



Nitrogen trifluoride

Safety Data Sheet P-4854

This SDS conforms to U.S. Code of Federal Regulations 29 CFR 1910.1200, Hazard Communication.

Issue date: 01/01/1985 Revision date: 06/10/2022 Supersedes: 01/28/2021 Version: 1.1

SECTION 1: Product and company identification

1.1. Product identifier

Product form : Substance
Substance name : Nitrogen trifluoride
CAS-No. : 7783-54-2
Formula : NF₃
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.

1.3. Details of the supplier of the safety data sheet

Linde Inc.
10 Riverview Drive
Danbury, CT 06810-6268, USA
www.lindeus.com

Linde Inc. 1-844-44LINDE (1-844-445-4633)

1.4. Emergency telephone number

Emergency number : Onsite Emergency: 1-800-645-4633

CHEMTREC, 24hr/day 7days/week
— Within USA: 1-800-424-9300, Outside USA: 001-703-527-3887
(collect calls accepted, Contract 17729)

SECTION 2: Hazard identification

2.1. Classification of the substance or mixture

GHS US classification

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

2.2. Label elements

GHS US labeling

Hazard pictograms (GHS US) :



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 (KIDNEYS, LIVER, SPLEEN, CENTRAL NERVOUS SYSTEM, BLOOD) THROUGH PROLONGED OR REPEATED EXPOSURE
CGA-HG10 - ASPHYXIATING EVEN WITH ADEQUATE OXYGEN.
CGA-HG11 - SYMPTOMS MAY BE DELAYED
CGA-HG01 - MAY CAUSE FROSTBITE.

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.



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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.
P302, P336, P315 - IF ON SKIN: Thaw frosted parts with lukewarm water. Do not rub affected area.. Get immediate medical advice/attention.
P304-P340-P312 - IF INHALED: remove victim to fresh air and keep at rest in a position comfortable for breathing.Call a POISON CENTER/doctor if you feel unwell.
P370+P376 - IN CASE OF FIRE: Stop leak if safe to do so
P501 - Dispose of contents/container in accordance with local/regional/national/international regulations. Contact supplier for any special requirements.
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-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

No additional information available

2.4. Unknown acute toxicity (GHS US)

No data available

SECTION 3: Composition/Information on ingredients

3.1. Substances

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

3.2. Mixtures

Not applicable

SECTION 4: First aid measures

4.1. Description of first aid measures

- First-aid measures after inhalation : Remove to fresh air and keep at rest in a position comfortable for breathing. If not breathing, give artificial respiration. If breathing is difficult, trained personnel should give oxygen. Call a physician.
- First-aid measures after skin contact : Wash with plenty of soap and water. If irritation persists, consult a doctor. The liquid may cause frostbite. For exposure to liquid, immediately warm frostbite area with warm water not to exceed 105°F (41°C). Water temperature should be tolerable to normal skin. Maintain skin warming for at least 15 minutes or until normal coloring and sensation have returned to the affected area. In case of massive exposure, remove clothing while showering with warm water. Seek medical evaluation and treatment as soon as possible.
- 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.

SECTION 5: Firefighting measures

5.1. Extinguishing media

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



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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.

SECTION 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

No additional information available

6.2. Environmental precautions

Try to stop release. Reduce vapor with fog or fine water spray. Dispose of contents/container in accordance with container supplier/owner instructions.

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. See Heading 8. Exposure controls and personal protection.



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SECTION 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.

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/No 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.

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

Nitrogen trifluoride (7783-54-2)		
ACGIH	ACGIH OEL TWA [ppm]	10 ppm
USA OSHA	OSHA PEL TWA [1]	29 mg/m ³
USA OSHA	OSHA PEL TWA [2]	10 ppm
USA IDLH	IDLH [ppm]	1000 ppm

8.2. Exposure controls

- 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; 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.



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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. For emergencies or instances with unknown exposure levels, use a self-contained breathing apparatus (SCBA).
Thermal hazard protection	: Wear cold insulating gloves when transfilling or breaking transfer connections.
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.

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

Physical state	: Gas
Molecular mass	: 71 g/mol
Color	: Colorless.
Odor	: Moldy.
Odor threshold	: No data available
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	: -39.3 °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
Partition coefficient n-octanol/water (Log Pow)	: Not applicable for inorganic gases.
Partition coefficient n-octanol/water (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

Additional information	: Gas/vapor heavier than air. May accumulate in confined spaces, particularly at or below ground level.
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SECTION 10: Stability and reactivity

10.1. Reactivity

MAY INTENSIFY FIRE; OXIDIZER.

