Material Safety Data Sheet

Nitrogen Dioxide/Inert Gas Mixture

1. Product and company identification

Product name : Nitrogen Dioxide/Inert Gas Mixture

Synonym : Not available.

Trade name : Nitrogen Dioxide/Inert Gas Mixture

Material uses : Not available.

Manufacturer : Praxair Canada Inc.
1 City Centre Drive
Suite 1200
Mississauga, ON L5B 1M2

MSDS # : E-6785-I

Validation date : **October 15, 2013**

Print date : **October 15, 2013**.

In case of emergency : **Emergencies:** * 1-800-363-0042
*Call emergency numbers 24 hours a day only for spills, leaks, fire, exposure, or accidents involving this product. For routine information, contact your supplier or Praxair sales representative.

Product type : Gas.

2. Hazards identification

Physical state : Gas.

Odor : Odorless.

Emergency overview : **DANGER!**

TOXIC, CORROSIVE, OXIDIZING HIGH PRESSURE GAS. May be fatal if inhaled. May cause lung damage. Symptoms may be delayed. Self-contained breathing apparatus may be required by rescue workers.

Contains gas under pressure. In a fire or if heated, a pressure increase will occur and the container may burst or explode. Very toxic by inhalation. Do not puncture or incinerate container. Do not breathe gas. Do not get on skin or clothing. Avoid contact with eyes. Contains material that can cause target organ damage. Use only with adequate ventilation. Keep container tightly closed and sealed until ready for use.

Routes of entry : Inhalation

Potential acute health effects

Inhalation : Overexposure may cause irritation of mucous membranes, sinus, pharynx and bronchia, with pain, headache, cyanosis, irregular respiration, chocking,dissiness and possibly pulmonary edema. If no pulmonary symptoms at time of exposure; may have latency of 5 - 72 hours. High pressure vapour concentrations may cause pain, chocking, bronchoconstriction,reflex slowing of the heart,and possibly asphyxiation. Lack of oxygen can kill.

Ingestion : Unlikely route of exposure. This product is a gas at normal temperature and pressure. May cause burns to the mouth, esophagus and stomach.

Skin : Contact with rapidly expanding gas may cause burns or frostbite.

Eyes : May cause severe conjunctivitis seen as marked redness and swelling of the conjunctiva, and corneal injury with opacification.

Potential chronic health effects

Chronic effects : Repeated inhalation may result in bronchitis or emphysema. Repeated skin contact may result in cumulative dermatitis.

Carcinogenicity :

Mutagenicity : No known significant effects or critical hazards.

Teratogenicity : No known significant effects or critical hazards.

Developmental effects : No known significant effects or critical hazards.

Fertility effects : No known significant effects or critical hazards.

2. Hazards identification

Target organs : Contains material which causes damage to the following organs: skin.
Contains material which may cause damage to the following organs: lungs, cardiovascular system, upper respiratory tract, eyes.

Over-exposure signs/symptoms

Inhalation : No known significant effects or critical hazards

Ingestion : No specific data.

Skin : No specific data.

Eyes : No specific data.

Medical conditions aggravated by over-exposure : In case of overexposure, keep patient under medical observation for at least 72 hours toobserve for pulmonary adema. Patient may have a second acute pulmonary reaction 2-6weeks after the first one. The hazards of this material are mainly due to its severe andcorrosive properties on the skin and mucosal surfaces. There are no specific antidote.Tretment of over-exposure should be directed at the control of symptoms and the clinical condition.

See toxicological information (section 11)

3. Composition/information on ingredients

Canada

Name	CAS number	%
nitrogen dioxide	10102-44-0	40 - 99.9999
AND CONTAINS ONE OR MORE OF THE FOLLOWING GASES:		
argon	7440-37-1	0 - 60
helium	7440-59-7	0 - 60
krypton	7439-90-9	0 - 60
neon	7440-01-9	0 - 60
nitrogen	7727-37-9	0 - 60
xenon	7440-63-3	0 - 60

There are no additional ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health or the environment and hence require reporting in this section.

4. First aid measures

Eye contact : Check for and remove any contact lenses. Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical attention immediately.

Skin contact : In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Clean shoes thoroughly before reuse. Get medical attention immediately.

Inhalation : Call medical doctor or poison control center immediately. Move exposed person to fresh air. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention immediately.

