Section 1 - PRODUCT AND COMPANY IDENTIFICATION

Material Name
NITROGEN TRIFLUORIDE

Synonyms
MTG MSDS 146; NITROGEN FLUORIDE (NF3); PERFLUOROAMMONIA; TRIFLUORAMINE; TRIFLUORAMMONIA; TRIFLUORAMMONIA; UN 2451; F3N;

Product Description
Classification determined in accordance with Compressed Gas Association standards.

Product Use
Industrial and Specialty Gas Applications.

Restrictions on Use
None known.

Details of the supplier of the safety data sheet
MATHESON TRI-GAS, INC.
150 Allen Road, Suite 302
Basking Ridge, NJ 07920
General Information: 1-800-416-2505
Emergency #: 1-800-424-9300 (CHEMTREC)
Outside the US: 703-527-3887 (Call collect)

Section 2 - HAZARDS IDENTIFICATION

Classification in accordance with paragraph (d) of 29 CFR 1910.1200.
Oxidizing Gases - Category 1
Gases Under Pressure - Liquefied gas
Acute Toxicity - Inhalation - Gas - Category 4
Specific target organ toxicity - Repeated exposure - Category 2 (kidney, liver, central nervous system)
Simple Asphyxiants

GHS Label Elements
Symbol(s)

Signal Word
Danger

Hazard Statement(s)
May cause or intensify fire; oxidizer.
Contains gas under pressure; may explode if heated.
Harmful if inhaled.
May cause damage to organs through prolonged or repeated exposure.
May displace oxygen and cause rapid suffocation.

Precautionary Statement(s)
Prevention
Keep valves and fittings free from oil and grease.
Keep/Store away from clothing/combustible materials.
Use only outdoors or in a well-ventilated area.
Do not breathe dust/fume/gas/mist/vapors/spray.
Response
In case of fire: stop leak if safe to do so.
IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER or doctor if you feel unwell.
Storage
Protect from sunlight. Store in a well-ventilated place.
Disposal
Dispose in accordance with all applicable regulations.
Other Hazards
Rapid release of compressed gas may cause frostbite. Contact with combustible material may cause fire.

Section 3 - COMPOSITION / INFORMATION ON INGREDIENTS

<table>
<thead>
<tr>
<th>CAS</th>
<th>Component Name</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>7783-54-2</td>
<td>NITROGEN TRIFLUORIDE</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Section 4 - FIRST AID MEASURES

Inhalation
Remove person to fresh air and keep comfortable for breathing. Give artificial respiration if not breathing. If breathing is difficult, oxygen should be administered by qualified personnel. Get immediate medical attention.

Skin
If frostbite or freezing occur, immediately flush with plenty of lukewarm water (105-115°F; 41-46°C). DO NOT USE HOT WATER. If warm water is not available, gently wrap affected parts in blankets. Remove contaminated clothing, jewelry, and shoes immediately. In case of frostbite, wash with plenty of water; do not remove clothing. Get immediate medical attention.

Eyes
Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Then get immediate medical attention.

Ingestion
If swallowed, get medical attention.

Most Important Symptoms/Effects
Acute
Frostbite, nausea, vomiting, irritation (possibly severe), irregular heartbeat, difficulty breathing, headache, dizziness, convolution, coma.

Delayed
Frostbite, nausea, vomiting, tooth discoloration, difficulty breathing, irregular heartbeat, headache, drowsiness, dizziness, loss of coordination, bluish skin color, bone disorders, convulsions, coma.

Note to Physicians
For inhalation, consider oxygen. Antidote: methylene blue, intravenous; ascorbic acid, intravenous. However, the decision to administer any antidote and the actual dose administered should be determined only by qualified medical personnel.

Section 5 - FIRE FIGHTING MEASURES

Extinguishing Media
Suitable Extinguishing Media
Small fires: carbon dioxide. Large fires: Use regular foam or flood with fine water spray.

Unsuitable Extinguishing Media
Do not direct water at source of leak or safety devices; icing may occur.