10.2. Chemical stability

Stable under normal conditions.



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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 violently with combustible materials. Carbon dioxide. Ammonia.

10.6. Hazardous decomposition products

No additional information available

SECTION 11: Toxicological information

11.1. Information on toxicological effects

Acute toxicity : Not classified

Nitrogen trifluoride (\f)7783-54-2	
LC50 Inhalation - Rat [ppm]	6700 ppm/1h
ATE US (gases)	3350 ppmV/4h

Skin corrosion/irritation : Not classified

pH: Not applicable.

Serious eye damage/irritation : Not classified

pH: Not applicable.

Respiratory or skin sensitization : Not classified

Germ cell mutagenicity : Not classified

Carcinogenicity : Not classified

Reproductive toxicity : Not classified

STOT-single exposure : Not classified

STOT-repeated exposure : MAY CAUSE DAMAGE TO ORGANS (KIDNEYS, LIVER, SPLEEN, CENTRAL NERVOUS SYSTEM, BLOOD) THROUGH PROLONGED OR REPEATED EXPOSURE.

Aspiration hazard : Not classified

Potential Adverse human health effects and symptoms : HARMFUL IF INHALED.

SECTION 12: Ecological information

12.1. Toxicity

Ecology - general : No data available.

12.2. Persistence and degradability

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

12.3. Bioaccumulative potential

Nitrogen trifluoride (7783-54-2)	
Partition coefficient n-octanol/water (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.



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12.5. Other adverse effects

Effect on ozone layer	: None.
Global warming potential [CO2=1]	: 17200
Other information	: Avoid release to the environment.

SECTION 13: Disposal considerations

13.1. Waste treatment methods

Waste treatment methods	: Do not discharge into any place where its accumulation could be dangerous.
Product/Packaging disposal recommendations	: Dispose of contents/container in accordance with container supplier/owner instructions.
Additional information	: None.

SECTION 14: Transport information

In accordance with DOT

Transport document description (DOT)	: UN2451 Nitrogen trifluoride, 2.2
UN-No.(DOT)	: UN2451
Proper Shipping Name (DOT)	: Nitrogen trifluoride
Class (DOT)	: 2.2 - Class 2.2 - Non-flammable compressed gas 49 CFR 173.115
Hazard labels (DOT)	: 2.2 - Non-flammable gas 5.1 - Oxidizer



Additional information

Emergency Response Guide (ERG) Number	: 122
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
Division (IMDG)	: 2.2 - Non-flammable, non-toxic gases
MFAG-No	: 122

Air transport

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

SECTION 15: Regulatory information

15.1. US Federal regulations

Nitrogen trifluoride (7783-54-2)

Listed on the United States TSCA (Toxic Substances Control Act) inventory



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Nitrogen trifluoride (7783-54-2)

All components of this product are listed on the Toxic Substances Control Act (TSCA) inventory.

15.2. International regulations

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 KECL/KECI (Korean Existing Chemicals Inventory)
Listed on PICCS (Philippines Inventory of Chemicals and Chemical Substances)
Listed on the Canadian IDL (Ingredient Disclosure List)
Listed on INSQ (Mexican National Inventory of Chemical Substances)
Listed on the TCSI (Taiwan Chemical Substance Inventory)

15.3. US State regulations

Nitrogen trifluoride(7783-54-2)

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
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) List

California Proposition 65 - This product does not contain any substances known to the state of California to cause cancer, developmental and/or reproductive harm



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SECTION 16: Other information

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.

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

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NFPA health hazard

: 1 - Materials that, under emergency conditions, can cause significant irritation.

NFPA fire hazard

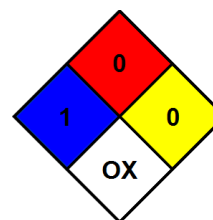
: 0 - Materials that will not burn under typical fire conditions, including intrinsically noncombustible materials such as concrete, stone, and sand.

NFPA instability

: 0 - Material that in themselves are normally stable, even under fire conditions.

NFPA specific hazard

: OX - Materials that posses oxidizing properties.



SDS US (GHS HazCom 2012) - Linde 2022

This information is based on our current knowledge and is intended to describe the product for the purposes of health, safety and environmental requirements only. It should not therefore be construed as guaranteeing any specific property of the product.