Ingestion : As this product is a gas, refer to the inhalation section.

Protection of first-aiders : No action shall be taken involving any personal risk or without suitable training. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Wash contaminated clothing thoroughly with water before removing it, or wear gloves.

Notes to physician : In case of overexposure, keep patient under medical observation for at least 72 hours toobserve for pulmonary adema. Patient may have second acute pulmonary reaction 2 to6 weeks after the first one. The hazard of this material are mainly due to it's severeirritant and corrosive properties on the skin and mucosal surfaces. There are no specificantidote. Treatment of over-exposure should be directed at the control of symptoms andthe clinical condition.

5. Fire-fighting measures

Flammability of the product : Contains Toxic, Corrosive and Oxidizing gas under pressure. In a fire or if heated, a pressure increase will occur and the container may burst or explode.

Extinguishing media

Suitable : Use an extinguishing agent suitable for the surrounding fire.

Not suitable : None known.

Special exposure hazards : Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training. Contact supplier immediately for specialist advice. Move containers from fire area if this can be done without risk. Use water spray to keep fire-exposed containers cool.

Hazardous thermal decomposition products : Decomposition products may include the following materials:
nitrogen oxides

Special protective equipment for fire-fighters : Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

Special remarks on fire hazards : Not available.

Special remarks on explosion hazards : Not available.

6. Accidental release measures

Personal precautions : No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Do not breathe gas. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment (see section 8).

Environmental precautions : Ensure emergency procedures to deal with accidental gas releases are in place to avoid contamination of the environment. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air).

Methods for cleaning up

Small spill : Immediately contact emergency personnel. Stop leak if without risk.

Large spill : Immediately contact emergency personnel. Stop leak if without risk. Note: see section 1 for emergency contact information and section 13 for waste disposal.

7. Handling and storage

Handling : Put on appropriate personal protective equipment (see section 8). Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Contains gas under pressure. Do not get in eyes or on skin or clothing. Do not breathe gas. Use only with adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Empty containers retain product residue and can be hazardous. Do not puncture or incinerate container.

Protect cylinder from damage. Never attempt to lift a cylinder by its cap; the cap is intended solely to protect the valve. 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. Open valve slowly. If valve is hard to open, discontinue use and contact your supplier. Close valve after each use; keep closed even when empty.

Storage : Store in accordance with local regulations. Store in a segregated and approved area. Store in a dry, cool and well-ventilated area, away from incompatible materials (see section 10). Keep container tightly closed and sealed until ready for use.

OTHER HAZARDOUS CONDITIONS OF HANDLING, STORAGE, AND USE:
Toxic, Corrosive, Oxidizing High-Pressure gas. May be fatal if inhaled. Do not breathe gas. Do not get vapour in eyes, on skin or on clothing. Have safety showers and eyewash fountains immediately available. Use piping and equipment adequately

7. Handling and storage

designed to withstand pressures to be encountered. Use only in a closed system. Store and use with adequate ventilation at all times. Close valve after each use; keep closed even when empty. **Never work on a pressurized system.** If there is a leak, close the cylinder valve. Vent the system down in a safe and environmentally sound manner in compliance with all federal, provincial and local laws; then repair the leak. **Never place a compressed gas cylinder where it may become part of an electrical circuit.**

PRECAUTIONS TO BE TAKEN IN STORAGE:
Store and use with adequate ventilation. Firmly secure cylinders upright to keep them from falling or being knocked over. Screw valve protection cap firmly in place by hand. Store only where temperature will not exceed 52˚C/125°F. Store full and empty cylinders separately. Use a first-in, first-out inventory system to prevent storing full cylinders for long periods.

RECOMMENDED PUBLICATIONS:
Additional information on storage, handling, and use of this product is provided in **NFPA 55: Standard for the Storage, Use, and Handling of Compressed and liquefied Gases in Portable Cylinders**, published by the National Fire Protection Association.

See also Praxair publication P-14-153, Guidelines for Handling Gas Cylinders and Containers. Obtain from your local supplier.

