

nitrogen dioxide

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

1.1. Product identifier

Product name	: nitrogen dioxide
Synonyms	: dioxide of nitrogen; nitrito; Nitrogen oxide (NO ₂); nitrogen oxide (NO ₂); nitrogen peroxide; N-oxide; oxide of nitrogen, red; red oxide of nitrogen
Registration number REACH	:
Product type REACH	: Substance/mono-constituent
CAS number	: 10102-44-0
EC index number	: 007-002-00-0
EC number	: 233-272-6
RTECS number	: QW9800000
Molecular mass	: 46.01 g/mol
Formula	: NO ₂

1.2. Relevant identified uses of the substance or mixture and uses advised against

1.2.1 Relevant identified uses

Industrial and professional use. Before use: carry out a risk assessment

1.2.2 Uses advised against

No uses advised against known

1.3. Details of the supplier of the safety data sheet

Supplier of the safety data sheet

BALCHEM NV
 Westvaardijk 85
 B-1850 Grimbergen Belgium
 ☎ +32 2 251 60 87
 📧 +32 2 252 17 51
 info.grimbergen@balchem.com

Distributor of the product

BALCHEM NV
 Westvaardijk 85
 B-1850 Grimbergen Belgium
 ☎ +32 2 251 60 87
 📧 +32 2 252 17 51
 info.grimbergen@balchem.com

1.4. Emergency telephone number

24h/24h (Telephone advice: English, French, German, Dutch):
 +32 14 58 45 45 (BIG)

SECTION 2: Hazards identification

2.1. Classification of the substance or mixture

Classified as dangerous according to the criteria of Regulation (EC) No 1272/2008

Class	Category	Hazard statements
Ox. Gas	category 1	H270: May cause or intensify fire; oxidiser.
Press. Gas	Liquefied gas	H280: Contains gas under pressure; may explode if heated.
Acute Tox.	category 1	H330: Fatal if inhaled.
Skin Corr.	category 1B	H314: Causes severe skin burns and eye damage.

2.2. Label elements



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Signal word	Danger
H-statements	
H270	May cause or intensify fire; oxidiser.
H280	Contains gas under pressure; may explode if heated.
H330	Fatal if inhaled.
H314	Causes severe skin burns and eye damage.
P-statements	
P244	Keep valves and fittings free from oil and grease.
P280	Wear protective gloves, protective clothing and eye protection/face protection.
P260	Do not breathe gas.
P304 + P340	IF INHALED: Remove person to fresh air and keep comfortable for breathing.
P303 + P361 + P353	IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower.
P305 + P351 + P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

2.3. Other hazards

May cause frostbites
Lachrymatory
May cause frostbites

SECTION 3: Composition/information on ingredients

3.1. Substances

Name REACH Registration No	CAS No EC No	Conc. (C)	Classification according to CLP	Note	Remark
nitrogen dioxide	10102-44-0 233-272-6		Ox. Gas 1; H270 Press. Gas - Liquefied gas; H280 Acute Tox. 1; H330 Skin Corr. 1B; H314	(1)(2)(8)	Mono-constituent

(1) For H-statements in full: see heading 16

(2) Substance with a Community workplace exposure limit

(8) Specific concentration limits, see heading 16

3.2. Mixtures

Not applicable

SECTION 4: First aid measures

4.1. Description of first aid measures

General:

Check the vital functions. Unconscious: maintain adequate airway and respiration. Respiratory arrest: artificial respiration or oxygen. Cardiac arrest: perform resuscitation. Victim conscious with laboured breathing: half-seated. Victim in shock: on his back with legs slightly raised. Vomiting: prevent asphyxia/aspiration pneumonia. Prevent cooling by covering the victim (no warming up). Keep watching the victim. Give psychological aid. Keep the victim calm, avoid physical strain. Depending on the victim's condition: doctor/hospital.

After inhalation:

Remove the victim into fresh air. Immediately consult a doctor/medical service.

After skin contact:

Wash immediately with lots of water (15 minutes)/shower. Do not apply (chemical) neutralizing agents. Remove clothing while washing. Do not remove clothing if it sticks to the skin. Cover wounds with sterile bandage. Consult a doctor/medical service. If burned surface > 10%: take victim to hospital.

After eye contact:

Rinse immediately with plenty of water for 15 minutes. Do not apply neutralizing agents. Take victim to an ophthalmologist.

After ingestion:

Not applicable.

