Isopropanol:
CAS no.: 67-63-0
STEL (threshold value list by SUVA – Swiss Accident Insurance Fund): 400ml/m^3 or 1000mg/m^3
TLV (SUVA – Swiss Accident Insurance Fund, 2012): 200ml/m^3 or 500mg/m^3

There are currently no established limits for the functionalised nanoparticles contained in terms of toxicology or occupational health.

nano Spraying the product creates aerosols containing nanoparticles; in particular where propellants are used, these aerosols could be of breathable size. Exposure to such aerosols is to be avoided; but should it be unavoidable due to technical reasons, it should be kept to a minimum (by means of ventilation, use in separate areas such as a chapel or cabins).

8.2 Personal protective measures:
Protective clothing (PPE): PPE is to be selected based on the concentration and amount of hazardous substances. The chemical resistance of the preservative should be clarified with the suppliers.

Respiratory protection: Filter type A (necessary when vapours / aerosols occur); EN143, EN14387.

nano If technical protective measures are unable to prevent the release of vapours / aerosols and nanoparticles, personal respiratory protection (filter class P-3) should be worn.

Gloves: If there is potential contact with the skin over a prolonged period of time, gloves should be worn; EN374. In the event of full contact, butyl rubber gloves with a thickness of 0.7mm and a penetration time of at least 480min. should be worn. In the event of splashes and drops, nitrile rubber gloves with a thickness of 0.4mm and a penetration time of at least 120min. should be worn.

nano If direct contact with the solution containing nanoparticles cannot be avoided, two layers of gloves one over the other are to be worn where possible.

Protective suit: Flame-proof clothing or flame-retardant anti-static protective clothing; EN14605, EN13982, EN345.

nano Use a protective suit made of membrane material (non-woven, fleece); avoid woven substances.

Eye protection: recommended; EN166.

nano Protective glasses should be fully enclosed; full masks are preferable.

Hygiene measures: Do not smoke, eat or drink at the workplace. Avoid prolonged or repeated contact with the skin (wear protective cream and gloves). Do not inhale vapours / spray. Do not keep in the pockets any material that has become dirty due to contact with the product. Keep away from food products, drinks and animal feed. Wash hands before breaks and once work is finished.

Section 9: Physical and chemical properties

Form: liquid

Colour: transparent

Smell: characteristically alcoholic

pH value of the substance: c. 5.0 at 20°C

Melting point: -120°C

Boiling point: 78°C

Ignition temperature: 425°C

Flash point (closed cup): 15°C

Oxidising properties: no data available

Flammability: highly inflammable

Explosion limits: lower 3.5 vol%

Explosion limits: upper 15 vol%

Vapour pressure: ca. 59hPa (at 20°C)

Relative vapour density: not specified

Rate of vaporisation: not specified

Self-ignition: not specified

Density: 092g/cm^3 (at 20°C)

Water solubility: 20°C soluble

Solubility in organic solvents: Not soluble in non-polar organic solvents (at 20°C).

Maximum size distribution of the nanoparticles contained: 45nm (as per “Nanoparticle Tracking Analysis” method)

Solubility of the nanoparticles contained in water: 1.8mmol/L (pH 7.3; 37°C) (ECETOC/JACC report, 51/2006)

nano **Redox activity and catalytic / photocatalytic activity of the nanoparticles contained:** not known

Agglomeration and aggregation behaviour of the nanoparticles contained: pyrogenic silica forms agglomerates which are stable under usual process conditions (ECETOC/JACC report, 51/2006)

Zeta potential of the nanoparticles contained: not known

Section 10: Stability and reactivity

Conditions to be avoided: heating

Substances to be avoided: danger of explosion with strong oxidising agents.

Dangerous decomposition products: none known

Further information: none

nano The basic material of the nanoparticles contained (pyrogenic silica, SiO_2) is stable.

Section 11: Toxicological information

The toxicological classification of the preparation was carried out based on the results of the calculation procedure of Regulation (EC) No 1272/2008 (CLP[2] Regulation).

nano In the human body the production of oxygen radicals and of pro-inflammatory cytokines is possible due to the pyrogenic silica content (LAM et al. 2004).