8. Exposure controls/personal protection

Occupational exposure limits		TWA (8 hours)			STEL (15 mins)			Ceiling			
Ingredient	List name	ppm	mg/m³	Other	ppm	mg/m³	Other	ppm	mg/m³	Other	Notations
nitrogen dioxide	US ACGIH 1/2012	0.2	0.38	-	-	-	-	-	-	-	
	AB 4/2009	3	5.6	-	5	9.4	-	-	-	-	[3]
	BC 10/2009	-	-	-	-	-	-	1	-	-	
	ON 8/2008	3	5.6	-	5	9.4	-	-	-	-	
	QC 6/2008	3	5.6	-	-	-	-	-	-	-	
argon	Simple asphyxiant.										[2]
helium											[2]
neon											[2]
nitrogen											[2]

[2]Oxygen Depletion [Asphyxiant] [3]Skin sensitization

Consult local authorities for acceptable exposure limits.

Recommended monitoring procedures : If this product contains ingredients with exposure limits, personal, workplace atmosphere or biological monitoring may be required to determine the effectiveness of the ventilation or other control measures and/or the necessity to use respiratory protective equipment.

Engineering measures : Use only with adequate ventilation. Use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits.

Hygiene measures : Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.

Personal protection

Respiratory : Use a properly fitted, air-purifying or air-fed respirator complying with an approved standard if a risk assessment indicates this is necessary. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator. Select in accordance with provincial regulations, local bylaws or guidelines. Selection should be based on the current CSA standard Z94.4, "Selection, Care, and Use of Respirators." Respirators should also be approved by NIOSH and MSHA.

Hands : Neoprene gloves

8. Exposure controls/personal protection

Eyes	:	Wear safety glasses when handling cylinders. Select in accordance with the current CSA standard Z94.3, "Industrial Eye and Face Protection", and any provincial regulations, local bylaws or guidelines.
Skin	:	Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.
Environmental exposure controls	:	Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.
Other protection	:	Metatarsal shoes for cylinder handling. Protective clothing where needed. Cuffless trousers should be worn outside the shoes. Select in accordance with the current CSA standard Z195, "Protective Foot Wear", and any provincial regulations, local bylaws or guidelines.

9. Physical and chemical properties

Physical state	:	Gas.
Flash point	:	Not available.
Burning time	:	Not applicable.
Burning rate	:	Not applicable.
Auto-ignition temperature	:	Not available.
Flammable limits	:	Not available.
Color	:	Colorless.
Odor	:	Odorless.
Taste	:	Not available.
Molecular weight	:	Not applicable.
Molecular formula	:	Not applicable.
pH	:	Not available.
Boiling/condensation point	:	Not available.
Melting/freezing point	:	Not available.
Critical temperature	:	Not available.
Relative density	:	Not available.
Vapor pressure	:	Not available.
Vapor density	:	Not available.
Volatility	:	Not available.
Odor threshold	:	Not available.
Evaporation rate	:	Not available.
Viscosity	:	Not available.
Ionicity (in water)	:	Not available.
Dispersibility properties	:	Not available.
Solubility	:	Not available.
Physical/chemical properties comments	:	Not available.
COEFFICIENT OF WATER/OIL DISTRIBUTION:	:	Not available.

10. Stability and reactivity

Chemical stability : The product is stable.

Conditions to avoid :

Materials to avoid :

Hazardous decomposition products : Above 160 C nitrogen dioxide decomposes to form nitric oxide and oxygen. Reacts with water to form nitric acid and nitric oxide.

Possibility of hazardous reactions : Under normal conditions of storage and use, hazardous reactions will not occur.

11. Toxicological information

Acute toxicity

Product/ingredient name	Result	Species	Dose	Exposure
nitrogen dioxide	LC50 Inhalation Vapor	Rat	790 mg/m3	5 minutes
	LC50 Inhalation Vapor	Rat	310 mg/m3	30 minutes
	LC50 Inhalation Vapor	Rat	220 mg/m3	1 hours
	LC50 Inhalation Gas.	Rat	200 ppm	30 minutes
	LC50 Inhalation Vapor	Rat	115 ppm	1 hours
	LC50 Inhalation Gas.	Rat	88 ppm	4 hours

Conclusion/Summary : Not available.

Chronic toxicity

Product/ingredient name	Result	Species	Dose	Exposure
Not available.				

Conclusion/Summary : Not available.

Irritation/Corrosion

Product/ingredient name	Result	Species	Score	Exposure	Observation
Not available.					

Sensitizer

Product/ingredient name	Route of exposure	Species	Result
Not available.			

