

SAFETY DATA SHEET
Nitrous oxide, refrigerated liquidIssue Date: 16.01.2013
Last revised date: 10.10.2017

Version: 1.0

SDS No.: 000010021819
1/13**SECTION 1: Identification of the substance/mixture and of the company/undertaking****1.1 Product identifier**

Product name: Nitrous oxide, refrigerated liquid

Trade name: Nitrous oxide 2.0 Chemical, Nitrous oxide 4.8 Scientific, Nitrous oxide 5.0 HiQ, Nitrous oxide Technical, N2O

Additional identification

Chemical name: Dinitrogen oxide

Chemical formula: N2O

INDEX No. -

CAS-No. 10024-97-2

EC No. 233-032-0

REACH Registration No. 01-2119970538-25

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

Identified uses: Industrial and professional. Perform risk assessment prior to use.
Aerosol propellant. Refrigerant. Using gas as feedstock in chemical processes.
Laboratory use. Medical applications.

Uses advised against Consumer use.

1.3 Details of the supplier of the safety data sheet**Supplier**

Oy AGA Ab
Itsehallintokuja 6
FIN-02600 ESPOO Finland

Telephone: +358 10 2421**E-mail:** info@fi.aga.com**1.4 Emergency telephone number:** Poison Information Center: open 24 hours a day, tel. 09 471 977**SECTION 2: Hazards identification****2.1 Classification of the substance or mixture**

Classification according to Regulation (EC) No 1272/2008 as amended.

Physical Hazards

Oxidizing gases	Category 1	H270: May cause or intensify fire; oxidizer.
Gases under pressure	Refrigerated liquefied gas	H281: Contains refrigerated gas; may cause cryogenic burns or injury.

Health Hazards

Specific Target Organ Toxicity - Single Exposure	Category 3	H336: May cause drowsiness or dizziness.
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2/13**2.2 Label Elements**

Contains: Dinitrogen oxide



Signal Words: Danger

Hazard Statement(s): H270: May cause or intensify fire; oxidizer.
H281: Contains refrigerated gas; may cause cryogenic burns or injury.
H336: May cause drowsiness or dizziness.**Precautionary Statements**Prevention: P220: Keep/Store away from combustible materials.
P244: Keep valves and fittings free from oil and grease.
P260: Do not breathe gas/vapors.
P282: Wear cold insulating gloves and either face shield or eye protection.Response: P336+P315: Thaw frosted parts with lukewarm water. Do not rub affected area. Get immediate medical advice/attention.
P304+P340+P315: IF INHALED: Remove person to fresh air and keep comfortable for breathing. Get immediate medical advice/attention.
P370+P376: In case of fire: Stop leak if safe to do so.

Storage: P403: Store in a well-ventilated place.

Disposal: None.

2.3 Other hazards: None.

SECTION 3: Composition/information on ingredients**3.1 Substances**

Chemical name	Dinitrogen oxide
INDEX No.:	-
CAS-No.:	10024-97-2
EC No.:	233-032-0
REACH Registration No.:	01-2119970538-25
Purity:	100%

The purity of the substance in this section is used for classification only, and does not represent the actual purity of the substance as supplied, for which other documentation should be consulted.

Trade name:	Nitrous oxide 2.0 Chemical, Nitrous oxide 4.8 Scientific, Nitrous oxide 5.0 HiQ, Nitrous oxide Technical, N2O
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3/13**SECTION 4: First aid measures**

General: Move the exposed person to fresh air at once. Remove victim to uncontaminated area wearing self contained breathing apparatus. Keep victim warm and rested. Call a doctor. Apply artificial respiration if breathing stopped.

4.1 Description of first aid measures

Inhalation: Move the exposed person to fresh air at once. Remove victim to uncontaminated area wearing self contained breathing apparatus. Keep victim warm and rested. Call a doctor. Apply artificial respiration if breathing stopped.

Eye contact: Rinse the eye with water immediately. Remove contact lenses, if present and easy to do. Continue rinsing. Flush thoroughly with water for at least 15 minutes. Get immediate medical assistance. If medical assistance is not immediately available, flush an additional 15 minutes.

Skin Contact: Contact with evaporating liquid may cause frostbite or freezing of skin. If clothing is saturated with the liquid and adhering to the skin then the area should be thawed with lukewarm water prior to removing the clothing.

Ingestion: Ingestion is not considered a potential route of exposure.

4.2 Most important symptoms and effects, both acute and delayed: Continuous inhalation of concentrations higher than 75% may cause nausea, dizziness, respiratory difficulty and convulsion. Contact with liquefied gas can cause damage (frostbite) due to rapid evaporative cooling.

