SAFETY DATA SHEET

Based upon Regulation (EC) No 1907/2006, as amended by Regulation (EU) No 2015/830

nitrogen monoxide, compressed

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

1.1. Product identifier

Product name	:	nitrogen monoxide, compressed
Synonyms	:	mononitrogen monoxide, compressed; nitric oxide, trimer, compressed; nitrogen(II) oxide, compressed; nitrogen monoxide; Nitrogen oxide (NO); nitrosyl radical, compressed
Registration number REACH	:	
Product type REACH	:	Substance/mono-constituent
CAS number	:	10102-43-9
EC number	:	233-271-0
RTECS number	:	QX0525000
Molecular mass	:	30.01 g/mol
Formula	:	NO

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
Westvaartdijk 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
Westvaartdijk 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	Compressed gas	H280: Contains gas under pressure; may explode if heated.
Acute Tox.	category 1	H330: Fatal if inhaled.
STOT RE	category 2	H373: May cause damage to organs through prolonged or repeated exposure if inhaled.
Skin Corr.	category 1B	H314: Causes severe skin burns and eye damage.

2.2. Label elements

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.
H373	May cause damage to organs through prolonged or repeated exposure 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

Produces effects on the nervous system
Highly toxic to fishes
Highly toxic to plankton

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 monoxide	10102-43-9 233-271-0	C>99 %	Ox. Gas 1; H270 Press. Gas - Compressed gas; H280 Acute Tox. 1; H330 STOT RE 2; H373 Skin Corr. 1B; H314	(1)(2)	Mono-constituent

(1) For H-statements in full: see heading 16
(2) Substance with a Community workplace exposure limit

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. 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. Take victim to an ophthalmologist. Do not apply neutralizing agents.

After ingestion:

Not applicable.

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

4.2.1 Acute symptoms

After inhalation:

Coughing. Irritation of the respiratory tract. Irritation of the nasal mucous membranes. Nausea. Respiratory difficulties. EXPOSURE TO HIGH CONCENTRATIONS: Methemoglobinemia. Blue/grey discolouration of the skin. FOLLOWING SYMPTOMS MAY APPEAR LATER: Risk of lung oedema. Respiratory collapse.

After skin contact:

Caustic burns/corrosion of the skin.

After eye contact:

Corrosion of the eye tissue.

After ingestion:

Not applicable.

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/burning: release of toxic and corrosive gases/vapours (nitrous vapours). Reacts exothermically with water (moisture): release of toxic and corrosive gases/vapours (nitrous vapours) and 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: persistant 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. 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. Take account of toxic/corrosive precipitation water.

6.3. Methods and material for containment and cleaning up

Damaged/cooled tanks must be emptied. 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. Observe very strict hygiene - avoid contact.

7.2. Conditions for safe storage, including any incompatibilities

7.2.1 Safe storage requirements:

Storage temperature: < 50 °C. Keep container in a well-ventilated place. Fireproof storeroom. Keep locked up. Meet the legal requirements.

7.2.2 Keep away from:

Heat sources, combustible materials, reducing agents, oils-fats, metals, organic materials.

7.2.3 Suitable packaging material:

Stainless steel, monel steel, carbon steel, polyethylene.

7.2.4 Non suitable packaging material:

No data available

7.3. Specific end use(s)

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

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

Stikstofmonoxide	Time-weighted average exposure limit 8 h (Public occupational exposure limit value)	0.2 ppm
	Time-weighted average exposure limit 8 h (Public occupational exposure limit value)	0.25 mg/m³

EU

Nitrogen monoxide	Time-weighted average exposure limit 8 h (Indicative occupational exposure limit value)	25 ppm
	Time-weighted average exposure limit 8 h (Indicative occupational exposure limit value)	30 mg/m³

Belgium

Azote (oxyde d')	Time-weighted average exposure limit 8 h	25 ppm
	Time-weighted average exposure limit 8 h	31 mg/m³

USA (TLV-ACGIH)

Nitric oxide	Time-weighted average exposure limit 8 h (TLV - Adopted Value)	25 ppm

France

Azote (oxyde d')	Time-weighted average exposure limit 8 h (VL: Valeur non réglementaire indicative)	25 ppm
	Time-weighted average exposure limit 8 h (VL: Valeur non réglementaire indicative)	30 mg/m³

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
Nitric Oxide	NIOSH	6014
Nitric Oxide	OSHA	ID 190
NO: nitrogen monoxide	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. Measure the concentration in the air regularly. Carry operations in the open/under local exhaust/ventilation or with respiratory protection. Exhaust gas must be neutralised.

8.2.2 Individual protection measures, such as personal protective equipment

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

a) Respiratory protection:

Dust/aerosol mask with filter type P3. Gas mask with filter type NO. High vapour/gas concentration: self-contained respirator.

b) Hand protection:

Gloves.

- materials (good resistance)

Butyl rubber, PVC.

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

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

Physical form	Compressed gas
Odour	Irritating/pungent odour

Odour threshold	0.36 - 1.2 mg/m³
Colour	Colourless
	On exposure to air: red-brown
Particle size	Not applicable (gas)
Explosion limits	No data available
Flammability	Non combustible
Log Kow	No data available
Dynamic viscosity	0.00002 Pa.s ; 25 °C
Kinematic viscosity	No data available
Melting point	-164 °C
Boiling point	-152 °C
Flash point	Not applicable
Evaporation rate	No data available
Relative vapour density	1.04
Vapour pressure	No data available
Solubility	water ; 0.006 g/100 ml
	ethanol ; 27 g/100 ml
Relative density	1.3 ; -152 °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	-93 °C
Critical pressure	65370 hPa
Absolute density	1300 kg/m³

SECTION 10: Stability and reactivity

10.1. Reactivity

May cause or intensify fire; oxidiser.