Conclusion/Summary : Not available.

Carcinogenicity

Product/ingredient name	Result	Species	Dose	Exposure
Not available.				

Conclusion/Summary : Not available.

Classification

Product/ingredient name	ACGIH	IARC	EPA	NIOSH	NTP	OSHA
nitrogen dioxide	A4	-	-	-	-	-

Mutagenicity

Product/ingredient name	Test	Experiment	Result
Not available.			

Conclusion/Summary : Not available.

Teratogenicity

Product/ingredient name	Result	Species	Dose	Exposure
Not available.				

Conclusion/Summary : Not available.

11. Toxicological information

Reproductive toxicity

Product/ingredient name	Maternal toxicity	Fertility	Development toxin	Species	Dose	Exposure
Not available.						

Conclusion/Summary : Not available.

Synergistic products : Not available.

12. Ecological information

Ecotoxicity : No known significant effects or critical hazards.

Aquatic ecotoxicity

Product/ingredient name	Test	Result	Species	Exposure
nitrogen dioxide	-	Acute LC50 79450 ug/L Marine water	Crustaceans - Redtail prawn - Penaeus penicillatus - 3.58 to 4.75 cm - 0.4 to 0.69 g	48 hours
	-	Acute LC50 52930 ug/L Marine water	Crustaceans - Redtail prawn - Penaeus penicillatus - 3.58 to 4.75 cm - 0.4 to 0.69 g	48 hours
	-	Acute LC50 19600 ug/L Fresh water	Fish - Tench - Tinca tinca - LARVAE - 20 days - 11.18 mm - 11.36 mg	96 hours
	-	Acute LC50 8640 to 9980 ug/L Fresh water	Crustaceans - Giant river prawn - Macrobrachium rosenbergii	48 hours

Conclusion/Summary : Not available.

Persistence/degradability

Product/ingredient name	Test	Result	Dose	Inoculum
Not available.				

Conclusion/Summary : Not available.

Octanol/water partition coefficient : Not available.

Bioconcentration factor : Not available.

Mobility : Not available.

Toxicity of the products of biodegradation : Not available.

Other adverse effects : No known significant effects or critical hazards.

13. Disposal considerations

Waste disposal : The generation of waste should be avoided or minimized wherever possible. Empty containers or liners may retain some product residues. This material and its container must be disposed of in a safe way. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Do not puncture or incinerate container. Empty pressure vessels should be returned to the supplier.

Waste stream : Not available.

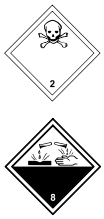
13. Disposal considerations

RCRA classification : Not available.

Disposal should be in accordance with applicable regional, national, and local laws and regulations.

Refer to Section 7: HANDLING AND STORAGE and Section 8: EXPOSURE CONTROLS/PERSONAL PROTECTION for additional handling information and protection of employees.

14. Transport information

Regulatory information	UN number	Proper shipping name	Classes	PG*	Label	Additional information
TDG Classification	3304	Compressed gas, toxic, corrosive, n.o.s. (nitrogen dioxide)	2.3 (8)	-		**PRODUCT REPORTABLE QUANTITY (PRQ):** Any accidental release in a quantity that could pose a danger to public safety or any sustained release of 10 minutes or more.

PG* : Packing group

SPECIAL SHIPPING INFORMATION:

Cylinders should be transported in a secure position, in a well-ventilated vehicle. Cylinders transported in an enclosed, nonventilated compartment of vehicle can present serious safety hazards.

15. Regulatory information

United States inventory (TSCA 8b) : All components are listed or exempted.

WHMIS (Canada) : Class A: Compressed gas.
Class C: Oxidizing material.
Class D-1A: Material causing immediate and serious toxic effects (Very toxic).
Class E: Corrosive material

Canadian lists : **CEPA Toxic substances**: The following components are listed: Nitrogen dioxide
Canadian ARET: None of the components are listed.
Canadian NPRI: None of the components are listed.
Alberta Designated Substances: None of the components are listed.
Ontario Designated Substances: None of the components are listed.
Quebec Designated Substances: None of the components are listed.

Canada inventory : All components are listed or exempted.

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all the information required by the Controlled Products Regulations.