4.3 Indication of any immediate medical attention and special treatment needed

Hazards: Continuous inhalation of concentrations higher than 75% may cause nausea, dizziness, respiratory difficulty and convulsion. Contact with liquefied gas can cause damage (frostbite) due to rapid evaporative cooling.

Treatment: Thaw frosted parts with lukewarm water. Do not rub affected area. Get immediate medical advice/attention.

SECTION 5: Firefighting measures

General Fire Hazards: Heat may cause the containers to explode.

5.1 Extinguishing media

Suitable extinguishing media: Water Spray or Fog. Dry powder. Foam. Carbon Dioxide.

Unsuitable extinguishing media: None.

5.2 Special hazards arising from the substance or mixture: Supports combustion.

Hazardous Combustion Products: If involved in a fire the following toxic and/or corrosive fumes may be produced by thermal decomposition: Nitrogen monoxide ; Nitrogen dioxide

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In case of fire: Stop leak if safe to do so. Continue water spray from protected position until container stays cool. Use extinguishants to contain the fire. Isolate the source of the fire or let it burn out.

Special protective equipment for fire-fighters:

Firefighters must use standard protective equipment including flame retardant coat, helmet with face shield, gloves, rubber boots, and in enclosed spaces, SCBA. Guideline: EN 469 Protective clothing for firefighters. Performance requirements for protective clothing for firefighting. EN 15090 Footwear for firefighters. EN 659 Protective gloves for firefighters. EN 443 Helmets for fire fighting in buildings and other structures. EN 137 Respiratory protective devices - Self-contained open-circuit compressed air breathing apparatus with full face mask - Requirements, testing, marking.

SECTION 6: Accidental release measures**6.1 Personal precautions, protective equipment and emergency procedures:**

Evacuate area. In case of leakage, eliminate all ignition sources. Provide adequate ventilation. Prevent from entering sewers, basements and workpits, or any place where its accumulation can be dangerous. Monitor the concentration of the released product.

6.2 Environmental Precautions:

Prevent further leakage or spillage if safe to do so.

6.3 Methods and material for containment and cleaning up:

Provide adequate ventilation. Liquid spillages can cause embrittlement of structural materials.

6.4 Reference to other sections:

Refer to sections 8 and 13.

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- 7.1 Precautions for safe handling:** Only experienced and properly instructed persons should handle gases under pressure. Use only properly specified equipment which is suitable for this product, its supply pressure and temperature. Keep equipment free from oil and grease. Open valve slowly to avoid pressure shock. Use only oxygen approved lubricants and sealants. Use only with equipment cleaned for oxygen service and rated for the pressure. Refer to supplier's handling instructions. The substance must be handled in accordance with good industrial hygiene and safety procedures. Protect containers from physical damage; do not drag, roll, slide or drop. Do not remove or deface labels provided by the supplier for the identification of the container contents. When moving containers, even for short distances, use appropriate equipment eg. trolley, hand truck, fork truck etc. Secure cylinders in an upright position at all times, close all valves when not in use. Provide adequate ventilation. Suck back of water into the container must be prevented. Do not allow backfeed into the container. Avoid suckback of water, acid and alkalis. Keep container below 50°C in a well ventilated place. Observe all regulations and local requirements regarding storage of containers. When using do not eat, drink or smoke. Store in accordance with. Never use direct flame or electrical heating devices to raise the pressure of a container. Leave valve protection caps in place until the container has been secured against either a wall or bench or placed in a container stand and is ready for use. Damaged valves should be reported immediately to the supplier. Close container valve after each use and when empty, even if still connected to equipment. Never attempt to repair or modify container valves or safety relief devices. Replace valve outlet caps or plugs and container caps where supplied as soon as container is disconnected from equipment. Keep container valve outlets clean and free from contaminants particularly oil and water. If user experiences any difficulty operating container valve discontinue use and contact supplier. Never attempt to transfer gases from one container to another. Container valve guards or caps should be in place.
- 7.2 Conditions for safe storage, including any incompatibilities:** Containers should not be stored in conditions likely to encourage corrosion. Stored containers should be periodically checked for general conditions and leakage. Container valve guards or caps should be in place. Store containers in location free from fire risk and away from sources of heat and ignition. Keep away from combustible material. Avoid asphalted locations for storage, transfer and use (ignition risk if spilt). Segregate from flammable gases and other flammable materials being stored.
- 7.3 Specific end use(s):** None.

