

## Nitric Oxide

### 1. Product and company identification

#### 1.1. Product identifier

Product form	: Substance
Name	: Nitric oxide
CAS No	: 10102-43-9
Formula	: NO
Other means of identification	: Nitrogen II Oxide, nitrogen monoxide, mononitrogen monoxide Chemical Family: Nitric Oxides (NOx)

**1.2. Relevant identified uses of the substance or mixture and uses advised against Use**  
of the substance/mixture : Industrial use. Use as directed.

### Manufacturer / Distributor:

#### Ehsan International Gases

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### SECTION 2: Hazards identification

#### 2.1. Classification of the substance or mixture

##### Classification (GHS-US)

Ox. Gas 1	H270
Compressed gas	H280
Acute Tox. 1 (Inhalation:gas)	H330
Skin Corr. 1B	H314
Eye Dam. 1	H318

#### 2.2. Label elements

##### GHS-US labeling

Hazard pictograms (GHS-US) :



GHS03

GHS04

GHS05

GHS06

Signal word (GHS-US) : DANGER

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**Hazard statements (GHS-US)** : H270 - MAY CAUSE OR INTENSIFY FIRE; OXIDIZER  
 H280 - CONTAINS GAS UNDER PRESSURE; MAY EXPLODE IF HEATED  
 H314 - CAUSES SEVERE SKIN BURNS AND EYE DAMAGE  
 H330 - FATAL IF INHALED  
 H371 - MAY CAUSE DAMAGE TO ORGANS (lung) (Inhalation)  
 CGA-HG11 - SYMPTOMS MAY BE DELAYED

**Precautionary statements (GHS-US)** : P202 - Do not handle until all safety precautions have been read and understood  
 P220 - Keep/Store away from clothing, combustible materials  
 P244 - Keep reduction valves/valves and fittings free from oil and grease  
 P260 - Do not breathe gas  
 P262 - Do not get in eyes, on skin, or on clothing.  
 P271+P403 - Use and store only outdoors or in a well-ventilated place.  
 P280+P284 - Wear protective gloves, protective clothing, eye protection, respiratory protection, and/or face protection.  
 P370+P376 - In case of fire: Stop leak if safe to do so  
 P405 - Store locked up  
 P501 - Dispose of contents/container Dispose in a safe manner in accordance with local/national regulations  
 CGA-PG05 - Use a back flow preventive device in the piping.  
 CGA-PG20+CGA-PG10 - Use only with equipment of compatible materials of construction and rated for cylinder pressure.  
 CGA-PG22 - Use only with equipment cleaned for oxygen service.  
 CGA-PG12 - Do not open valve until connected to equipment prepared for use.  
 CGA-PG18 - When returning cylinder, install leak tight valve outlet cap or plug.  
 CGA-PG21 - Open valve slowly.  
 CGA-PG06 - Close valve after each use and when empty.  
 CGA-PG02 - Protect from sunlight when ambient temperature exceeds 52°C (125°F).

### 2.3. Other hazards

Other hazards not contributing to the classification : None.

### 2.4. Unknown acute toxicity (GHS-US)

No data available

## 3: Composition/information on ingredients

### 3.1. Substance

Name	Product identifier	%
Nitric oxide (Main constituent)	(CAS No) 10102-43-9	100

### 3.2. Mixture

Not applicable

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## 4: First aid measures

### 4.1. Description of first aid measures

First-aid measures after inhalation	: Immediately remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, qualified personnel may give oxygen. Call a physician. WARNING: To avoid possible chemical burns, the rescuer should avoid breathing any exhaled air from the victim.
First-aid measures after skin contact	: In case of contact, immediately flush affected areas with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Call a physician. Wash clothing before reuse. Discard contaminated shoes.
First-aid measures after eye contact	: Immediately flush eyes thoroughly with water for at least 15 minutes. Hold the eyelids open and away from the eyeballs to ensure that all surfaces are flushed thoroughly. Contact an ophthalmologist immediately.
First-aid measures after ingestion	: Ingestion is not considered a potential route of exposure.

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

No additional information available

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

CONTACT WITH THIS PRODUCT REQUIRES IMMEDIATE MEDICAL ATTENTION! Symptoms may be delayed. Seek medical attention even if no symptoms are present.

## 5: Firefighting measures

### 5.1. Extinguishing media

Suitable extinguishing media : Does not burn. Use extinguishing media appropriate for surrounding fire.