International regulations

International lists : **Australia inventory (AICS)**: All components are listed or exempted.
China inventory (IECSC): All components are listed or exempted.
Japan inventory: Not determined.
Korea inventory: All components are listed or exempted.
New Zealand Inventory of Chemicals (NZIoC): Not determined.
Philippines inventory (PICCS): All components are listed or exempted.

Chemical Weapons Convention List Schedule I Chemicals : Not listed

Chemical Weapons Convention List Schedule II Chemicals : Not listed

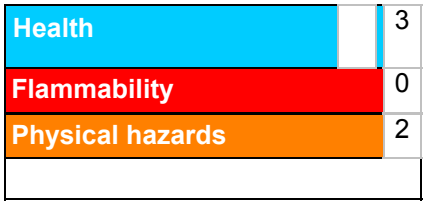
15. Regulatory information

Chemical Weapons Convention List Schedule III Chemicals : Not listed

16. Other information

Label requirements : TOXIC, CORROSIVE, OXIDIZING HIGH PRESSURE GAS. May be fatal if inhaled. May cause lung damage. Symptoms may be delayed. Self-contained breathing apparatus may be required by rescue workers.

Hazardous Material Information System (U.S.A.) :



Caution: HMIS® ratings are based on a 0-4 rating scale, with 0 representing minimal hazards or risks, and 4 representing significant hazards or risks Although HMIS® ratings are not required on MSDSs under 29 CFR 1910.1200, the preparer may choose to provide them. HMIS® ratings are to be used with a fully implemented HMIS® program. HMIS® is a registered mark of the National Paint & Coatings Association (NPCA). HMIS® materials may be purchased exclusively from J. J. Keller (800) 327-6868.

The customer is responsible for determining the PPE code for this material.

References : AV-1 Safe Handling and Storage of Compressed Gas
P-1 Safe Handling of Compressed Gases in Containers
P-14 Accident Prevention in Oxygen-Rich, Oxygen-Deficient Atmosphere
SB-2 Oxygen-Deficient Atmospheres
V-1 Compressed Gas Cylinder Valve Inlet and Outlet Connections
V-7 Standard Method of Determining Cylinder Valve Outlet Connections for Industrial Gas Mixtures
--- Handbook of Compressed Gases, Fifth Edition

Other special considerations : Not available.

Date of printing **10/15/2013.**

Date of issue : 10/15/2013.

Date of previous issue : No previous validation.

Version : 0.05

Indicates information that has changed from previously issued version.

Notice to reader

To the best of our knowledge, the information contained herein is accurate. However, neither the above-named supplier, nor any of its subsidiaries, assumes any liability whatsoever for the accuracy or completeness of the information contained herein.
Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.

STANDARD VALVE CONNECTIONS FOR U.S. AND CANADA:

THREADED: For information on CGA Valves, please contact your Specialty Gas Representative.

PIN-INDEXED YOKE: Not applicable.

ULTRA-HIGH-INTEGRITY CONNECTION: Not available.

Use the proper CGA connections. **DO NOT USE ADAPTERS.** Additional limited-standard connections may apply. See CGA pamphlets V-1 and V-7 listed below.

16. Other information

Ask your supplier about free Praxair safety literature as referred to in this MSDS and on the label for this product. Further information about this product can be found in the following pamphlets published by the Compressed Gas Association, Inc. (CGA), 4221 Walney Road, 5th Floor, Chantilly, VA 20151-2923, Telephone (703) 788-2700, Fax (703) 961-1831, website: www.cganet.com.

MIXTURES:

When two or more gases, or liquefied gases are mixed, their hazardous properties may combine to 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 make your safety evaluation of the end product. Remember, gases and liquids have properties which can cause serious injury or death.

For more in-depth information for each component, refer to the pure product MSDS.

The information contained in this MSDS is generated from technical sources using the Chemmate Mixture MSDS system and the pure-product MSDS for each component. These mixtures are not tested as a whole for chemical, physical, or health effects.

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

Praxair Canada Inc. requests the users of this product to study this Material Data Sheet (MSDS) and become aware of product hazards and safety information. To promote safe use of this product, a user should (1) notify its employees, agents and contractors of the information on this MSDS and any product hazards and safety nformation, (2) furnish this same information to each of its customers for the product, and (3) request such customers to notify their employees and customers for the product of the same product hazards and safety information.

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