

Trade name: Avantama N-20X-Flex

## Safety data sheet

### 1 Identification of the substance/mixture and of the company

#### 1.1 Product identifiers

Trade name: Avantama N-20X-Flex

Product number: 10022

REACH No.: A registration number is not available for this substance as the substance or its uses are exempted from registration, the annual tonnage does not require a registration or the registration is envisaged for a later registration deadline.

#### 1.2 Relevant identified uses of the substance or mixture

Identified uses: Laboratory chemicals, Manufacture of thin films

#### 1.3 Details of the supplier of the safety data sheet

##### Distributing company:

Avantama AG

Laubisrütistrasse 50

8712 Stäfa

Switzerland

Tel.-Nr.: +41 44 244 51 00

**Informational:** info@avantama.com

#### 1.4 Emergency telephone number:

Schweizerisches Toxikologisches Informationszentrum (STIZ), Switzerland

Tel.-Nr.: +41 (0)44 251 5151

### 2 Hazards identification

#### 2.1 Classification of the substance or mixture

For the full text of the H-statements and P-phrases mentioned in this section, see Section 16

##### Classification according to Regulation (EC) No 1272/2008 [EU-GHS/CLP]

Flammable liquids (Category 2)	H225
Acute toxicity Oral (Category 4)	H302
Skin irritation (Category 2)	H315
Serious eye damage (Category 1)	H318
Specific target organ toxicity - single exposure (Category 3) Respiratory system	H335
Specific target organ toxicity – single exposure (Category 3) Central nervous system	H336
Acute aquatic toxicity (Category 1)	H400
Chronic aquatic toxicity (Category 1)	H410

Classification systems:

The classification corresponds to the current EC-Lists and is complemented with literature and the company knowledge.

#### 2.2 Label elements

Labeling according to Regulation (EC) Nr. 1272/2008

The product is classified and labeled according to the CLP regulation.

##### Pictogram



**Signal word:** Danger

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**Hazard statement(s)**

H225	Highly flammable liquid and vapour
H226	Flammable liquid and vapour
H302	Harmful if swallowed.
H315	Causes skin irritation.
H318	Causes serious eye damage
H319	Causes serious eye irritation
H335	May cause respiratory irritation.
H336	May cause drowsiness and dizziness.
H400	Very toxic to aquatic life.
H410	Very toxic to aquatic life with long lasting effects

**Precautionary statement(s)**

P210	Keep away from heat/ sparks/ open flames/ hot surfaces. – No smoking.
P261	Avoid breathing dust/ fume/ gas/ mist/ vapors/ spray.
P273	Avoid release to the environment.
P280	Wear protective gloves protective clothing eye protection face protection
P301+P312+P330	IF SWALLOWED: Call a POISON CENTER or doctor/ physician if you feel unwell. Rinse mouth.
P304+P340+P312	IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER or doctor/ physician if you feel unwell.
P305+P351+P338 +P310	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a POISON CENTER or doctor/ physician.
P403+P235	Store in a well-ventilated place. Keep cool.
P501	Dispose of contents/ container to an approved waste disposal plant.

**2.3 Supplemental Hazard**

The applied nanoparticles may be enriched in human body and/ or in organisms.

### 3 Composition / information on ingredients

**Chemical characterization:** Mixtures

**Description:** Mixture made of following ingredients including non-hazardous admixtures.

<b>Hazardous ingredients:</b>		
CAS: 71-36-3 EC: 200-751-6	1-Butanol Flam. Liq. 3; Acute Tox 4; Skin irrit. 2; Eye dam. 1; STOT SE 3; H226, H315, H318, H335, H336	43-49%
CAS: 78-92-2 EC: 201-158-5	2-Butanol Flam. Liq. 3; Eye Irrit. 2; STOT SE 3; H226, H319, H336, H335	43-49%
CAS: 64-17-5 EC: 200-578-6	Ethanol Flam. Liq. 2; H225, Eye Irrit. 2 H319	< 10%
CAS: 1314-13-2 EC: 215-222-5	Zinc oxide Aquatic Acute 1; H400; Aquatic Chronic 1; H410	< 5%

**Additional indication:**

Comprised zinc oxide is present as nanoparticles.

For the full text of the H-statements and P-phrases mentioned in this section, see Section 16

### 4 First aid measures

**4.1 Description of first aid measures**

If inhaled:	If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.
In case of skin contact:	Wash off with soap and plenty of water.
In case of eye contact:	Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

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If swallowed: Do NOT induce vomiting. Never give anything by mouth to an unconscious person.  
Rinse mouth with water. Consult a physician.

**4.2 Most important symptoms and effects, both acute and delayed**

The most important known symptoms and effects are described in the labeling (see section 2.2) and/or in section 11.