Special Hazards Arising from the Chemical
Safety Data Sheet

Material Name: NITROGEN TRIFLUORIDE

Pressurized containers may rupture or explode if exposed to sufficient heat. Combustion-supporting.

**Hazardous Combustion Products**
oxides of nitrogen, fluorides.

**Fire Fighting Measures**
Use extinguishing agents appropriate for surrounding fire. Move container from fire area if it can be done without risk. Stay away from the ends of tanks. Withdraw immediately in case of rising sound from venting safety device or any discoloration of tanks due to fire. For tank, rail car or tank truck, evacuation radius: 800 meters (1/2 mile). Avoid inhalation of material or combustion by-products. Stay upwind and keep out of low areas. Consider downwind evacuation if material is leaking. Do not direct water at source of leak or safety devices; icing may occur. Cool containers with water from unmanned hose holder or monitor nozzles until well after fire is out.

**Special Protective Equipment and Precautions for Firefighters**
Wear personal protective clothing and equipment such as self-contained breathing apparatus (SCBA) for protection against possible exposure.

---

**Section 6 - ACCIDENTAL RELEASE MEASURES**

**Personal Precautions, Protective Equipment and Emergency Procedures**
Wear personal protective clothing and equipment, see Section 8.

**Methods and Materials for Containment and Cleaning Up**
Stop leak if possible without personal risk. Do not touch or walk through spilled material. Keep unnecessary people away, isolate hazard area and deny entry. Stay upwind and keep out of low areas. For tank, rail car or tank truck: Consider initial downwind evacuation for 800 m in all directions. Ventilate closed spaces before entering.

**Environmental Precautions**
Avoid release to the environment.

---

**Section 7 - HANDLING AND STORAGE**

**Precautions for Safe Handling**
Use only outdoors or in a well-ventilated area. Wear protective eye/face protection. Do not breathe dust/fume/gas/mist/vapors/spray. Do not eat, drink or smoke when using this product. Wash thoroughly after handling. Subject to handling regulations: U.S. OSHA 29 CFR 1910.119.

**Conditions for Safe Storage, Including any Incompatibilities**

**Incompatible Materials**
combustible materials, bases, reducing agents, metals.

---

**Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION**

<table>
<thead>
<tr>
<th>Component Exposure Limits</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>NITROGEN TRIFLUORIDE</strong></td>
</tr>
<tr>
<td>ACGIH:</td>
</tr>
<tr>
<td>NIOSH:</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>OSHA (US):</td>
</tr>
</tbody>
</table>
Safety Data Sheet

Material Name: NITROGEN TRIFLUORIDE  
SDS ID: MAT16650

Mexico: 10 ppm TWA [VLE-PPT ]; 30 mg/m3 TWA [VLE-PPT ]

ACGIH - Threshold Limit Values - Biological Exposure Indices (BEI)
NITROGEN TRIFLUORIDE (7783-54-2)
1.5 % of hemoglobin  
Medium: blood  
Time: during or end of shift  
Parameter: Methemoglobin (background, nonspecific, semi-quantitative )

Engineering Controls
Provide local exhaust ventilation system. Ensure compliance with applicable exposure limits.

Individual Protection Measures, such as Personal Protective Equipment

Eye/face protection
For the gas: Eye protection not required, but recommended. For the liquid: Wear splash resistant safety goggles. Contact lenses should not be worn. Provide an emergency eye wash fountain and quick drench shower in the immediate work area.

Skin Protection
For the gas: Protective clothing is not required, but recommended. For the liquid: Wear appropriate protective, cold insulating clothing.

Respiratory Protection
The following respirators and maximum use concentrations are drawn from NIOSH and/or OSHA. Up to 100ppm: Any air-purifying half-mask respirator equipped with cartridge(s) providing protection against the compound of concern. Any supplied-air respirator. Up to 250ppm: Any supplied-air respirator operated in a continuous-flow mode. Any powered, air-purifying respirator with cartridge(s) providing protection against this substance. Up to 500ppm: Any air-purifying respirator with a full facepiece and a canister providing protection against this substance. Any air-purifying full-facepiece respirator (gas mask) with a chin-style, front-mounted or back-mounted canister providing protection against the compound of concern. Any powered, air-purifying respirator with a tight-fitting facepiece and cartridge(s) providing protection against this substance. Any supplied-air respirator with a tight-fitting facepiece that is operated in a continuous-flow mode. Any self-contained breathing apparatus with a full facepiece.