The following data apply to ethanol:
Acute tox: LD50 orally: 6,200mg/kg (oral / rat) IUCLID

Acute tox: LD50 after inhalation: 95.6mg/L, 4h RTECS

Acute toxicity when in contact with the skin: dermatitis symptoms

Skin irritation (rabbit): no irritation (OECD-RL 404)

Eye irritation (rabbit): no irritation (OECD-RL 405)

Sensitisation test: negative (Magnusson and Kligman / IUCLID)

No other known data on the preparation in question is known.

Section 12: Ecological information

General information: The eco-toxicological classification of the preparation was carried out based on the results of the calculation procedure of Regulation (EC) No 1272/2008 (CLP[3] Regulation).

The following information applies to ethanol:
Fish toxicity (golden orfe): LC50 of ethanol: 8140mg/L (48h)
Daphnia toxicity (Daphnia magna): EC50 of ethanol: 1-14g/L (48h)
Algae toxicity (Scenedesmus quadricauda): EC5 of ethanol: 5,000mg/L (7d)

nano The production of oxygen radicals and cytokines is possible (LAM et al., 2004).

Other ecologic information: No disturbance in the water treatment plant is to be expected when used correctly. Harmful effects on water organisms in high concentrations.

nano Pyrogenic silica is inert in the environment and will not be transformed except by dissolving (ECETOC/JACC report, 51/2006).

[2] Classification, Labelling and Packaging
[3] Classification, Labelling and Packaging

Section 13: Disposal considerations

Product: Hazardous waste with code 07 01 04 S "Other organic solvent, washing liquids, mother liquors"

Further data: Emptied containers can be eliminated as municipal waste.

Waste code (Switzerland): 15 01 01, 15 01 02, 15 01 04, 15 01 05, 15 01 06, 15 01 07 or 15 01 09.

nano { The waste contains < 1% functionalised (silanised) nanoparticles comprising technical pyrogenic silica (CAS-no. 7631-86-9).

Section 14: Transport information

Land transport ADR (European Agreement on the International Land Transport of Merchandising and Dangerous goods) / COTIF (Convention concerning International Carriage by Rail): UN number: 1263 Paint, Class 3, VG II

UN number: 1170 Ethanol, / Kemler number: 33

Technical postage description: 33/1263 Paint, Solution

Section 15: Regulatory information

15.1 Labelling according to Regulation (EC) No 1272/2008 (CLP[4] Regulation):
Hazardous component(s):
Propan-2-ol, ethanol

Pictogram, pictogram code and signal word:

GHS02 Warning

GHS07 Warning

Hazard statements (H-phrases):
GHS02 Flam. Liq. 2 **H225** Highly flammable liquid and vapor
GHS07 Eye Irrit. 2: **H319** Causes serious eye irritation
STOT SE 3: **H336** May cause drowsiness or dizziness

Precautionary statements (P-phrases):
P233 Keep container tightly closed.
P210 Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking. *(Producer/supplier must indicate applicable ignition sources)*
P262 Do not get in eyes, on skin, or on clothing.
P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses if present and easy to do – continue rinsing.

15.2 National regulations:
Ordinance on Air Pollution Control (OAPC): Class: III Proportion in %: 98

[4] Classification, Labelling and Packaging

Section 16: Other information

The above data is based on our current levels of knowledge and does not constitute a warranty of the characteristics in a legal sense. Regulations are to be observed at the user's own responsibility. Please obtain further information regarding the properties of the products from the technical product data sheet.


GHS02 Warning


GHS07 Warning

Hazard statements (H-phrases) regarding ingredients:
GHS02 Flam. Liq. 2 **H225** Highly flammable liquid and vapor
GHS07 Eye Irrit. 2: **H319** Causes serious eye irritation
STOT SE 3: **H336** May cause drowsiness or dizziness

Information on safety data sheet: Health protection and the environment department (044 111 11 11, auskunft@bloggo.gsu.com)

nano **This SDS contains nanospecific information.**

SDS example 2: SECOKAT

SECOKAT, photocatalyst in wall colours:

Product: "SECOKAT"
Safety data sheet as per ChemO Annex 2
Printed: 25 September 2016 Version as of 24 September 2016

Section 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product data:
Trade name: SECOKAT