**4.3 Indication of any immediate medical attention and special treatment needed.**

No data available.

## 5 Firefighting measures

### 5.1 Extinguishing media

**Unsuitable media:**

Water jet

**Suitable media:**

CO<sub>2</sub>, alcohol-resistant foam, dry chemical

### 5.2 Special hazards arising from the substance or mixtures

Zinc/ Zinc oxide, Carbon oxide

### 5.3 Advice for firefighters

Specific protective equipment: Wear self-contained breathing apparatus for firefighting if necessary.

Further information: Use water spray to cool unopened containers. Prevent fire-extinguishing water from contaminating surface water or the ground water system.

## 6 Accidental release measures

### 6.1 Personal precautions, protective equipment and emergency procedures

Use personal protective equipment. Avoid breathing vapors, mist or gas. Ensure adequate ventilation. Remove all sources of ignition. Evacuate personnel to safe areas. Beware of vapors accumulating to form explosive concentrations. Vapors can accumulate in low areas.

### 6.2 Environmental precautions

Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

### 6.3 Methods and materials for containment and cleaning up

Pick up and arrange disposal with liquid binding material (chemical binders, sand, diatomite, acid binders, universal binders, sawdust). Then collect by wet-brushing and place in container for disposal according to local regulations. Provide adequate ventilation.

### 6.4 Reference to other sections

For handling see section 7

For disposal see section 13

## 7 Handling and storage

### 7.1 Handling

**Precaution for safe handling**

Ensure adequate ventilation. Use personal protective equipment. Avoid breathing vapors, mist or gas. Avoid contact with skin and eyes. Remove all sources of ignition. Evacuate personnel to safe areas. Beware of vapors accumulating to form explosive concentrations. Vapors can accumulate in low areas. Usual measures of the preventing fire protection.

Avoid formation of aerosols, do not inhale.

### 7.2 Conditions for safe storage, including any incompatibilities

**Storage**

Store in cool in place. Keep container tightly closed in a dry and well-ventilated place. Containers, which are opened, must be carefully resealed and kept upright to prevent leakage.

### 7.3 Specific end use(s)

Apart from the uses mentioned in section 1 no other specific uses are stipulated.

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## 8 Exposure controls/personal protections

Additional indication for technical installation: No data available, see section 7.

### 8.1 Control parameters

<b>Components requiring monitoring of workplace exposure limit values:</b>	
<b>Zinc oxide</b>	
MAK (Switzerland)	3 mg/m <sup>3</sup> (NIOSH, OSHA) Inert dust, general dust limit value; inert dust is termed by the current state of scientific knowledge as dust which is not resorbed, no increased formation of connective tissue in lungs (fibrogenic effect) is observed and no specific symptoms of illness are triggered. Such kind of dust may infringe the functionality of the respiratory system by mechanical irritation. Therefore a MAK of 3 mg/m <sup>3</sup> of alveolar dust is applied, measured according to EN 481 and also 10 mg/m <sup>3</sup> for respirable dust. The here used zinc oxide is not existent in form of dust, but can be inhaled in form as an aerosol.
<b>1-Butanol</b>	
MAK (Switzerland, max. workplace concentration)	50 ppm 150 mg/m <sup>3</sup>
KZGW	50 ppm 150 mg/m <sup>3</sup>
<b>2-Butanol</b>	
MAK (Switzerland, (max. workplace concentration)	100 ppm 300 mg/m <sup>3</sup>
KZGW	200 ppm 600 mg/m <sup>3</sup>
<b>Ethanol</b>	
MAK (Switzerland, max. workplace concentration)	500 ppm 960 mg/m <sup>3</sup>

### 8.2 Exposure controls

#### Personal protective equipment

##### General protective and hygienic measures

Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of the day. Keep away from food, beverage and feeding stuff.

Take off contaminated clothing immediately.

##### Eye/face protection



Safety glasses with side-shields conforming to EN166. Use equipment for eye protection tested and approved under appropriate government standards.

##### Respiratory protection

For mist /aerosol exposures use respiratory protection.

Recommended filter type: ABEK P3

##### Skin protection



Handle with gloves. Use proper glove removal technique to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

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**Glove material**

The selected protective gloves have to satisfy the specifications of EU Directive 89/686/EEC and the standard EN 374 derived from it.

Recommended material: Nitrile rubber

**Full contact:**

Minimum layer thickness: 0.4 mm

Break through time: 480 min

**Splash contact**

Minimum layer thickness: 0.4 mm

Break through time: 60min

**Body protection**

Type of protective equipment according to risk evaluation.