### 5.2. Special hazards arising from the substance or mixture

Fire hazard	: Oxidizing agent; vigorously accelerates combustion. Contact with flammable materials may cause fire or explosion.
Explosion hazard	: Heating may cause an explosion. PRESSURIZED CONTAINER: MAY BURST IF HEATED.
Reactivity	: Cylinders not equipped with a pressure relief valve. MAY CAUSE OR INTENSIFY FIRE; OXIDIZER. MAY CAUSE FIRE OR EXPLOSION; STRONG OXIDIZER. corrosive vapors.

### 5.3. Advice for firefighters

Firefighting instructions : Evacuate all personnel from the danger area. Use self-contained breathing apparatus (SCBA) and protective clothing. Immediately cool containers with water from maximum distance. Stop flow of gas if safe to do so, while continuing cooling water spray. Remove ignition sources if safe to do so. Remove containers from area of fire if safe to do so. On-site fire brigades must comply with OSHA 29 CFR 1910.156 and applicable standards under 29 CFR 1910 Subpart L—Fire Protection.

Protection during firefighting : DANGER! Toxic, corrosive, high-pressure gas.

Special protective equipment for fire fighters : Standard protective clothing and equipment (Self Contained Breathing Apparatus) for fire fighters.

Specific methods : Use fire control measures appropriate for the surrounding fire. Exposure to fire and heat radiation may cause gas containers to rupture. Cool endangered containers with water spray jet from a protected position. Prevent water used in emergency cases from entering sewers and drainage systems.

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Stop flow of product if safe to do so.

Use water spray or fog to knock down fire fumes if possible.

## 6: Accidental release measures

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

General measures : Evacuate personnel to a safe area. Wear a self-contained breathing apparatus and appropriate personal protective equipment (PPE). (gas tight, chemical-protective) Approach suspected leak area with caution. Remove all sources of ignition. Toxic, corrosive vapor can spread from spill. Contact with flammable materials may cause fire or explosion. Ventilate area or move container to a well-ventilated area. Before entering the area, especially a confined area, check the atmosphere with an appropriate device. Prevent from entering sewers, basements and workpits, or any place where its accumulation can be dangerous.

#### 6.1.1. For non-emergency personnel

No additional information available

#### 6.1.2. For emergency responders

No additional information available

### 6.2. Environmental precautions

Prevent waste from contaminating the surrounding environment. Prevent soil and water pollution. Dispose of contents/container in accordance with local/regional/national/international regulations. Contact supplier for any special requirements.

### 6.3. Methods and material for containment and cleaning up

No additional information available

### 6.4. Reference to other sections

See also sections 8 and 13.

## 7: Handling and storage

### 7.1. Precautions for safe handling

Precautions for safe handling

: Do not breathe gas/vapor. Avoid all contact with skin, eyes, or clothing. Emergency eye wash fountains and safety showers should be available in the immediate vicinity of any potential exposure.

Wear leather safety gloves and safety shoes when handling cylinders. Protect cylinders from physical damage; do not drag, roll, slide or drop. While moving cylinder, always keep in place removable valve cover. Never attempt to lift a cylinder by its cap; the cap is intended solely to protect the valve. When moving cylinders, even for short distances, use a cart (trolley, hand truck, etc.) designed to transport cylinders. Never insert an object (e.g., wrench, screwdriver, pry bar) into cap openings; doing so may damage the valve and cause a leak. Use an adjustable strap wrench to remove over-tight or rusted caps. Slowly open the valve. If the valve is hard to open, discontinue use and contact your supplier. Close the container valve after each use; keep closed even when empty. Never apply flame or localized heat directly to any part of the container. High temperatures may damage the container and could cause the pressure relief device to fail prematurely, venting the container contents. For other precautions in using this product, see section 16.

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**7.2. Conditions for safe storage, including any incompatibilities**

Storage conditions : Avoid oil, grease and all other combustible materials.

Store only where temperature will not exceed 125°F (52°C). Post “No Smoking or Open Flames” signs in storage and use areas. There must be no sources of ignition. Separate packages and protect against potential fire and/or explosion damage following appropriate codes and requirements (e.g., NFPA 30, NFPA 55, NFPA 70, and/or NFPA 221 in the U.S.) or according to requirements determined by the Authority Having Jurisdiction (AHJ). Always secure containers upright to keep them from falling or being knocked over. Install valve protection cap, if provided, firmly in place by hand when the container is not in use. Store full and empty containers separately. Use a first-in, first-out inventory system to prevent storing full containers for long periods. For other precautions in using this product, see section 16.

