

Material Safety Data Sheet

Prepared according to US OSHA, CMA, ANSI and Canadian WHMIS Standards.

Nitrogen fluoride



Section 1. Chemical product and company identification

Commercial name(s).	: Nitrogen fluoride
MSDS no.	20134
Product use	Fluorine source for high energy lasers; dry etchant in semiconductor manufacturer; chemical intermediate.
Manufactured/supplied	
Address	2700 Post Oak Drive Houston, TX 77056-8229
Emergency telephone number	CHEMTREC: 1-800-424-9300
Telephone no.	
GENERAL MSDS INFORMATION	1-(713)-896-2896
Fax on Demand	1-(800)-231-1366

Section 2. Hazards identification

Physical state	: Gas.
OSHA/HCS status	: This material is classified hazardous under OSHA regulations in the United States and the WHMIS Controlled Product Regulation in Canada.
Emergency overview	: DANGER! STRONG OXIDIZER. CONTACT WITH OTHER MATERIAL MAY CAUSE FIRE. HIGH PRESSURE GAS. MAY CAUSE EYE IRRITATION. CAN CAUSE TARGET ORGAN DAMAGE. GAS REDUCES OXYGEN AVAILABLE FOR BREATHING. Keep away from heat (<52°C/125°F). Use only with adequate ventilation. Extremely hazardous gas under pressure. Keep cylinder valve closed when the product is not used.
Routes of entry	: Dermal contact. Eye contact. Inhalation.
Potential acute health effects	
Inhalation	: High level of exposure can interfere with the ability of the blood to carry oxygen, causing headache, fatigue, dizziness and a blue color to the skin and lips (methemoglobinemia). Higher levels of exposure can cause trouble breathing, collapse and even death.
Skin	: No known significant effects or critical hazards.
Eyes	: Mildly irritating to the eyes.
Ingestion	: Since the product is a gas, it will probably be inhaled rather than ingested. See above.
Potential chronic health effects	: Carcinogenic effects: Not classified or listed by IARC, NTP, OSHA, EU and ACGIH. Mutagenic effects: Not available. Teratogenic effects: Not available.
Over-exposure signs/symptoms	
Inhalation	: Inhalation of this gas may cause dizziness, an irregular heartbeat, narcosis, nausea or asphyxiation.
Ingestion	: No specific data.
Skin	: No specific data.
Eyes	: Adverse symptoms may include the following: irritation watering redness
Medical conditions aggravated by over-exposure	: Repeated or prolonged exposure to the substance can produce target organs damage.

See toxicological information (section 11)

Section 3. Composition, Information on Ingredients

	CAS number	mole %
Canada Nitrogen fluoride	7783-54-2	100

United States

Chemical name	CAS #	mole %	Occupational exposure limits	IDLH
Nitrogen fluoride	7783-54-2	100	ACGIH TLV (United States, 1/2006). STEL: 29 mg/m ³ 15 minute(s). Form: All forms. TWA: 10 ppm 8 hour(s). Form: All forms. NIOSH REL (United States, 12/2001). TWA: 29 mg/m ³ 10 hour(s). Form: All forms. OSHA PEL (United States, 11/2006). TWA: 29 mg/m ³ 8 hour(s). Form: All forms.	1000 ppm

NE: Not Established

C: Ceiling Limit

See Section 16 for possible acronym definitions

See Sections 8, 11, 14 and 15 for details.

Section 4. First aid measures

Prompt medical attention is mandatory in all cases of overexposure to this gas. Rescue personnel should wear a self-contained breathing apparatus.

- Inhalation** : 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.
- Skin contact** : Not applicable.
- Eye contact** : Immediately flush eyes with plenty of water for at least 20 minutes, occasionally lifting the upper and lower eyelids. Get medical attention.
- Ingestion** : Since the product is a gas, it will probably be inhaled rather than ingested. See above.
- Notes to physician** : Effects of contact or inhalation may be delayed. Provide general supportive measures. Oxygen may be beneficial. The medical doctor must be warned that the person may suffer from anoxia.

Section 5. Fire fighting measures

- Flammability of the product** : Non-flammable.
- Products of combustion** : Decomposition products may include the following materials:
nitrogen oxides
halogenated compounds
- Fire-fighting media and instructions** : Use an extinguishing agent suitable for the surrounding fire.
- 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.
- Container explosion may occur under fire conditions or when heated.
- 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.

Section 6. Accidental release measures

- Personal precautions** : EVACUATE ALL PERSONNEL FROM AFFECTED AREA.
Use appropriate protective equipment. If leak is in user's equipment, be certain to purge piping with an inert gas prior to attempting repairs. If leak is on cylinder or cylinder valve, contact the closest Air Liquide location.
- Environmental precautions** : In case of a leak, clear the affected area, protect people, eliminate sources of ignition and respond with trained personnel.
- If leaking incidentally from the cylinder or its valve, contact your supplier. Use non-sparking tools and equipment during the response.
- Methods for cleaning up** : Contact your local Air Liquide Gas supplier for details.