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

4.2.1 Acute symptoms

After inhalation:

Irritation of the respiratory tract. Irritation of the nasal mucous membranes. Coughing. Respiratory difficulties. Headache. Nausea. Disturbances of heart rate. Feeling of weakness. FOLLOWING SYMPTOMS MAY APPEAR LATER: Rapid respiration. Accelerated heart action. Blue/grey discolouration of the skin. Possible inflammation of the respiratory tract. Risk of lung oedema. Risk of pneumonia. Methemoglobinemia. Respiratory collapse.

After skin contact:

Frostbites. Caustic burns/corrosion of the skin.

After eye contact:

Corrosion of the eye tissue. Permanent eye damage.

After ingestion:

Not applicable.

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4.2.2 Delayed symptoms

No effects known.

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

If applicable and available it will be listed below.

SECTION 5: Firefighting measures

5.1. Extinguishing media

5.1.1 Suitable extinguishing media:

Adapt extinguishing media to the environment.

5.1.2 Unsuitable extinguishing media:

No unsuitable extinguishing media known.

5.2. Special hazards arising from the substance or mixture

On heating: oxidation resulting in increased fire or explosion risk. Reacts with water (moisture): release of corrosive products (nitric acid).

5.3. Advice for firefighters

5.3.1 Instructions:

Cool tanks/drums with water spray/remove them into safety. Physical explosion risk: cool from behind cover. Do not move the load if exposed to heat. After cooling: persistent risk of physical explosion. Dilute toxic gases with water spray. Take account of toxic fire-fighting water. Use water moderately and if possible collect or contain it.

5.3.2 Special protective equipment for fire-fighters:

Gas-tight suit. Corrosion-proof suit. Compressed air/oxygen apparatus.

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

Keep upwind. Seal off low-lying areas. Close doors and windows of adjacent premises. No naked flames. Avoid ingress of water in the containers.

6.1.1 Protective equipment for non-emergency personnel

See heading 8.2

6.1.2 Protective equipment for emergency responders

Gas-tight suit. Corrosion-proof suit.

Suitable protective clothing

See heading 8.2

6.2. Environmental precautions

Contain released substance, pump into suitable containers. Plug the leak, cut off the supply. Dam up the liquid spill. Tip the container on one side to stop the leakage. Try to reduce evaporation. Take account of toxic/corrosive precipitation water. Prevent soil and water pollution. Prevent spreading in sewers.

6.3. Methods and material for containment and cleaning up

Take up liquid spill into a non combustible material e.g.: powdered limestone or sand. Scoop absorbed substance into closing containers. Carefully collect the spill/leftovers. Damaged/cooled tanks must be emptied. Clean contaminated surfaces with an excess of water. Take collected spill to manufacturer/competent authority. Wash clothing and equipment after handling.

6.4. Reference to other sections

See heading 13.

SECTION 7: Handling and storage

The information in this section is a general description. If applicable and available, exposure scenarios are attached in annex. Always use the relevant exposure scenarios that correspond to your identified use.

7.1. Precautions for safe handling

Keep away from naked flames/heat. Avoid contact of substance with water. Gas/vapour heavier than air at 20°C. Observe very strict hygiene - avoid contact. Keep container tightly closed. Remove contaminated clothing immediately. Do not discharge the waste into the drain.

7.2. Conditions for safe storage, including any incompatibilities

7.2.1 Safe storage requirements:

Storage temperature: < 50 °C. Store in a dry area. Store in a dark area. Ventilation at floor level. Keep locked up. Provide for a tub to collect spills. Meet the legal requirements.

7.2.2 Keep away from:

Heat sources, combustible materials, oxidizing agents, reducing agents, (strong) bases, oils-fats, highly flammable materials, metals, halogens, organic materials, alcohols, gases, water/moisture.

7.2.3 Suitable packaging material:

Steel, stainless steel, carbon steel, aluminium, nickel, synthetic material.

7.2.4 Non suitable packaging material:

Copper.

7.3. Specific end use(s)

If applicable and available, exposure scenarios are attached in annex. See information supplied by the manufacturer.

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SECTION 8: Exposure controls/personal protection

8.1. Control parameters

8.1.1 Occupational exposure

a) Occupational exposure limit values

If limit values are applicable and available these will be listed below.

The Netherlands

Stikstofdioxide	Time-weighted average exposure limit 8 h (Public occupational exposure limit value)	0.21 ppm
	Time-weighted average exposure limit 8 h (Public occupational exposure limit value)	0.4 mg/m ³
	Short time value (Public occupational exposure limit value)	0.52 ppm
	Short time value (Public occupational exposure limit value)	1 mg/m ³

Belgium

Azote (dioxyde d')	Time-weighted average exposure limit 8 h	3 ppm
	Time-weighted average exposure limit 8 h	5.7 mg/m ³
	Short time value	5 ppm
	Short time value	9.5 mg/m ³

USA (TLV-ACGIH)

Nitrogen dioxide	Time-weighted average exposure limit 8 h (TLV - Adopted Value)	0.2 ppm
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France

Azote (dioxyde d')	Short time value (VL: Valeur non réglementaire indicative)	3 ppm
	Short time value (VL: Valeur non réglementaire indicative)	6 mg/m ³

b) National biological limit values

If limit values are applicable and available these will be listed below.