**OTHER PRECAUTIONS FOR HANDLING, STORAGE, AND USE:** When handling product under pressure, use piping and equipment adequately designed to withstand the pressures to be encountered. Never work on a pressurized system. Use a back flow preventive device in the piping. Gases can cause rapid suffocation because of oxygen deficiency; store and use with adequate ventilation. If a leak occurs, close the container valve and blow down the system in a safe and environmentally correct manner in compliance with all international, federal/national, state/provincial, and local laws; then repair the leak. Never place a container where it may become part of an electrical circuit.

**7.3. Specific end use(s)**

None.

## 8: Exposure controls/personal protection

**8.1. Control parameters**

Nitric oxide (10102-43-9)		
ACGIH	ACGIH TLV-TWA (ppm)	25 ppm
USA OSHA	OSHA PEL (TWA) (mg/m <sup>3</sup> )	30 mg/m <sup>3</sup>
USA OSHA	OSHA PEL (TWA) (ppm)	25 ppm

**8.2. Exposure controls**

- Appropriate engineering controls : Product to be handled in a closed system and under strictly controlled conditions. Use corrosion-proof equipment. Preferably use only permanent leak-tight installations (e.g. welded pipes). Systems under pressure should be regularly checked for leakages. Provide adequate general and local exhaust ventilation. Consider work permit system e.g. for maintenance activities.
- Eye protection : Wear safety glasses with side shields. Provide readily accessible eye wash stations and safety showers. Wear safety glasses when handling cylinders; vapor-proof goggles and a face shield during cylinder changeout or whenever contact with product is possible. Select eye protection in accordance with OSHA 29 CFR 1910.133.
- Skin and body protection : Wear metatarsal shoes and work gloves for cylinder handling, and protective clothing where needed. Wear neoprene gloves during cylinder changeout or wherever contact with product is possible. Select per OSHA 29 CFR 1910.132, 1910.136, and 1910.138.
- Respiratory protection : When workplace conditions warrant respirator use, follow a respiratory protection program that meets OSHA 29 CFR 1910.134, ANSI Z88.2, or MSHA 30 CFR 72.710 (where applicable). Use an air-supplied or air-purifying cartridge if the action level is exceeded. Ensure that the respirator has the appropriate protection factor for the exposure level. If cartridge type respirators are used, the cartridge must be appropriate for the chemical

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exposure (e.g., an organic vapor cartridge). For emergencies or instances with unknown exposure levels, use a self-contained breathing apparatus (SCBA).

Thermal hazard protection : None necessary.  
Other information : Wear safety shoes while handling containers. Standard EN ISO 20345 - Personal protective equipment - Safety footwear. Keep suitable chemically resistant protective clothing readily available for emergency use. Standard EN943-1 - Full protective suits against liquid, solid and gaseous chemicals.

## 9: Physical and chemical properties

### 9.1. Information on basic physical and chemical properties

Physical state : Gas

Appearance : Colorless gas. Turns yellow to reddish brown on exposure to light and air.

Molecular mass : 30 g/mol

Color : Brownish gas.

Odor : No data available

Odor threshold : 0.3 - 1 ppm Odor threshold is subjective and inadequate to warn for overexposure.

pH : No data available

Relative evaporation rate (butyl acetate=1) : No data available

Relative evaporation rate (ether=1) : Not applicable.

Melting point : -164 °C

Freezing point : No data available

Boiling point : -151.8 °C

Flash point : Not applicable.

Critical temperature : -92.95 °C

Auto-ignition temperature : Not applicable.

Decomposition temperature : No data available

Flammability (solid, gas) : No data available

Vapor pressure : Not applicable.

Critical pressure : 6480 kPa

Relative vapor density at 20 °C : No data available

Relative density : 1.3

Specific gravity / density : 1.3 kg/l @ NTP (20°C, 1atm)

Relative gas density : 1.04 @ NTP (20°C, 1atm)

Solubility : Water: 67 mg/l

Log Pow : Not applicable for inorganic gases.

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Log Kow : No data available  
 Viscosity, kinematic : Not applicable.  
 Viscosity, dynamic : Not applicable.  
 Explosive properties : Not applicable.  
 Oxidizing properties : Oxidizer.  
 Explosive limits : Non flammable.

### 9.2. Other information

Gas group : Compressed gas  
 Additional information : Gas/vapor heavier than air. May accumulate in confined spaces, particularly at or below ground level.

## 10: Stability and reactivity

### 10.1. Reactivity

Cylinders not equipped with a pressure relief valve. MAY CAUSE OR INTENSIFY FIRE; OXIDIZER. MAY CAUSE FIRE OR EXPLOSION; STRONG OXIDIZER. corrosive vapors.

### 10.2. Chemical stability

Decomposes at room temperature to other nitrogen oxides and nitrogen. Oxidizes in air to form nitrogen dioxide which is extremely reactive. Stable under normal conditions.