Glove Recommendations
For the gas: Protective gloves are not required, but recommended. For the liquid: Wear insulated gloves.

### Section 9 - PHYSICAL AND CHEMICAL PROPERTIES

<table>
<thead>
<tr>
<th>Appearance</th>
<th>colorless gas</th>
<th>Physical State</th>
<th>gas</th>
</tr>
</thead>
<tbody>
<tr>
<td>Odor</td>
<td>damp, moldy odor</td>
<td>Color</td>
<td>colorless</td>
</tr>
<tr>
<td>Odor Threshold</td>
<td>Not available</td>
<td>pH</td>
<td>Not available</td>
</tr>
<tr>
<td>Melting Point</td>
<td>-217 - -207 °C (-359 - -341 °F )</td>
<td>Boiling Point</td>
<td>-129 - -120 °C (-200 - -184 °F )</td>
</tr>
<tr>
<td>Boiling Point Range</td>
<td>Not available</td>
<td>Freezing point</td>
<td>Not available</td>
</tr>
<tr>
<td>Property</td>
<td>Value</td>
<td></td>
<td></td>
</tr>
<tr>
<td>----------------------------------</td>
<td>---------------------------------------------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Evaporation Rate</td>
<td>Not available</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flammability (solid, gas)</td>
<td>Non-flammable</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Autoignition Temperature</td>
<td>Not available</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flash Point</td>
<td>Not available</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lower Explosive Limit</td>
<td>Not available</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Decomposition temperature</td>
<td>Not available</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Upper Explosive Limit</td>
<td>Not available</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vapor Pressure</td>
<td>1500 mmHg @ -119 °C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vapor Density (air=1)</td>
<td>2.46</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Specific Gravity (water=1)</td>
<td>Not available</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Water Solubility (Slightly soluble)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Partition coefficient: n-octanol/water</td>
<td>Not available</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Viscosity</td>
<td>0.018 cp</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kinematic viscosity</td>
<td>Not available</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Solubility (Other)</td>
<td>Not available</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Density</td>
<td>2.96 g/L at 20 °C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physical Form</td>
<td>Liquified gas</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Molecular Weight</td>
<td>71</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Section 10 - STABILITY AND REACTIVITY**

**Reactivity**
Has strong oxidizing properties.

**Chemical Stability**
Stable at normal temperatures and pressure.

**Possibility of Hazardous Reactions**
Will not polymerize.

**Conditions to Avoid**
Protect from physical damage and heat. Containers may rupture or explode if exposed to heat. Minimize contact with material. Avoid inhalation of material or combustion by-products.

**Incompatible Materials**
combustible materials, bases, reducing agents, metals

**Hazardous decomposition products**
halogenated compounds

**Section 11 - TOXICOLOGICAL INFORMATION**

**Information on Likely Routes of Exposure**

**Inhalation**
Frostbite; irritation (possibly severe), nausea, vomiting, difficulty breathing, asthma, irregular heartbeat, headache, drowsiness, dizziness, bluish skin color, lung congestion, convulsions, coma, death.

**Skin Contact**
Frostbite, blisters

**Eye Contact**
Frostbite, irritation (possibly severe).

**Ingestion**
Ingestion of a gas in unlikely.

**Acute and Chronic Toxicity**
Material Name: NITROGEN TRIFLUORIDE

Gas mixture inhalation acute toxicity determined according to Compressed Gas Association Standard P-20.

Component Analysis - LD50/LC50
The components of this material have been reviewed in various sources and the following selected endpoints are published:

NITROGEN TRIFLUORIDE (7783-54-2)
Inhalation LC50 Rat 6700 ppm 1 h

Product Toxicity Data
Acute Toxicity Estimate
No data available.

