

Nitrogen Trifluoride

1. Product and company identification

Product form : Substance
 Name : Nitrogen trifluoride
 CAS No : 7783-54-2
 Formula : F₃N
 Other means of identification : Nitrogen Fluoride, Trifluoroamine,
 Trifluoroammonia
 Chemical Family = Inorganic Halide

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:

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2: Hazards identification

2.1. Classification of the substance or mixture

Classification (GHS-US)

Ox. Gas 1 H270
 Compressed gas H280
 Acute Tox. 4 (Inhalation:gas) H332
 STOT RE 2 H373

Signal word (GHS-US) : DANGER
 Hazard statements (GHS-US) : H270 - MAY CAUSE OR INTENSIFY FIRE; OXIDIZER
 H280 - CONTAINS GAS UNDER PRESSURE; MAY EXPLODE IF HEATED
 H332 - HARMFUL IF INHALED
 H373 - MAY CAUSE DAMAGE TO ORGANS (BLOOD, CIRCULATORY SYSTEM)
 THROUGH PROLONGED OR REPEATED EXPOSURE
 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
 P271+P403 - Use and store only outdoors or in a well-ventilated place.
 P370+P376 - In case of fire: Stop leak if safe to do so
 CGA-PG05 - Use a back flow preventive device in the piping.

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CGA-PG20+CGA-PG10 - Use only with equipment of compatible materials of construction and rated for cylinder pressure.

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CGA-PG22 - Use only with equipment cleaned for oxygen service.

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

2.4. Unknown acute toxicity (GHS US)

Other hazards not contributing to the classification : Contact with liquid may cause cold burns/frostbite.

No data available

3: Composition/information on ingredients

3.1. Substance

3.2. Mixture

Name	Product identifier	%
Nitrogen trifluoride (Main constituent)	(CAS No) 7783-54-2	100

Not applicable

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.
- First-aid measures after skin contact : Wash with plenty of soap and water. If irritation persists, consult a doctor.
- 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.

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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.

5.1. Extinguishing media

5: Firefighting measures

Suitable extinguishing media : Use extinguishing media appropriate for surrounding fire.

5.2. Special hazards arising from the substance or mixture

Fire hazard : Oxidizer. May accelerate the burning of other combustible materials.

Reactivity : MAY INTENSIFY FIRE; OXIDIZER.

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.

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.

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 : **DANGER: High-pressure, oxidizing gas.** Evacuate personnel to a safe area. Appropriate self-contained breathing apparatus may be required. Remove all sources of ignition. Vapor can spread from spill. Contact with flammable materials may cause fire or explosion. When containers have cooled, move them away from fire area if safe to do so. Before entering the area, especially a confined area, check the atmosphere with an appropriate device. On-site fire brigades must comply with OSHA 29 CFR 1910.156 and applicable standards under 29 CFR 1910 Subpart L—Fire Protection.

6.1.1. For non-emergency personnel

No additional information available

6.1.2. For emergency responders

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No additional information available

6.2. Environmental precautions

Try to stop release. 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

6.4. Reference to other sections

For containment : On land, sweep or shovel into suitable containers.

See also sections 8 and 13. See Heading 8. Exposure controls and personal protection.

7.1. Precautions for safe handling

7: Handling and storage

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.

7.2. Conditions for safe storage, including any incompatibilities

Storage conditions : 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

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7.3. Specific end use(s)

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.

None.

8: Exposure controls/personal protection

Nitrogen trifluoride (7783-54-2)		
ACGIH	ACGIH TLV-TWA (ppm)	10 ppm
USA OSHA	OSHA PEL (TWA) (mg/m ³)	29 mg/m ³
USA OSHA	OSHA PEL (TWA) (ppm)	10 ppm

Appropriate engineering controls	: Use corrosion-proof equipment. A canopy-type, forced-draft fume hood is preferred. Provide adequate general and local exhaust ventilation.
Hand protection	: Wear working gloves when handling gas containers.
Eye protection	: Wear safety glasses with side shields. Wear safety glasses when handling cylinders; vaporproof 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.
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 exposure (e.g., an organic vapor cartridge). For emergencies or instances with unknown exposure levels, use a self-contained breathing apparatus (SCBA).
Environmental exposure controls	: Refer to local regulations for restriction of emissions to the atmosphere.
Other information	: Do not eat, drink or smoke during use. Wear safety shoes while handling containers.

9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

Physical state : Gas

Molecular mass : 71 g/mol

Color : Colorless.

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Odor	: Moldy.
Odor threshold	: No data available
applicable.	pH : Not applicable.
Relative evaporation rate (butyl acetate=1)	: No data available
Relative evaporation rate (ether=1)	: Not applicable.
Melting point	: -207 °C
Freezing point	: No data available
Boiling point	: -129 °C
Flash point	: Not applicable.
Critical temperature	: -39 °C
Auto-ignition temperature	: Not applicable.
Decomposition temperature	: No data available
Flammability (solid, gas)	: No data available
Vapor pressure	: 33400 mm Hg (at -50 °C)
Critical pressure	: 4460 kPa
Relative vapor density at 20 °C	: No data available
Relative density	: 1.5
Relative gas density	: 2.4
Solubility	: Water: 61 mg/l
Log Pow	: Not applicable for inorganic gases.
Log Kow	: No data available
Viscosity, kinematic	: Not applicable.
Viscosity, dynamic	: Not applicable.
Explosive properties	: Not applicable.
Oxidizing properties	: Oxidizer.
Explosion limits	: Non flammable.