SECTION 8: Exposure controls/personal protection**8.1 Control Parameters****Occupational Exposure Limits**

Chemical name	Type	Exposure Limit Values	Source
Dinitrogen oxide	HTP 8H	100 ppm 180 mg/m ³	Finland. Workplace Exposure Limits (2009)

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DNEL-Values

Critical component	Type	Value	Remarks
Dinitrogen oxide	Worker - inhalative, long-term - systemic	183 mg/m ³	-

8.2 Exposure controls

Appropriate engineering controls:

Consider a work permit system e.g. for maintenance activities. Ensure adequate air ventilation. Avoid oxygen rich (>23,5%) atmospheres. Gas detectors should be used when quantities of oxidizing gases may be released. Provide adequate ventilation, including appropriate local extraction, to ensure that the defined occupational exposure limit is not exceeded. Systems under pressure should be regularly checked for leakages. Preferably use permanent leak tight connections (eg. welded pipes). Do not eat, drink or smoke when using the product. Consider a work permit system e.g. for maintenance activities. Ensure adequate air ventilation. Gas detectors should be used when quantities of oxidizing gases may be released. Systems under pressure should be regularly checked for leakages. Preferably use permanent leak tight connections (eg. welded pipes). Do not eat, drink or smoke when using the product. Heat and impact sensitive - impact or heating can cause decomposition.

Individual protection measures, such as personal protective equipment

General information:

A risk assessment should be conducted and documented in each work area to assess the risks related to the use of the product and to select the PPE that matches the relevant risk. The following recommendations should be considered. Keep self contained breathing apparatus readily available for emergency use. Personal protective equipment for the body should be selected based on the task being performed and the risks involved.

Eye/face protection:

Safety eyewear, goggles or face-shield to EN166 should be used to avoid exposure to liquid splashes. Wear eye protection to EN 166 when using gases. Guideline: EN 166 Personal Eye Protection.

Skin protection

Hand Protection:

Wear cold insulating gloves.
Guideline: EN 511 Protective gloves against cold.

Body protection:

Wear appropriate clothing to prevent skin contamination or freezing.

Other:

Wear safety shoes while handling containers
Guideline: ISO 20345 Personal protective equipment - Safety footwear.

Respiratory Protection:

Not required.

Thermal hazards:

If there is a risk of contact with the liquid, all protective equipment should be suitable for extremely low temperatures.

Hygiene measures:

Specific risk management measures are not required beyond good industrial hygiene and safety procedures. Do not eat, drink or smoke when using the product.

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controls:

For waste disposal, see section 13 of the SDS.

SECTION 9: Physical and chemical properties**9.1 Information on basic physical and chemical properties****Appearance**

Physical state:	Gas
Form:	Refrigerated liquefied gas
Color:	Colorless
Odor:	Slightly sweetish odor
Odor Threshold:	Odor threshold is subjective and is inadequate to warn of over exposure.
pH:	not applicable.
Melting Point:	-90,81 °C Other, Key study
Boiling Point:	-88,5 °C (1.013 hPa) Experimental result, Key study
Sublimation Point:	not applicable.
Critical Temp. (°C):	36,4 °C
Flash Point:	Not applicable to gases and gas mixtures.
Evaporation Rate:	Not applicable to gases and gas mixtures.
Flammability (solid, gas):	Nonflammable Gas, but supports combustion at elevated temperatures
Flammability Limit - Upper (%):	not applicable.
Flammability Limit - Lower (%):	not applicable.
Vapor pressure:	5.719,51 kPa (25 °C)
Vapor density (air=1):	1,53 AIR=1
Relative density:	1,226 (-89 °C)
Solubility(ies)	
Solubility in Water:	1,5 g/l (15 °C)
Partition coefficient (n-octanol/water):	0,36
Autoignition Temperature:	not applicable.
Decomposition Temperature:	575 °C
Viscosity	
Kinematic viscosity:	No data available.
Dynamic viscosity:	0,014 mPa.s (25 °C)
Explosive properties:	Not applicable.
Oxidizing properties:	Oxidizing

9.2 Other information:

Gas/vapour heavier than air. May accumulate in confined spaces, particularly at or below ground level.