Section 7. Handling and storage

- Handling** : Valve protection caps must remain in place unless cylinder is secured with valve outlet piped to usage point. Do not drag, slide or roll cylinders. Use a suitable hand truck for cylinder movement. Use a pressure regulator when connecting cylinder to lower pressure piping or systems. Do not heat cylinder by any means to increase the discharge rate of product from the cylinder. Use a check valve or trap in the discharge line to prevent hazardous back flow to the cylinder. Do not tamper with (valve) safety device. Close valve after each use and when empty.
- Storage** : Protect cylinders from physical damage. Store in cool, dry, well-ventilated area of non combustible construction away from heavy traffic areas and emergency exits. Do not allow the temperature where cylinders are stored to exceed 52°C/125°F. Cylinders must be stored upright and firmly secured to prevent falling or being knocked over. Full and empty cylinders should be segregated. Prevent full cylinders being stored for excessive periods of time. Post "No Smoking or Open Flames" signs in the storage or use area. There should be no source of ignition in the storage or use area.

Section 8. Exposure controls/personal protection

- Engineering controls** : Use only in well-ventilated areas. Gas is heavier than air and will therefore accumulate in low lying areas.
- Personal protection**
- Respiratory** : Maintain oxygen levels above 19.5% in the workplace. Use supplied air respiratory protection if oxygen levels are below 19.5% (air purifying respirators will not function) or during emergency response to a release of this gas. During an emergency situation, before entering the area, check for oxygen-deficient atmospheres. If respiratory protection is required, follow the requirements of the Federal OSHA Respiratory Protection Standard (29 CFR 1910.134), or equivalent State standard. 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.
- Hands** : Wear leather gloves when handling cylinders of this gas. Otherwise, wear glove protection appropriate to the specific operation for which this gas is used.
- Eyes** : Safety glasses with side shields.
- Skin/Body** : Use body protection appropriate for task. Cotton clothing is recommended for use to prevent static electric build-up. Pressurized product may require use of fire retardant clothing.
Metal cap, safety shoes are recommended when handling cylinders.



Some applications of this product may require additional or other specific protective clothings. Please consult your supervisor.

Personal protection in case of a major leak : Safety glasses with side shields, goggles or face shield. Impervious gloves. Protective clothing. Metal cap, safety shoes. Wear MSHA/NIOSH-approved self-contained breathing apparatus or equivalent and full protective gear.

Product name
Canada
Nitrogen fluoride

Exposure limits

ACGIH TLV (United States, 1/2006).
STEL: 29 mg/m³ 15 minute(s). Form: All forms.
TWA: 10 ppm 8 hour(s). Form: All forms.

United States
Nitrogen fluoride

ACGIH TLV (United States, 1/2006).
STEL: 29 mg/m³ 15 minute(s). Form: All forms.
TWA: 10 ppm 8 hour(s). Form: All forms.
NIOSH REL (United States, 12/2001).
TWA: 29 mg/m³ 10 hour(s). Form: All forms.
OSHA PEL (United States, 11/2006).
TWA: 29 mg/m³ 8 hour(s). Form: All forms.

NE: Not Established

Section 9. Physical and chemical properties

Physical state : Gas.
Color : Colorless.
Odor : Odorless.
Molecular weight : 71.01 g/mole
Molecular formula : NF₃
Boiling/condensation point : -128.88°C (-200°F)
Melting/freezing point : -206.66°C (-340°F)

Section 10. Stability and reactivity

Stability and reactivity : The product is stable.
Hazardous decomposition products : Under normal conditions of storage and use, hazardous decomposition products should not be produced.
Hazardous polymerization : Under normal conditions of storage and use, hazardous polymerization will not occur.

Section 11. Toxicological information

Toxicity data

IDLH : 1000 ppm

Acute Effects

Inhalation : High level of exposure can interfere with the ability of the blood to carry oxygen, causing headache, fatigue, dizziness and a blue color to the skin and lips (methemoglobinemia). Higher levels of exposure can cause trouble breathing, collapse and even death.

Skin : No known significant effects or critical hazards.

Eyes : Mildly irritating to the eyes.

Ingestion : Since the product is a gas, it will probably be inhaled rather than ingested. See above.

Potential chronic health effects : Carcinogenic effects: Not classified or listed by IARC, NTP, OSHA, EU and ACGIH.
Mutagenic effects: Not available.
Teratogenic effects: Not available.

Target organs : Causes damage to the following organs: blood, kidneys, liver, upper respiratory tract, skin, eye, lens or cornea.

Section 12. Ecological information







Products of degradation : These gases are released as is in the atmosphere.

Section 13. Disposal considerations

Disposal : Residual materials contained in customer-owned cylinders should be disposed of in accordance with Federal, State and Local regulations on waste management. For residual materials contained in cylinders owned by Air Liquide, contact Sales or Customer Service to determine appropriate disposal. Do not return cylinders without authorization from Air Liquide.