Immediate Effects
Frostbite, irritation (possibly severe): nausea, vomiting, difficulty breathing, headache, drowsiness, dizziness, loss of coordination, convulsions, coma, death.

Delayed Effects
Same effects as detailed in acute exposure may occur.

Irritation/Corrosivity Data
May cause irritation.

Respiratory Sensitization
No data available.

Dermal Sensitization
No data available.

Component Carcinogenicity

<table>
<thead>
<tr>
<th>Component</th>
<th>ACGIH</th>
</tr>
</thead>
<tbody>
<tr>
<td>NITROGEN TRIFLUORIDE</td>
<td>7783-54-2</td>
</tr>
<tr>
<td>ACGIH</td>
<td>A4 - Not Classifiable as a Human Carcinogen (related to Fluorides)</td>
</tr>
</tbody>
</table>

Germ Cell Mutagenicity
No data available.

Tumorigenic Data
No data available.

Reproductive Toxicity
No data available.

Specific Target Organ Toxicity - Single Exposure
No target organs identified.

Specific Target Organ Toxicity - Repeated Exposure
kidney; liver, central nervous system

Aspiration hazard
Not applicable.

Medical Conditions Aggravated by Exposure
No data available.

Section 12 - ECOLOGICAL INFORMATION

Ecotoxicity
Avoid release to the environment.

Component Analysis - Aquatic Toxicity
No LOLI ecotoxicity data are available for this product's components.

Persistence and Degradability
No data available.

Bioaccumulative Potential
No data available.
Section 13 - DISPOSAL CONSIDERATIONS

Disposal Methods
Dispose in accordance with all applicable regulations. Subject to disposal regulations: U.S. EPA 40 CFR 262.

Component Waste Numbers
The U.S. EPA has not published waste numbers for this product’s components.

Section 14 - TRANSPORT INFORMATION

US DOT Information:
Shipping Name: NITROGEN TRIFLUORIDE
Hazard Class: 2.2
UN/NA #: UN2451
Required Label(s): 2.2 5.1

IMDG Information:
Shipping Name: NITROGEN TRIFLUORIDE
Hazard Class: 2.2
UN#: UN2451
Required Label(s): 2.2 5.1

International Bulk Chemical Code
This material does not contain any chemicals required by the IBC Code to be identified as dangerous chemicals in bulk.

Section 15 - REGULATORY INFORMATION

U.S. Federal Regulations
This material contains one or more of the following chemicals required to be identified under SARA Section 302 (40 CFR 355 Appendix A), SARA Section 313 (40 CFR 372.65), CERCLA (40 CFR 302.4), TSCA 12(b), and/or require an OSHA process safety plan.

<table>
<thead>
<tr>
<th>NITROGEN TRIFLUORIDE</th>
<th>7783-54-2</th>
</tr>
</thead>
<tbody>
<tr>
<td>OSHA (safety):</td>
<td>5000 lb TQ</td>
</tr>
</tbody>
</table>

SARA Section 311/312 (40 CFR 370 Subparts B and C) reporting categories
Gas Under Pressure; Oxidizer; Acute toxicity; Specific Target Organ Toxicity; Simple Asphyxiant

U.S. State Regulations
The following components appear on one or more of the following state hazardous substances lists:

<table>
<thead>
<tr>
<th>Component</th>
<th>CAS</th>
<th>CA</th>
<th>MA</th>
<th>MN</th>
<th>NJ</th>
<th>PA</th>
</tr>
</thead>
<tbody>
<tr>
<td>NITROGEN TRIFLUORIDE</td>
<td>7783-54-2</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

California Safe Drinking Water and Toxic Enforcement Act (Proposition 65)
Not listed under California Proposition 65.