Molecular weight: 44,01 g/mol (N₂O)

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8/13**SECTION 10: Stability and reactivity**

- 10.1 Reactivity:** No reactivity hazard other than the effects described in sub-section below. No reactivity hazard other than the effects described in sub-section below.
- 10.2 Chemical Stability:** Stable under normal conditions. Stable under normal conditions. At temperatures above 575°C and at atmospheric pressure, nitrous oxide decomposes into nitrogen and oxygen. Pressurised nitrous oxide can also decompose at temperatures equal to or greater than 300°C.
- 10.3 Possibility of hazardous reactions:** Violently oxidises organic material. May react violently with combustible materials. May react violently with reducing agents. Violently oxidises organic material. May react violently with combustible materials. May react violently with reducing agents.
- 10.4 Conditions to avoid:** None. Heat.
- 10.5 Incompatible Materials:** Cryogenic liquids can cause embrittlement of some metals and alter the physical properties of other materials. Combustible materials Reducing agents. Keep equipment free from oil and grease. For material compatibility see latest version of ISO-11114. Consider the potential toxicity hazard due to the presence of chlorinated or fluorinated polymers in high pressure (>30 bar) oxygen lines and equipment in case of combustion. Cryogenic liquids can cause embrittlement of some metals and alter the physical properties of other materials. May react violently with combustible materials. May react violently with reducing agents. Combustible materials Catalyst. Reducing agents. Organic material. For material compatibility see latest version of ISO-11114.
- 10.6 Hazardous Decomposition Products:** Under normal conditions of storage and use, hazardous decomposition products should not be produced. Thermal decomposition yields toxic products which can be corrosive in the presence of moisture. Under normal conditions of storage and use, hazardous decomposition products should not be produced. If involved in a fire the following toxic and/or corrosive fumes may be produced by thermal decomposition: Nitrogen Oxides

SECTION 11: Toxicological information**General information:** None.**11.1 Information on toxicological effects**

- Acute toxicity - Oral Product** Based on available data, the classification criteria are not met.
- Acute toxicity - Dermal Product** Based on available data, the classification criteria are not met.
- Acute toxicity - Inhalation Product** Based on available data, the classification criteria are not met.

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Dinitrogen oxide	LC 50 (Mouse, 4 h): > 500000 ppm	Remarks: Gas Experimental result, Key study
Repeated dose toxicity Dinitrogen oxide	NOAEL (Mouse(Female, Male), Inhalation, 14 Weeks): 50.000 ppm(m)	Inhalation Experimental result, Key study
Skin Corrosion/Irritation Product	Based on available data, the classification criteria are not met.	
Serious Eye Damage/Eye Irritation Product	Based on available data, the classification criteria are not met.	
Respiratory or Skin Sensitization Product	Based on available data, the classification criteria are not met.	
Germ Cell Mutagenicity Product	Based on available data, the classification criteria are not met.	
Carcinogenicity Product	Based on available data, the classification criteria are not met.	
Reproductive toxicity Product	Based on available data, the classification criteria are not met.	
Specific Target Organ Toxicity - Single Exposure Product	May cause drowsiness or dizziness.	
Specific Target Organ Toxicity - Repeated Exposure Product	Based on available data, the classification criteria are not met.	
Aspiration Hazard Product	Not applicable to gases and gas mixtures..	

SECTION 12: Ecological information**12.1 Toxicity****Acute toxicity**
Product

No ecological damage caused by this product.

12.2 Persistence and Degradability

Product

Not applicable to gases and gas mixtures..

12.3 Bioaccumulative potential

Product

The subject product is expected to biodegrade and is not expected to persist for long periods in an aquatic environment.

12.4 Mobility in soil

Product

Because of its high volatility, the product is unlikely to cause ground or water pollution.

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10/13**12.5 Results of PBT and vPvB
assessment****Product** Not classified as PBT or vPvB.**12.6 Other adverse effects:****Global Warming Potential**Global warming potential: 298
Contains greenhouse gas(es). When discharged in large quantities may contribute to the greenhouse effect.

Dinitrogen oxide

UN / IPCC. Greenhouse Gas Global Warming Potentials (IPCC Fourth Assessment Report, Climate Change, Table TS.2

- Global warming potential: 298 100-yr

SECTION 13: Disposal considerations**13.1 Waste treatment methods****General information:** Do not discharge into any place where its accumulation could be dangerous. Vent to atmosphere in a well ventilated place.**Disposal methods:** Refer to the EIGA code of practice (Doc.30 "Disposal of Gases", downloadable at <http://www.eiga.org>) for more guidance on suitable disposal methods. Dispose of container via supplier only. Discharge, treatment, or disposal may be subject to national, state, or local laws.**European Waste Codes****Container:** 16 05 04*: Gases in pressure containers (including halons) containing dangerous substances.**SECTION 14: Transport information****ADR**14.1 UN Number: UN 2201
14.2 UN Proper Shipping Name: NITROUS OXIDE, REFRIGERATED LIQUID
14.3 Transport Hazard Class(es)
Class: 2
Label(s): 2.2, 5.1
Hazard No. (ADR): 225
Tunnel restriction code: (C/E)
14.4 Packing Group: -
14.5 Environmental hazards: not applicable
14.6 Special precautions for user: -