1.2 Intended use:
nano Nanoscale photocatalyst in wall colours for the destroying of VOC

1.3 Producer / supplier data:
Producer / supplier: Sonne AG

Information on safety data sheet: Health protection and the environment department (Tel: 044 111 11 11, info@sun.gsu.com)

Emergency number (company): Tel: 044 000 00 00

Emergency information: Swiss Toxicological Information Centre (STIC) Tel 145

Section 2: Hazard identification

2.1 Hazard designation of the product:

No classification according to ChemO or Regulation (EC) No 1272/2008 (CLP[5] Regulation).

nano **Classification based on ENRHES Review 2009**
(Derived from the toxicological data for nano TiO_2**)**

STOT SE 3 GHS07, Warning, H335,
Aquatic Chronic 3, H412

2.2 Particular dangers for humans and the environment:

Hazard statements (H-phrases):
nano **H335** May cause respiratory irritation
H412 Harmful to aquatic life with long-lasting effects

Precautionary statements (P-phrases):
nano **P262** Do not get in eyes, on skin, or on clothing.
P273 Avoid release to the environment. *(If not part of the product's intended purpose)*

[5] Classification, Labelling and Packaging

Section 3: Composition/information on ingredients

nano

3.1 Chemical characterisation (preparation):
Aqueous dispersion of particulate nano titanium dioxide (anatase)

3.2 Dangerous ingredients:
None

nano

3.3 Additional information:
Contains 25% TiO_2 nanoparticles

nano

Material	**Nano TiO_2**
Amount	25%
CAS no.	13463-67-7
Hazard category	STOT SE 3, Aquatic Chronic 3
R-phrases	H335, H412

Source: ENRHES Review 2009, adapted to GHS

Section 4: Description of first aid measures

In case of inhaling: Breathe in fresh air

In case of contact with the skin: Wash immediately with soap and water. Remove any adhesive material immediately. Notify a doctor in the event of persistent skin irritation.

In case of contact with the eyes: Immediately rinse thoroughly (15 minutes), spreading eyelids wide. Protect the unaffected eye and remove any contact lenses. Consult a doctor if necessary

In case of ingestion: Rinse mouth with water and consume lots of water. Do not make the patient vomit. Consult a doctor immediately.

General advice: In case of continued discomfort, consult a doctor.

Section 5: Firefighting measures

5.1 Suitable extinguishing agent:
Foam, carbon dioxide, dry extinguishing agent, water spray jet
(Unsuitable extinguishing agent: full water jet)

5.2 Particular dangers with firefighting:
Carbon monoxide may be released in the event of fire

5.3 Further information: The product itself is non-flammable

Section 6: Accidental release measures

6.1 Personal protection measures:
Ensure good ventilation, use personal protective equipment.

6.2 Environmental protection measures:
Do not empty into surface water or sewers. Make sure it does not spread over a surface.

6.3 Cleaning procedures:
Use liquid-absorbent material (e.g. sand, silica gel, universal binder, sawdust). Rinse traces away after cleaning with water.

Section 7: Handling and storage

7.1 Handling:
Advice on safe handling: Ensure good ventilation, suction of air at the workplace.

Note on fire and explosion protection: The product is not combustible or inflammable.

7.2 Storage:
Further data on storage conditions: Arrange for a floor without drainage. Close any opened containers carefully and store upright. Keep containers tightly shut and store in a cool well ventilated place.

Section 8: Exposure controls/personal protection

8.1 Components with occupational exposure limits

nano This product however has dispersed nanoparticles as aqueous solution.

8.2 Personal protective measures:
Protective clothing (PPE): PPE is to be selected based on the concentration and amount of hazardous substances. The chemical resistance of the preservative should be clarified with the suppliers.

Respiratory protection: Not required, but vapours should not be inhaled. Exception: aerosol usage; EN143, EN14387, for which a fine dust mask should also be worn (protecting nose and mouth)

Gloves: If there is likely to be contact with the skin over a prolonged period of time, protective gloves should be worn; EN374. In the event of full contact, butyl rubber gloves with a thickness of 0.7mm and a penetration time of at least 480min. should be worn. For spray or splash applications, nitrile rubber gloves with a thickness of 0.4mm and a penetration time of at least 120min. should be worn.

nano Wear double-layered protective gloves (water impermeable).