8.1.2 Sampling methods

Product name	Test	Number
Nitrogen Dioxide & Nitric Oxide	NIOSH	6014
Nitrogen Dioxide & Nitric Oxide	NON	11
Nitrogen dioxide	NIOSH	6700
Nitrogen Dioxide	OSHA	ID 182
NO ₂ : nitrogen peroxide	NIOSH	6014-1

8.1.3 Applicable limit values when using the substance or mixture as intended

If limit values are applicable and available these will be listed below.

8.1.4 DNEL/PNEC values

If applicable and available it will be listed below.

8.1.5 Control banding

If applicable and available it will be listed below.

8.2. Exposure controls

The information in this section is a general description. If applicable and available, exposure scenarios are attached in annex. Always use the relevant exposure scenarios that correspond to your identified use.

8.2.1 Appropriate engineering controls

Keep away from naked flames/heat. Avoid contact of substance with water. Measure the concentration in the air regularly. Carry operations in the open/under local exhaust/ventilation or with respiratory protection.

8.2.2 Individual protection measures, such as personal protective equipment

Observe very strict hygiene - avoid contact. Keep container tightly closed. Do not eat, drink or smoke during work.

a) Respiratory protection:

Wear gas mask with filter type B if conc. in air > exposure limit. Gas mask with filter type NO at conc. in air > exposure limit. High vapour/gas concentration: self-contained respirator.

b) Hand protection:

Insulated gloves.

- materials (good resistance)

Neoprene.

- materials (poor resistance)

PVC, tetrafluoroethylene.

c) Eye protection:

Protective goggles.

d) Skin protection:

Head/neck protection. Corrosion-proof clothing.

8.2.3 Environmental exposure controls:

See headings 6.2, 6.3 and 13

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SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

Physical form	Liquefied gas
Odour	Irritating/pungent odour
Odour threshold	0.1 - 5 ppm 2 - 10 mg/m ³
Colour	Yellow-red to red-brown
Particle size	Not applicable (gas)
Explosion limits	No data available
Flammability	Non combustible
Log Kow	-0.58 ; Estimated value
Dynamic viscosity	No data available
Kinematic viscosity	No data available
Melting point	-11 °C
Boiling point	21 °C
Flash point	Not applicable
Evaporation rate	No data available
Relative vapour density	1.59
Vapour pressure	1013 hPa ; 20 °C 3480 hPa ; 50 °C
Solubility	No data available
Relative density	1.448 ; 20 °C
Decomposition temperature	No data available
Auto-ignition temperature	No data available
Explosive properties	No chemical group associated with explosive properties
Oxidising properties	May cause or intensify fire; oxidiser.
pH	No data available

9.2. Other information

Critical temperature	158 °C
Critical pressure	101300 hPa
Surface tension	0.0275 N/m
Saturation concentration	1810 g/m ³
Absolute density	1448 kg/m ³ ; 20 °C

SECTION 10: Stability and reactivity

10.1. Reactivity

May cause or intensify fire; oxidiser. Substance has acid reaction.

10.2. Chemical stability

Unstable on exposure to heat. Unstable on exposure to moisture.

10.3. Possibility of hazardous reactions

Reacts with many compounds e.g.: with oxygen compounds: (increased) risk of fire/explosion. Reacts exothermically with many compounds e.g.: with (strong) reducers, with (some) bases, with organic material, with combustible materials and with (some) halogens compounds: (increased) risk of fire/explosion.

10.4. Conditions to avoid

Keep away from naked flames/heat. Avoid contact of substance with water.

10.5. Incompatible materials

Combustible materials, oxidizing agents, reducing agents, (strong) bases, oils-fats, highly flammable materials, metals, halogens, organic materials, alcohols, gases, water/moisture.

10.6. Hazardous decomposition products

Reacts with water (moisture): release of corrosive products (nitric acid).