**Control of environmental exposure**

Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

**9 Physical und chemical properties**

<b>9.1 Information on basic physical and chemical properties</b>	
General properties	
Appearance:	
Form:	Liquid
Color:	Brownish, translucent
Odor:	Alcohol-like
Odor threshold:	No data available
pH:	No data available
Phase transition	
Melting point/melting range:	No data available
Initial boiling point/boiling range:	No data available
Flash point:	No data available
Flammability (solid, gas):	No data available
Ignition temperature:	No data available
Decomposition temperature:	No data available
Auto-ignition temperature:	No data available
Explosive properties:	No data available
Explosion limit:	
Lower:	No data available
Upper:	No data available
Oxidizing properties	No data available
Vapor pressure at 20°C:	No data available
Density at 20°C	No data available
Relative density	No data available
Vapor density	No data available
Evaporation rate	No data available
Solubility in / Miscibility with Water:	Miscible but not stable
Partition coefficient:	No data available
Viscosity:	
Dynamic:	3-4 mPa s at 23°C
Kinematic:	No data available
Solvent content:	
Organic solvents:	90-100%
VOC (EU):	95-100%
VOCV (CH):	95-100%

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Solid load:	<5%
<b>9.2 Additional safety information:</b>	Primary particle size (dried appearance): 5-50 nm Particle size (agglomerate size) in Dispersion: <100 nm Zeta-Potential of nanoparticles is unknown.  Nanoparticle solubility: poorly soluble (0.1 g/L) Nanoparticles are functionalized.

## 10 Stability and Reactivity

### 10.1 Reactivity

No data available

### 10.2 Chemical stability

Stable under recommended storage conditions

### 10.3 Thermic decomposition / conditions to avoid:

No decomposition under recommended application.

### 10.4 Possibility of hazardous reactions

No data available.

### 10.5 Conditions to avoid

Heat, flames and sparks. Extreme temperatures and direct sunlight

### 10.6 Incompatible materials

Strong bases, strong oxidizing agents, strong acids, halogenated compounds.

### 10.7 Hazardous decomposition products

Other decomposition products – no data available.

In the event of fire: See section 5

## 11 Toxicological information

### 11.1 Information on toxicological effects

#### Acute toxicity

Classification-relevant LD/LC50 values:		
<b>Zinc oxide</b>		
Oral	LD50	15'000 mg/kg (rat) (OECD 401)
Inhalative	LC50	5.7 mg/L / 4h (rat) (OECD 401)
<b>1-Butanol</b>		
Oral	LD50	790 mg/kg (rat)
Inhalative	LC50	8'000 ppm, 4h (rat)
Dermal	LD50	3'400 mg/kg (rabbit)
<b>2-Butanol</b>		
Oral	LD50	2'193 mg/kg (rat)
Dermal	LD50	>2'000 mg/kg (rabbit)
<b>Ethanol</b>		
Oral	LD50	7'060 mg/kg (rat)
Inhalative	LC50	20'000 mg/kg / 10h (rat)

#### Primary corrosion/irritation:

Respiratory:	May be harmful, may cause irritation of respiratory system by inhalation of aerosol or dust.
Skin (rabbit):	Skin irritation – 24h
Eye (rabbit):	Blindness
Sensitizations:	No data available

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**Carcinogenicity:** No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

**Reproductive toxicity:** Reproductive toxicity - Rat - Inhalation  
Effects on Fertility: Post-implantation mortality (e.g., dead and/or resorbed implants per total number of implants). Effects on Embryo or Fetus: Fetal death.  
Specific Developmental Abnormalities: Musculoskeletal system.  
Developmental Toxicity - Rat - Inhalation  
Effects on Embryo or Fetus: Fetotoxicity (except death, e.g., stunted fetus).

**Additional toxicological information:**

RTECS: EO1400000: 1-Butanol

drying, cracking of the skin, Skin irritation

RTECS: EO1750000: 2-Butanol

Nausea, Dizziness, Headache,

To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

## 12 Ecological information

### 12.1 Toxicity

Aquatic Toxicity:

**Zinc oxide:** LC<sub>50</sub>: >320 mg/l / 96 h (Lepomis macrochirus)  
1.1 mg/l / 96 h (Onchorhynchus mykiss)  
2'246 mg/l / 96 h (Pimephales promelas)  
EC<sub>50</sub>: 2.2 mg/l / 48 h (Daphnia magna)  
IC<sub>50</sub>: 136 mg/l / 72 h (Selenastrum capricornutum) (OECD 201)  
NOEC: 0.025 mg/l (clupea harengus) (27 d, OECD 215)  
0.04 mg/l (Onchorhynchus mykiss) (30 d, OECD 215)  
NOEC: 0.011 mg/l (Pseudokirchneriella subcapitata) (5 d, OECD 201)