9.2. Other information

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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

MAY INTENSIFY FIRE; OXIDIZER.

10.2. Chemical stability

Stable under normal conditions.

10.3. Possibility of hazardous reactions

May occur. On decomposition may produce fumes of fluorides. The presence of certain metals at elevated temperatures may form tetrafluorohydrazine (N₂F₄), a material sensitive to heat and shock.

10.4. Conditions to avoid

None under recommended storage and handling conditions (see section 7).

10.5. Incompatible materials

Diborane. Hydrogen. Hydrogen sulfide. Methane. Tetrafluorohydrazine. Natural rubber. Avoid oil, grease and all other combustible materials. Reducing agents. May react

10.6. Hazardous decomposition products

violently with combustible materials. Carbon dioxide. Ammonia.

No additional information available

11: Toxicological information

11.1. Information on toxicological effects

Acute toxicity : Inhalation:gas: HARMFUL IF INHALED.

Nitrogen trifluoride (\f)7783-54-2	
LC50 inhalation rat (ppm)	6700 ppm/1h
ATE US (gases)	3350.000 ppmV/4h

Skin corrosion/irritation : Not classified pH:
Not applicable.

Serious eye damage/irritation : Not classified pH:
Not applicable.

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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 exposure) : MAY CAUSE DAMAGE TO ORGANS (BLOOD, CIRCULATORY SYSTEM) THROUGH PROLONGED OR REPEATED EXPOSURE.

Aspiration hazard : Not classified
 Potential Adverse human health effects and symptoms : HARMFUL IF INHALED.

12: Ecological information

12.1. Toxicity

Ecology - general : No data available.

12.2. Persistence and degradability

12.3. Bioaccumulative potential

Nitrogen trifluoride (7783-54-2)	
Persistence and degradability	Not applicable for inorganic gases. Not established.

Nitrogen trifluoride (7783-54-2)	
Log Pow	Not applicable for inorganic gases.
Bioaccumulative potential	No data available. Not established.

12.4. Mobility in soil

Nitrogen trifluoride (7783-54-2)	
Ecology - soil	Because of its high volatility, the product is unlikely to cause ground or water pollution.

12.5. Other adverse effects

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Effect on ozone layer : None.
Global warming potential [CO2=1] : 17200

Other information : Avoid release to the environment.

13: Disposal considerations

13.1. Waste treatment methods

Waste treatment methods : Do not discharge into any place where its accumulation could be dangerous.

Waste disposal recommendations : Dispose of contents/container in accordance with local/regional/national/international regulations. Contact supplier for any special requirements.

Additional information : None.

SECTION 14: Transport information

In accordance with DOT

Transport document description : UN2451 Nitrogen trifluoride, 2.2

UN-No.(DOT) : UN2451

Proper Shipping Name (DOT) : Nitrogen trifluoride

Transport hazard class(es) (DOT) : 2.2 - Class 2.2 - Non-flammable compressed gas 49 CFR 173.115

5.1 - Oxidizer



Additional information

Emergency Response Guide (ERG) Number : 122

Hazard labels (DOT) : 2.2 - Non-flammable gas

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

UN-No. (IMDG) : 2451

Proper Shipping Name (IMDG) : NITROGEN TRIFLUORIDE

Class (IMDG) : 2 - Gases

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MFAG-No : 122

Air transport

UN-No.(IATA) : 2451
 Proper Shipping Name (IATA) : Nitrogen trifluoride
 Class (IATA) : 2
 Civil Aeronautics Law : Gases under pressure/Gases nonflammable nontoxic under pressure

15: Regulatory information

15.1. US Federal regulations

15.2. International regulations

Nitrogen trifluoride (7783-54-2)	
Listed on the United States TSCA (Toxic Substances Control Act) inventory	
SARA Section 311/312 Hazard Classes	Immediate (acute) health hazard Fire hazard Sudden release of pressure hazard

CANADA

Nitrogen trifluoride (7783-54-2)
Listed on the Canadian DSL (Domestic Substances List)

EU-Regulations

Nitrogen trifluoride (7783-54-2)
Listed on the EEC inventory EINECS (European Inventory of Existing Commercial Chemical Substances)

15.2.2. National regulations

Nitrogen trifluoride (7783-54-2)
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 Japanese ISHL (Industrial Safety and Health Law)
Listed on the Korean ECL (Existing Chemicals List)
Listed on PICCS (Philippines Inventory of Chemicals and Chemical Substances)
Listed on the Canadian IDL (Ingredient Disclosure List)

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16: Other information

Indication of changes : Revised safety data sheet in accordance with commission regulation (EU) No 453/2010.

Revision date : 4/28/2015 12:00:00 AM

Other information : This Safety Data Sheet has been established in accordance with the applicable European Union legislation.

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 Ehsan international. 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 Ehsan international., it is the user's obligation to determine the conditions of safe use of the product.

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 : 1 Slight Hazard - Irritation or minor reversible injury possible

Flammability : 0 Minimal Hazard

Physical : 3 Serious Hazard