Protective suit: Clothing suitable to the workplace and handling chemicals; EN 14605, EN13982, EN 345

Eye protection: EN166.

nano Protective glasses should be fully enclosed; full masks are preferable.

Hygiene measures: The usual protective measures when handling chemicals are to be observed. Wash hands and face before breaks and immediately after handling the product. Do not eat, smoke or drink during use.

Section 9: Physical and chemical properties

Form: liquid

Colour: whitish

Smell: characteristic

Flash point: >100°C

Ignition temperature: not specified

Boiling point / boiling range: 100°C

Density: ca. 1.1g/cm³

pH value (in water): 7.5

Vapour pressure: not specified

Viscosity (20°C): ca. 200mPa.s.

Water solubility: mixable

Solids content: 10%

nano

Particle size distribution: Maximum size of the nanoparticles contained: 20nm (as per "Nanoparticle Tracking Analysis" method)

Water solubility of the nanoparticles contained: insoluble

Redox activity and catalytic / photo catalytic activity of the nanoparticles contained:

- **Redox:** barely active
- **Photo-catalytic:** active

Zeta potential of the nanoparticles contained: 17 at pH 7, isoelectric point: 7.8

Section 10: Stability and reactivity

Stability: Stable under normal conditions

Conditions to be avoided: None when used in accordance with instructions

Substances to be avoided: No dangerous reactions when stored and handled in accordance with instructions

Dangerous decomposition products: No known dangerous decomposition products

Further information: None

Section 11: Toxicological information

Acute toxicity: Not specified

nano

Local effects: None known. In high dosage, the nanoparticles contained do have toxic effects in various cell systems (ROS-activity, ENRHES Review 2009)

Long-term toxicity:

nano

NOEC of the nanoparticles contained (inhalation, 13 weeks): 0.5mg/m³ (ENRHES Review 2009)

Sensitisation: Not specified

Specific effects: Not specified

Effects on humans: Frequent and persistent contact with the skin can lead to skin irritations

Further information: Product-specific toxicological data not known

Section 12: Ecological information

nano

General information: Based on the ENRHES Review, 2009:

Acute eco-toxicology of the nanoparticles contained: Daphnia magna LC50 (96h) 20mg/L; Pseudokirchneriella sub., EC_{50} (72h): 5.8mg/L

Chronic eco-toxicology of the nanoparticles contained: Oncorhynchus mykiss, sublethal effects (14d): 0.1mg/L

Other ecological tips: Make sure that it does not penetrate into the soil, water or sewers.

Section 13: Disposal considerations

Product: Waste code 06 13 16 S metal oxides with the exception of those which come under 06 03 15

nano

Aqueous dispersion of particulate nano-titanium dioxide (anatase)

Waste / containers which contain nanoparticles should be disposed of as hazardous waste. Completely-emptied containers can also be disposed of as municipal waste.

Section 14: Transport information

Land transport ADR (European Agreement on the International Land Transport of Merchandising and Dangerous goods) **/ COTIF** (Convention concerning International Carriage by Rail): The product is not subject to the transport regulations for land and rail transport.

Sea transport: The product is not subject to the transport regulations for sea transport.

IMDG (International Maritime Code for Dangerous Goods) **/ GGVSee** (German Carriage of Dangerous Goods by Sea ordinance): The product is not subject to transport regulations for lake transport.

Air transport ICAO/IATA: The product is not subject to transport regulations for air transport.

Section 15: Regulatory information

15.1 Labelling according to EC guidelines:
The product does not need to be labelled according to Regulation (EC) No 1272/2008 (CLP[6] Regulation).

15.2 National regulations:
The product does not need to be labelled according to ChemO.

[6] Classification, Labelling and Packaging

Section 16: Other information

The information is based on our level of knowledge and in no way represents a guarantee of the properties in terms of legal warranty provisions. Further information on the properties of the product can be found on the technical product information sheet.

nano

(Based on the ENRHES Review 2009)

STOT SE 3  GHS07, Warning

H335 May cause respiratory irritation

H412 Harmful to aquatic life with long lasting effects

P262 Do not get in eyes, on skin, or on clothing.

P273 Avoid release to the environment. (*If not part of the product's intended purpose*)

Contains 25% TiO_2 nanoparticles.

This SDS contains nano-specific information.