**1-Butanol:** Toxicity to fish LC<sub>50</sub> - Pimephales promelas (fathead minnow) - 1.840 mg/l - 96 h  
Toxicity to daphnia and other aquatic invertebrates EC<sub>50</sub>  
Daphnia magna (Water flea) - 1.983 mg/l - 48 h

**2-Butanol:** Toxicity to fish LC<sub>50</sub> - Pimephales promelas (fathead minnow) - 3.670 mg/l - 96 h  
static test LC<sub>50</sub> - Leuciscus idus melanotus - 3.520 - 3.540 mg/l - 48 h  
Toxicity to daphnia and other aquatic invertebrates EC<sub>50</sub>  
Daphnia magna (Water flea) - 4.227 mg/l - 48 h

**Ethanol:** LC<sub>50</sub> – 14'200 mg/L / 96h (Pimephales promelas)  
LC<sub>50</sub> – 5'012 mg/L / 48h (Ceriodaphnia dubia)  
NOEC – 9.6 mg/mL / 9d (Daphnia magna)  
EC<sub>50</sub> – 275 mg/L / 72h (Chlorella vulgaris)

### 12.2 Persistence and degradability

Zinc oxide: No data available

1-Butanol: No data available

2-Butanol: Aerobic - Exposure time 5 d  
Result: 86 % - Readily biodegradable

### 12.3 Behavior in environmental compartments:

Bio-accumulative potential: No data available.

Mobility in soil: No data available.

### 12.4 Additional ecological indication:

General indication: Do not let product enter drains, surface water or the ground water system. Discharge into the environment must be avoided.

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### 12.5 Results of PBT- and vPvB assessment

PBT/vPvB assessment not available as chemical safety assessment not required/not conducted.

### 12.6 Other adverse effects

Very toxic to aquatic life.

## 13 Disposal considerations

### 13.1 Waste treatment methods

**Recommendation:** Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting, as this material is highly flammable. Offer surplus and non-recyclable solutions to a licensed disposal company.

### 13.2 Contaminated packaging

**Recommendation:** Dispose of as unused product

**Recommended detergent:** Ethanol

## 14 Transport information

### Land transport ADR/RID and GGVSEB (cross-border/interior):



ADR/RID-GGVSEB class:	3 flammable liquid
<b>UN number:</b>	<b>1993</b>
Packing group:	II
Hazard label:	3
UN proper shipping name:	Flammable liquid, N.O.S. (Butanol, Ethanol, Zinc oxide)
Tunnel restriction code	D/E
Transport hazard class(es)	3

### Sea shipment IMDG/GGVSee



IMDG/GGVSee class:	3 flammable liquid
<b>UN number:</b>	<b>1993</b>
Hazard label:	3
Packing group:	II
EMS code:	F-E, S-E
Marine pollutant:	Yes
UN proper shipping name:	Flammable liquid, N.O.S. (Butanol, Ethanol, Zinc oxide)

### Air transport ICAO-TI und IATA-DGR



ICAO/IATA class:	3
<b>UN/ID number:</b>	<b>1993</b>
Hazard label:	3
Packing group:	II
UN proper shipping name:	Flammable liquid, N.O.S. (Butanol, Ethanol, Zinc oxide)



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## 15 Regulatory information

Chemical Safety Assessment: For this product a chemical safety assessment was not carried out

## 16 Other information

The above information is believed to be correct but does not purport to be all-inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Avantama Ltd shall not be held liable for any damage resulting from handling or from contact with the above product.

This safety data sheet contains nano-specific information.

### 16.1 H-statements

H225	Highly flammable liquid and vapour.
H302	Harmful if swallowed.
H315	Causes skin irritation.
H318	Causes serious eye damage.
H335	May cause respiratory irritation.
H336	May cause drowsiness and dizziness.
H410	Very toxic to aquatic life with long lasting effects

### 16.2 Precautionary statement(s)

P210	Keep away from heat/ sparks/ open flames/ hot surfaces. – No smoking.
P261	Avoid breathing dust/ fume/ gas/ mist/ vapors/ spray.
P273	Avoid release to the environment.
P280	Wear protective gloves protective clothing eye protection face protection
P301+P312+P330	IF SWALLOWED: Call a POISON CENTER or doctor/ physician if you feel unwell. Rinse mouth.
P304+P340+P312	IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER or doctor/ physician if you feel unwell.
P305+P351+P338 +P310	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a POISON CENTER or doctor/ physician.
P403+P235	Store in a well-ventilated place. Keep cool.
P501	Dispose of contents/ container to an approved waste disposal plant.