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RID

14.1 UN Number: UN 2201
14.2 UN Proper Shipping Name: NITROUS OXIDE, REFRIGERATED LIQUID
14.3 Transport Hazard Class(es):
Class: 2
Label(s): 2.2, 5.1
14.4 Packing Group: -
14.5 Environmental hazards: not applicable
14.6 Special precautions for user: -

IMDG

14.1 UN Number: UN 2201
14.2 UN Proper Shipping Name: NITROUS OXIDE, REFRIGERATED LIQUID
14.3 Transport Hazard Class(es):
Class: 2.2
Label(s): 2.2, 5.1
EmS No.: F-C, S-W
14.3 Packing Group: -
14.5 Environmental hazards: not applicable
14.6 Special precautions for user: -

IATA

14.1 UN Number: UN 2201
14.2 Proper Shipping Name: Nitrous oxide, refrigerated liquid
14.3 Transport Hazard Class(es):
Class: 2.2
Label(s): -
14.4 Packing Group: -
14.5 Environmental hazards: not applicable
14.6 Special precautions for user: -
Other information
Passenger and cargo aircraft: Forbidden.
Cargo aircraft only: Forbidden.

14.7 Transport in bulk according to Annex II of MARPOL and the IBC Code: not applicable

Additional identification: Avoid transport on vehicles where the load space is not separated from the driver's compartment. Ensure vehicle driver is aware of the potential hazards of the load and knows what to do in the event of an accident or an emergency. Before transporting product containers ensure that they are firmly secured. Ensure that the container valve is closed and not leaking. Container valve guards or caps should be in place. Ensure adequate air ventilation.

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SECTION 15: Regulatory information

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

National Regulations

Council Directive 89/391/EEC on the introduction of measures to encourage improvements in the safety and health of workers at work Directive 89/686/EEC on personal protective equipment Only products that comply with the food regulations (EC) No. 1333/2008 and (EU) No. 231/2012 and are labelled as such may be used as food additives.

This Safety Data Sheet has been produced to comply with Regulation (EU) 2015/830.

15.2 Chemical safety assessment: CSA has been carried out.

SECTION 16: Other information

Revision Information: Not relevant.

Key literature references and sources for data: Various sources of data have been used in the compilation of this SDS, they include but are not exclusive to:
Agency for Toxic Substances and Diseases Registry (ATSDR) (<http://www.atsdr.cdc.gov/>).
European Chemical Agency: Guidance on the Compilation of Safety Data Sheets.
European Chemical Agency: Information on Registered Substances <http://apps.echa.europa.eu/registered/registered-sub.aspx#search>
European Industrial Gases Association (EIGA) Doc. 169 Classification and Labelling guide.
International Programme on Chemical Safety (<http://www.inchem.org/>)
ISO 10156:2010 Gases and gas mixtures - Determination of fire potential and oxidizing ability for the selection of cylinder valve outlets.
Matheson Gas Data Book, 7th Edition.
National Institute for Standards and Technology (NIST) Standard Reference Database Number 69.
The ESIS (European chemical Substances Information System) platform of the former European Chemicals Bureau (ECB) ESIS (<http://ecb.jrc.ec.europa.eu/esis/>).
The European Chemical Industry Council (CEFIC) ERICards.
United States of America's National Library of Medicine's toxicology data network TOXNET (<http://toxnet.nlm.nih.gov/index.html>)
Threshold Limit Values (TLV) from the American Conference of Governmental Industrial Hygienists (ACGIH).
Substance specific information from suppliers.
Details given in this document are believed to be correct at the time of publication.

Wording of the H-statements in section 2 and 3

H270	May cause or intensify fire; oxidizer.
H280	Contains gas under pressure; may explode if heated.
H281	Contains refrigerated gas; may cause cryogenic burns or injury.
H336	May cause drowsiness or dizziness.

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Training information: Users of breathing apparatus must be trained. Ensure operators understand the hazard of oxygen enrichment. Ensure operators understand the hazards.

Classification according to Regulation (EC) No 1272/2008 as amended.

Ox. Gas 1, H270
Press. Gas Refrig. Liq. Gas, H281
STOT SE 3, H336

Other information: Before using this product in any new process or experiment, a thorough material compatibility and safety study should be carried out. Ensure adequate air ventilation. Ensure all national/local regulations are observed. Whilst proper care has been taken in the preparation of this document, no liability for injury or damage resulting from its use can be accepted.

Last revised date: 10.10.2017

Disclaimer: This information is provided without warranty. The information is believed to be correct. This information should be used to make an independent determination of the methods to safeguard workers and the environment.