SECTION 11: Toxicological information

11.1. Information on toxicological effects

11.1.1 Test results

Acute toxicity

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Route of exposure	Parameter	Method	Value	Exposure time	Species	Value determination	Remark
Inhalation	LC50		0.17 mg/l	4 h	Rat	Literature study	

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Conclusion

Fatal if inhaled.
Not classified as acute toxic if swallowed
Not classified as acute toxic in contact with skin

Corrosion/irritation

nitrogen dioxide

Route of exposure	Result	Method	Exposure time	Time point	Species	Value determination	Remark
Eye	Serious eye damage; category					Annex VI	
Skin	Corrosive to the skin; category 1B					Annex VI	

Conclusion

Causes severe skin burns and eye damage.

Respiratory or skin sensitisation

nitrogen dioxide

No (test)data available

Conclusion

Not classified as sensitizing for skin
Not classified as sensitizing for inhalation

Specific target organ toxicity

nitrogen dioxide

No (test)data available

Conclusion

Not classified for subchronic toxicity

Mutagenicity (in vitro)

nitrogen dioxide

No (test)data available

Mutagenicity (in vivo)

nitrogen dioxide

No (test)data available

Carcinogenicity

nitrogen dioxide

No (test)data available

Reproductive toxicity

nitrogen dioxide

No (test)data available

Conclusion CMR

Not classified for carcinogenicity
Not classified for mutagenic or genotoxic toxicity
Not classified for reprotoxic or developmental toxicity

Toxicity other effects

nitrogen dioxide

No (test)data available

Chronic effects from short and long-term exposure

nitrogen dioxide

ON CONTINUOUS/REPEATED EXPOSURE/CONTACT: Skin rash/inflammation. Possible inflammation of the respiratory tract.

SECTION 12: Ecological information

12.1. Toxicity

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No (test)data available

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Conclusion

pH shift
Insufficient data available on ecotoxicity

12.2. Persistence and degradability

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Half-life soil (t1/2 soil)

Method	Value	Primary degradation/mineralisation	Value determination
Not applicable			

Conclusion

Biodegradability: not applicable

12.3. Bioaccumulative potential

nitrogen dioxide

Log Kow

Method	Remark	Value	Temperature	Value determination
		-0.58		Estimated value

Conclusion

Not bioaccumulative

12.4. Mobility in soil

Not applicable (gas)

12.5. Results of PBT and vPvB assessment

The criteria of PBT and vPvB as listed in Annex XIII of Regulation (EC) No 1907/2006 do not apply to inorganic substances.

12.6. Other adverse effects

nitrogen dioxide

Global warming potential (GWP)

Not included in the list of fluorinated greenhouse gases (Regulation (EC) No 517/2014)

Ozone-depleting potential (ODP)

Not classified as dangerous for the ozone layer (Regulation (EC) No 1005/2009)

SECTION 13: Disposal considerations

The information in this section is a general description. If applicable and available, exposure scenarios are attached in annex. Always use the relevant exposure scenarios that correspond to your identified use.

13.1. Waste treatment methods

13.1.1 Provisions relating to waste

Waste material code (Directive 2008/98/EC, Decision 2000/0532/EC).

16 05 04* (gases in pressure containers and discarded chemicals: gases in pressure containers (including halons) containing dangerous substances).

Depending on branch of industry and production process, also other waste codes may be applicable. Hazardous waste according to Regulation (EU) No 1357/2014.

13.1.2 Disposal methods

Refer to manufacturer/supplier for information on recovery/ recycling. Remove waste in accordance with local and/or national regulations. Hazardous waste shall not be mixed together with other waste. Different types of hazardous waste shall not be mixed together if this may entail a risk of pollution or create problems for the further management of the waste. Hazardous waste shall be managed responsibly. All entities that store, transport or handle hazardous waste shall take the necessary measures to prevent risks of pollution or damage to people or animals.

13.1.3 Packaging/Container

Waste material code packaging (Directive 2008/98/EC).

15 01 10* (packaging containing residues of or contaminated by dangerous substances).

SECTION 14: Transport information

Road (ADR)

14.1. UN number

UN number	1067
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14.2. UN proper shipping name

Proper shipping name	dinitrogen tetroxide (nitrogen dioxide)
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14.3. Transport hazard class(es)

Hazard identification number	265
Class	2
Classification code	2TOC

14.4. Packing group

Packing group	
Labels	2.3+5.1+8

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14.5. Environmental hazards

Environmentally hazardous substance mark	no
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14.6. Special precautions for user

Special provisions	
Limited quantities	none.

Rail (RID)

14.1. UN number

UN number	1067
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14.2. UN proper shipping name

Proper shipping name	dinitrogen tetroxide (nitrogen dioxide)
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14.3. Transport hazard class(es)

Hazard identification number	265
Class	2
Classification code	2TOC

14.4. Packing group

Packing group	
Labels	2.3+5.1+8 (+13)

14.5. Environmental hazards

Environmentally hazardous substance mark	no
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14.6. Special precautions for user

Special provisions	
Limited quantities	none.