Component Analysis - Inventory
NITROGEN TRIFLUORIDE (7783-54-2)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>DSL No</td>
<td>Yes</td>
<td>EIN</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td></td>
</tr>
</tbody>
</table>
Safety Data Sheet

Material Name: NITROGEN TRIFLUORIDE

Section 16 - OTHER INFORMATION

NFPA Ratings
Health: 2 Fire: 0 Instability: 0 Other:
Hazard Scale: 0 = Minimal 1 = Slight 2 = Moderate 3 = Serious 4 = Severe

Summary of Changes
Updated: 02/26/2016

Key / Legend
ACGIH - American Conference of Governmental Industrial Hygienists; ADR - European Road Transport; AU - Australia; BOD - Biochemical Oxygen Demand; C - Celsius; CA - Canada; CA/MA/MN/NJ/PA - California/Massachusetts/Minnesota/New Jersey/Pennsylvania*; CAS - Chemical Abstracts Service; CERCLA - Comprehensive Environmental Response, Compensation, and Liability Act; CFR - Code of Federal Regulations (US); CLP - Classification, Labelling, and Packaging; CN - China; CPR - Controlled Products Regulations; DFG - Deutsche Forschungsgemeinschaft; DOT - Department of Transportation; DSD - Dangerous Substance Directive; DSL - Domestic Substances List; EC – European Commission; EEC - European Economic Community; EINECS - European Inventory of Existing Commercial Chemical Substances; ENCS - Japan Existing and New Chemical Substance Inventory; EPA - Environmental Protection Agency; EU - European Union; F - Fahrenheit; F - Background (for Venezuela Biological Exposure Indices); IARC - International Agency for Research on Cancer; IATA - International Air Transport Association; ICAO - International Civil Aviation Organization; IDL - Ingredient Disclosure List; IDLH - Immediately Dangerous to Life and Health; IMDG - International Maritime Dangerous Goods; ISHL - Japan Industrial Safety and Health Law; IUCLID - International Uniform Chemical Information Database; JP - Japan; Kow - Octanol/water partition coefficient; KR KECl Annex 1 - Korea Existing Chemical Inventory (KECl) / Korea Existing Chemicals List (KECl); KR KECl Annex 2 - Korea Existing Chemicals Inventory (KECl) / Korea Existing Chemicals List (KECl); KR - Korea; LD50/LC50 - Lethal Dose/ Lethal Concentration; KR REACH CCA - Korea Registration and Evaluation of Chemical Substances Chemical Control Act; LEL - Lower Explosive Limit; LLV - Level Limit Value; LOHI - List Of Lists™ - ChemADVISOR’s Regulatory Database; MAK - Maximum Concentration Value in the Workplace; MEL - Maximum Exposure Limits; MX – Mexico; NE - Non-specific; NFPA - National Fire Protection Agency; NIOSH - National Institute for Occupational Safety and Health; NJTSR - New Jersey Trade Secret Registry; Nq - Non-quantitative; NSL – Non-Domestic Substance List (Canada); NTP - National Toxicology Program; NZ - New Zealand; OSHA - Occupational Safety and Health Administration; PEL - Permissible Exposure Limit; PH - Philippines; RCRA - Resource Conservation and Recovery Act; REACH- Registration, Evaluation, Authorisation, and restriction of Chemicals; RID - European Rail Transport; SARA - Superfund Amendments and Reauthorization Act; Sc - Semi-quantitative; STEL - Short-term Exposure Limit; TCCA – Korea Toxic Chemicals Control Act; TDG - Transportation of Dangerous Goods; TH-TECI - Thailand - FDA Existing Chemicals Inventory (TECl); TLV - Threshold Limit Value; TSCA - Toxic Substances Control Act; TW – Taiwan; TWA - Time Weighted Average; UEL - Upper Explosive Limit; UN/NA - United Nations /North American; US - United States; VLE - Exposure Limit Value (Mexico); VN (Draft) - Vietnam (Draft); WHMIS - Workplace Hazardous Materials Information System (Canada).

Other Information
Disclaimer:
Matheson Tri-Gas, Inc. makes no express or implied warranties, guarantees or representations regarding the product or the information herein, including but not limited to any implied warranty or merchantability or fitness for use. Matheson Tri-Gas, Inc. shall not be liable for any personal injury, property or other damages of any nature, whether
compensatory, consequential, exemplary, or otherwise, resulting from any publication, use or reliance upon the information herein.