10.2. Chemical stability

Unstable on exposure to air.

10.3. Possibility of hazardous reactions

Reacts with combustible materials: (increased) risk of fire/explosion. Reacts violently with many compounds e.g.: with (strong) reducers.

10.4. Conditions to avoid

Keep away from naked flames/heat.

10.5. Incompatible materials

Combustible materials, reducing agents, oils-fats, metals, organic materials.

10.6. Hazardous decomposition products

On exposure to air: release of toxic and corrosive gases/vapours (nitrous vapours). On heating/burning: release of toxic and corrosive gases/vapours (nitrous vapours). Reacts exothermically with water (moisture): release of toxic and corrosive gases/vapours (nitrous vapours) and release of corrosive products (nitric acid).

SECTION 11: Toxicological information

11.1. Information on toxicological effects

11.1.1 Test results

Acute toxicity

nitrogen monoxide, compressed

Route of exposure	Parameter	Method	Value	Exposure time	Species	Value determination	Remark
Inhalation	LC50		0.14 mg/l	4 h	Rat	Literature study	

Conclusion

Fatal if inhaled.

Not classified as acute toxic if swallowed

Not classified as acute toxic in contact with skin

Corrosion/irritation

nitrogen monoxide, compressed

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 1C					Annex VI	

Conclusion

Causes severe skin burns and eye damage.

Respiratory or skin sensitisation

nitrogen monoxide, compressed

No (test)data available

Conclusion

Not classified as sensitizing for skin

Not classified as sensitizing for inhalation

Specific target organ toxicity

nitrogen monoxide, compressed

Route of exposure	Parameter	Method	Value	Organ	Effect	Exposure time	Species	Value determination
Inhalation			STOT RE cat.2					Literature study

Conclusion

May cause damage to organs through prolonged or repeated exposure if inhaled.

Not classified as sub-chronically toxic in contact with skin

Not classified as sub-chronically toxic if swallowed

Mutagenicity (in vitro)

nitrogen monoxide, compressed

No (test)data available

Mutagenicity (in vivo)

nitrogen monoxide, compressed

No (test)data available

Carcinogenicity

nitrogen monoxide, compressed

No (test)data available

Reproductive toxicity

nitrogen monoxide, compressed

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 monoxide, compressed

No (test)data available

Chronic effects from short and long-term exposure

nitrogen monoxide, compressed

ON CONTINUOUS/REPEATED EXPOSURE/CONTACT: Coughing. Headache. Feeling of weakness. Respiratory difficulties. Possible inflammation of the respiratory tract. Affection/discolouration of the teeth.

SECTION 12: Ecological information

12.1. Toxicity

nitrogen monoxide, compressed

No (test)data available

Conclusion

Highly toxic to fishes

Reaction products are harmful to aquatic organisms

12.2. Persistence and degradability

nitrogen monoxide, compressed

Half-life soil (t1/2 soil)

Method	Value	Primary degradation/mineralisation	Value determination
Not applicable			

Conclusion

Biodegradability: not applicable

12.3. Bioaccumulative potential

nitrogen monoxide, compressed

Log Kow

Method	Remark	Value	Temperature	Value determination
	No data available			

Conclusion

Bioaccumulation: not applicable

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 monoxide, compressed

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. Do not discharge into drains or the environment.

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	1660

14.2. UN proper shipping name

Proper shipping name	Nitric oxide, compressed

14.3. Transport hazard class(es)

Hazard identification number	
Class	2
Classification code	1TOC

14.4. Packing group

Packing group	
Labels	2.3+5.1+8

14.5. Environmental hazards

Environmentally hazardous substance mark	no

14.6. Special precautions for user

Special provisions	

Limited quantities	none.

Rail (RID)

14.1. UN number

UN number	1660

14.2. UN proper shipping name

Proper shipping name	Nitric oxide, compressed

14.3. Transport hazard class(es)

Hazard identification number	265
Class	2
Classification code	1TOC

14.4. Packing group

Packing group	
Labels	2.3+5.1+8

14.5. Environmental hazards

Environmentally hazardous substance mark	no

14.6. Special precautions for user

Special provisions	
Limited quantities	none.

Inland waterways (ADN)

14.1. UN number

UN number	1660

14.2. UN proper shipping name

Proper shipping name	Nitric oxide, compressed

14.3. Transport hazard class(es)

Class	2
Classification code	1TOC

14.4. Packing group

Packing group	
Labels	2.3+5.1+8

14.5. Environmental hazards

Environmentally hazardous substance mark	no

14.6. Special precautions for user

Special provisions	
Limited quantities	none.

Sea (IMDG/IMSBC)

14.1. UN number

UN number	1660

14.2. UN proper shipping name

Proper shipping name	Nitric oxide, compressed

14.3. Transport hazard class(es)

Class	2.3

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

Air (ICAO-TI/IATA-DGR)

14.1. UN number

Transport	Forbidden
UN number	1660

14.2. UN proper shipping name

Proper shipping name	Nitric oxide, compressed

14.3. Transport hazard class(es)

Class	2.3

14.4. Packing group

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
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

No data available

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.
H373 May cause damage to organs through prolonged or repeated exposure 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)

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.