### 10.3. Possibility of hazardous reactions

Violently oxidizes organic material.

### 10.4. Conditions to avoid

Heat.

### 10.5. Incompatible materials

Air. May react violently with reducing agents. May react violently with combustible materials.

### 10.6. Hazardous decomposition products

No additional information available

## 11: Toxicological information

### 11.1. Information on toxicological effects

Acute toxicity : Inhalation:gas: FATAL IF INHALED.

Nitric oxide ( $\text{N}_2\text{O}$ )10102-43-9	
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LC50 inhalation rat (mg/l)	1068 mg/m <sup>3</sup> (Exposure time: 4 h)
LC50 inhalation rat (ppm)	57.5 ppm/4h
ATE US (gases)	57.500 ppmV/4h

Skin corrosion/irritation : CAUSES SEVERE SKIN BURNS AND EYE DAMAGE.

Serious eye damage/irritation : CAUSES SERIOUS EYE DAMAGE.

Respiratory or skin sensitization : Not classified Germ cell

mutagenicity : Not classified

Carcinogenicity : Not classified

Reproductive toxicity : Not classified

Specific target organ toxicity (single exposure) : Not classified

Specific target organ toxicity (repeated : Not classified exposure)

Aspiration hazard : Not classified

## 12: Ecological information

### 12.1. Toxicity

Ecology - general : No data available.

### 12.2. Persistence and degradability

<b>Nitric oxide (10102-43-9)</b>	
Persistence and degradability	Not applicable for inorganic gases.

### 12.3. Bioaccumulative potential

<b>Nitric oxide (10102-43-9)</b>	
Log Pow	Not applicable for inorganic gases.
Bioaccumulative potential	No data available.

### 12.4. Mobility in soil

<b>Nitric oxide (10102-43-9)</b>	
Ecology - soil	Because of its high volatility, the product is unlikely to cause ground or water pollution.

### 12.5. Other adverse effects

Other adverse effects : May cause pH changes in aqueous ecological systems.

Effect on ozone layer : None.

Effect on the global warming : No known effects from this product.



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### 13: Disposal considerations

#### 13.1. Waste treatment methods

- Regional legislation (waste) : U.S. - RCRA (Resource Conservation & Recovery Act) - Hazardous Constituents - Appendix VIII to 40 CFR 261. U.S. - RCRA (Resource Conservation & Recovery Act) - P Series Wastes - Acutely Toxic Wastes.
- Waste disposal recommendations : Do not attempt to dispose of residual or unused quantities. Return container to supplier.

### SECTION 14: Transport information

- In accordance with DOT
- Transport document description : UN1660 Nitric oxide, compressed, 2.3
- UN-No.(DOT) : UN1660
- Proper Shipping Name (DOT) : Nitric oxide, compressed
- Department of Transportation (DOT) Hazard Classes : 2.3 - Class 2.3 - Poisonous gas 49 CFR 173.115
- Hazard labels (DOT) : 2.3 - Poison gas  
5.1 - Oxidizer  
8 - Corrosive



- DOT Special Provisions (49 CFR 172.102) : 1 - This material is poisonous by inhalation (see 171.8 of this subchapter) in Hazard Zone A (see 173.116(a) or 173.133(a) of this subchapter), and must be described as an inhalation hazard under the provisions of this subchapter.  
B37 - The amount of nitric oxide charged into any tank car tank may not exceed 1,379 kPa (200 psig) at 21 C (70 F).  
B46 - The detachable protective housing for the loading and unloading valves of multi-unit tank car tanks must withstand tank test pressure and must be approved by the Associate Administrator.  
B50 - Each valve outlet of a multi-unit tank car tank must be sealed by a threaded solid plug or a threaded cap with inert luting or gasket material. Valves must be of stainless steel and the caps, plugs, and valve seats must be of a material that will not deteriorate as a result of contact with the lading.  
B60 - DOT Specification 106A500X multi-unit tank car tanks that are not equipped with a pressure relief device of any type are authorized. For the transportation of phosgene, the outage must be sufficient to prevent tanks from becoming liquid full at 55 C (130 F). B77 - Other packaging are authorized when approved by the Associate Administrator.

#### Additional information

- Emergency Response Guide (ERG) Number : 124
- Other information : No supplementary information available.
- Special transport precautions : 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 there is adequate ventilation. - Ensure that containers are firmly secured. - Ensure cylinder valve is closed and not leaking. - Ensure valve outlet cap nut or plug (where provided) is correctly fitted. - Ensure valve protection device (where provided) is correctly fitted.