Inland waterways (ADN)

14.1. UN number

UN number	1067
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14.2. UN proper shipping name

Proper shipping name	dinitrogen tetroxide (nitrogen dioxide)
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14.3. Transport hazard class(es)

Class	2
Classification code	2TOC

14.4. Packing group

Packing group	
Labels	2.3+5.1+8

14.5. Environmental hazards

Environmentally hazardous substance mark	no
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14.6. Special precautions for user

Special provisions	
Limited quantities	none.

Sea (IMDG/IMSBC)

14.1. UN number

UN number	1067
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14.2. UN proper shipping name

Proper shipping name	dinitrogen tetroxide (nitrogen dioxide)
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14.3. Transport hazard class(es)

Class	2.3
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14.4. Packing group

Packing group	
Labels	2.3 + 5.1 + 8

14.5. Environmental hazards

Marine pollutant	-
Environmentally hazardous substance mark	no

14.6. Special precautions for user

Special provisions	
Limited quantities	none.

14.7. Transport in bulk according to Annex II of Marpol and the IBC Code

Annex II of MARPOL 73/78	Not applicable
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Air (ICAO-TI/IATA-DGR)

14.1. UN number

Transport	Forbidden
UN number	1067

14.2. UN proper shipping name

Proper shipping name	Nitrogen dioxide
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14.3. Transport hazard class(es)

Class	2.3
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14.4. Packing group

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Packing group	
Labels	
14.5. Environmental hazards	
Environmentally hazardous substance mark	no
14.6. Special precautions for user	
Special provisions	A2
Passenger and cargo transport: limited quantities: maximum net quantity per packaging	

SECTION 15: Regulatory information

15.1. Safety, health and environmental regulations/legislation specific for the substance or mixture

European legislation:

VOC content Directive 2010/75/EU

VOC content	Remark
	Not applicable (inorganic)

National legislation The Netherlands

Waste identification (the Netherlands)	LWCA (the Netherlands): KGA category 06
Waterbezwaarlijkheid	5

National legislation Germany

Schwangerschaft Gruppe	D
MAK - Krebserzeugend Kategorie	3B
WGK	1; Classification water polluting in compliance with Verwaltungsvorschrift wassergefährdender Stoffe (VwVwS) of 27 July 2005 (Anhang 2)
TA-Luft	5.2.4; IV

National legislation France

No data available

National legislation Belgium

No data available

Other relevant data

TLV - Carcinogen	Nitrogen dioxide; A4
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15.2. Chemical safety assessment

No chemical safety assessment has been conducted.

SECTION 16: Other information

Full text of any H-statements referred to under headings 2 and 3:

H270 May cause or intensify fire; oxidiser.

H280 Contains gas under pressure; may explode if heated.

H314 Causes severe skin burns and eye damage.

H330 Fatal if inhaled.

(*) = INTERNAL CLASSIFICATION BY BIG

PBT-substances = persistent, bioaccumulative and toxic substances

CLP (EU-GHS) Classification, labelling and packaging (Globally Harmonised System in Europe)

Specific concentration limits CLP

nitrogen dioxide	C ≥ 0,5 %	STOT SE 3; H335	CLP Annex VI (ATP 1)
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The information in this safety data sheet is based on data and samples provided to BIG. The sheet was written to the best of our ability and according to the state of knowledge at that time. The safety data sheet only constitutes a guideline for the safe handling, use, consumption, storage, transport and disposal of the substances/preparations/mixtures mentioned under point 1. New safety data sheets are written from time to time. Only the most recent versions may be used. Old versions must be destroyed. Unless indicated otherwise word for word on the safety data sheet, the information does not apply to substances/preparations/mixtures in purer form, mixed with other substances or in processes. The safety data sheet offers no quality specification for the substances/preparations/mixtures in question. Compliance with the instructions in this safety data sheet does not release the user from the obligation to take all measures dictated by common sense, regulations and recommendations or which are necessary and/or useful based on the real applicable circumstances. BIG does not guarantee the accuracy or exhaustiveness of the information provided and cannot be held liable for any changes by third parties. This safety data sheet is only to be used within the European Union, Switzerland, Iceland, Norway and Liechtenstein. Any use outside of this area is at your own risk. Use of this safety data sheet is subject to the licence and liability limiting conditions as stated in your BIG licence agreement or when this is failing the general conditions of BIG. All intellectual property rights to this sheet are the property of BIG and its distribution and reproduction are limited. Consult the mentioned agreement/conditions for details.

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