14 . Transport information

AERG : 122

Regulatory information	Proper shipping name	Class	UN number	PG	Label
UN / IMDG / IATA Classification	NITROGEN TRIFLUORIDE, COMPRESSED	2.2, (5.1)	UN2451	-	 
DOT Classification	NITROGEN TRIFLUORIDE, COMPRESSED	2.2, (5.1)	UN2451	-	 
TDG Classification	NITROGEN TRIFLUORIDE, COMPRESSED	2.2, (5.1)	UN2451	-	 
Additional information	UN	IMDG	IATA	DOT	TDG
	-	-	<u>Passenger and Cargo Aircraft</u> Quantity limitation: 75 kg <u>Cargo Aircraft Only</u> Quantity limitation: 150 kg	<u>Limited quantity</u> Yes. <u>Packaging instruction Passenger aircraft</u> Quantity limitation: 75 kg <u>Cargo aircraft</u> Quantity limitation: 150 kg	<u>Special provisions</u> 38

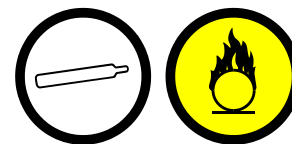
Cylinders should be transported in a secure position, in a well ventilated vehicle. The transportation of compressed gas cylinders in automobiles or in closed-body vehicles can present serious safety hazards and should be discouraged.

Section 15. Regulatory information

Canada

WHMIS (Canada)

: Class A: Compressed gas.
Class C: Oxidizing material.



Canada inventory: This material is listed or exempted.
CEPA DSL: All components listed.

United States

OSHA HAZARD COMMUNICATION STANDARD (29CFR PART 1910.1200).

Compressed gas
Oxidizing material
Irritating material
Target organ effects

SARA 302/304 emergency planning and notification: No products were found.

SARA 311/312 MSDS distribution - chemical inventory - hazard identification: Nitrogen trifluoride: Fire hazard, Sudden release of pressure, Immediate (acute) health hazard

CERCLA: Hazardous substances.: No products were found.

US INVENTORY (TSCA)

TSCA 8(b) inventory: All components listed.

State regulations

California prop. 65: No products were found.

Connecticut Carcinogen Reporting: This material is not listed.

Connecticut Hazardous Material Survey: This material is not listed.

Florida substances: This material is not listed.

Illinois Chemical Safety Act: This material is not listed.

Illinois Toxic Substances Disclosure to Employee Act: This material is not listed.

Louisiana Reporting: This material is not listed.

Louisiana Spill: This material is not listed.

Massachusetts Spill: This material is not listed.

Massachusetts Substances: This material is listed.

Michigan Critical Material: This material is not listed.

Minnesota Hazardous Substances: This material is not listed.

New Jersey Hazardous Substances: This material is listed.

New Jersey Spill: This material is not listed.

New Jersey Toxic Catastrophe Prevention Act: This material is not listed.

New York Acutely Hazardous Substances: This material is not listed.

New York Toxic Chemical Release Reporting: This material is not listed.

Pennsylvania RTK Hazardous Substances: This material is listed.

Rhode Island Hazardous Substances: This material is not listed.

Section 16. Other information

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

Health	*	1
Fire hazard		0
Reactivity		1
Personal protection		G

National Fire Protection Association (U.S.A.)

Health	1	0	Flammability
	OX	1	Instability
			Special

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.

Further information about gas mixtures can be found in pamphlets published by: Compressed Gas Association Inc (CGA), 4221 Walney Road, 5th floor, Chantilly, VA 20151-2923 Telephone: (703) 788-2700.

Acronyms

- : ACGIH: American Conference of Governmental Industrial Hygiene.
- IARC: International Agency for Research on Cancer.
- NIOSH: National Institute of Occupational Safety and Health.
- OSHA: Occupational Safety and Health Administration
- NTP: National Toxicology program.
- OECD: Organisation for Economic Co-operation and Development.
- PEL: Permissible Exposure Limit.
- IDLH: Immediately Dangerous to Life and Health.
- NE: Not established.
- C: Ceiling Limit.
- DSL: Domestic Substance List.
- NDSL: Non-Domestic Substance List.
- CFR: Code of Federal Regulations.
- TSCA: Toxic Substance Control Act.

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Notice to reader

This Material Safety Data Sheet is offered pursuant to OSHA's Hazard Communication Standard, 29 CFR, 1910.1200, American National Standard Institute Z400.1, 2004, the Canadian Workplace Hazardous Material Information Systems (WHMIS). Other government regulations must be reviewed for applicability to this gas mixture. To the best of Air Liquide's knowledge, the information contained herein is reliable and accurate as of this date; however, accuracy, suitability or completeness are not guaranteed and no warranties of any type, either express or implied, are provided. The information contained herein relates only to this specific product. If this gas mixture is combined with other materials, all component properties must be considered. Data may be changed from time to time. Be sure to consult the latest edition.