#### Transport by sea

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UN-No. (IMDG) : 1660  
 Proper Shipping Name (IMDG) : NITRIC OXIDE, COMPRESSED  
 Class (IMDG) : 2 - Gases  
 MFAG-No : 124

### Air transport

UN-No.(IATA) : 1660  
 Proper Shipping Name (IATA) : Nitric oxide, compressed  
 Class (IATA) : 2  
 Civil Aeronautics Law : Gases under pressure/Gases toxic under pressure

## 15: Regulatory information

### 15.1. US Federal regulations

<b>Nitric oxide (10102-43-9)</b>	
Listed on the United States TSCA (Toxic Substances Control Act) inventory	
Listed on the United States SARA Section 302	
SARA Section 302 Threshold Planning Quantity (TPQ)	100
SARA Section 311/312 Hazard Classes	Delayed (chronic) health hazard Immediate (acute) health hazard Sudden release of pressure hazard Reactive hazard

### 15.2. International regulations

#### CANADA

<b>Nitric oxide (10102-43-9)</b>
Listed on the Canadian DSL (Domestic Substances List)

#### EU-Regulations

<b>Nitric oxide (10102-43-9)</b>
Listed on the EEC inventory EINECS (European Inventory of Existing Commercial Chemical Substances)

### 15.2.2. National regulations

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### 15.3. US State regulations

<b>Nitric oxide(10102-43-9)</b>	
U.S. - California - Proposition 65 - Carcinogens List	No
U.S. - California - Proposition 65 - Developmental Toxicity	No
U.S. - California - Proposition 65 - Reproductive Toxicity - Female	No
U.S. - California - Proposition 65 - Reproductive Toxicity - Male	No
<b>Nitric oxide (10102-43-9)</b>	
Listed on the AICS (Australian Inventory of Chemical Substances) Listed on IECSC (Inventory of Existing Chemical Substances Produced or Imported in China) Listed on the Japanese ENCS (Existing & New Chemical Substances) inventory Listed on the Korean ECL (Existing Chemicals List) Listed on NZIoC (New Zealand Inventory of Chemicals) Listed on PICCS (Philippines Inventory of Chemicals and Chemical Substances) Listed on the Canadian IDL (Ingredient Disclosure List)	
<b>Nitric oxide(10102-43-9)</b>	
State or local regulations	U.S. - Massachusetts - Right To Know List U.S. - New Jersey - Right to Know Hazardous Substance List U.S. - Pennsylvania - RTK (Right to Know) - Environmental Hazard List U.S. - Pennsylvania - RTK (Right to Know) List

## 16: Other information

Revision date : 2/20/2015 12:00:00 AM  
Other information

: When you mix two or more chemicals, you can create additional, unexpected hazards. Obtain and evaluate the safety information for each component before you produce the mixture. Consult an industrial hygienist or other trained person when you evaluate the end product. Before using any plastics, confirm their compatibility with this product.

Ehsan international asks users of this product to study this SDS and become aware of the product hazards and safety information. To promote safe use of this product, a user should (1) notify employees, agents, and contractors of the information in this SDS and of any other known product hazards and safety information, (2) furnish this information to each purchaser of the product, and (3) ask each purchaser to notify its employees and customers of the product hazards and safety information.

The opinions expressed herein are those of qualified experts within Praxair, Inc. We believe that the information contained herein is current as of the date of this Safety Data Sheet. Since the use of this information and the conditions of use are not within the control of Praxair, Inc., it is the user's obligation to determine the conditions of safe use of the product.

Ehsan international SDSs are furnished on sale or delivery by Praxair or the independent distributors and suppliers who package and sell our products. To obtain current SDSs for these products, contact your Praxair sales representative, local distributor, or supplier, or download from [www.praxair.com](http://www.praxair.com). If you have questions regarding Praxair SDSs, would like the document

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number and date of the latest SDS, or would like the names of the Ehsan international suppliers in your area

Ehsan international and the Flowing Airstream design are trademarks or registered trademarks of Ehsan international Technology, Inc. in the United States and/or other countries.

NFPA health hazard : 3 - Short exposure could cause serious temporary or residual injury even though prompt medical attention was given.

NFPA fire hazard : 0 - Materials that will not burn.

NFPA reactivity : 0 - Normally stable, even under fire exposure conditions, and are not reactive with water.

NFPA specific hazard : OX - This denotes an oxidizer, a chemical which can greatly increase the rate of combustion/fire.

### HMIS III Rating

Health : 3 Serious Hazard - Major injury likely unless prompt action is taken and medical treatment is given

Flammability : 0 Minimal Hazard

Physical : 3 Serious Hazard