



8210 N. Austin Avenue, Morton Grove, IL 60053-0519, U.S.A.
 847-967-6000 800-323-8144
 (Monday - Friday: 7:30 a.m. - 4:00 p.m. CST)

Emergency Contact:
 INFOTRAC 800-535-5053 [U.S.A.]

Name: MSTFA
 Code: 270589, 270590, 270591, 270592, 270593, 270594

..... **MATERIAL SAFETY DATA SHEET**

SECTION 1 PRODUCT IDENTIFICATION

Name: N-Methyltrimethylsilyltrifluoroacetamide
 Code: 270589, 270590, 270591, 270592, 270593, 270594

SECTION 2 COMPOSITION, INFORMATION ON INGREDIENTS

Synonyms

MSTFA; N-Methyl-N-(trimethylsilyl)trifluoroacetamide; 2,2,2-trifluoro-N-methyl-N-(trimethylsilyl)acetamide

CAS #: 24589-78-4

MF: C₆H₁₂F₃NOSi

Ingredients

Concentration (%)

MSTFA (24589-78-4)	NLT	96.0%
Manufacturing Impurities	NMT	4.0%

SECTION 3 HAZARDS IDENTIFICATION.....

Precautionary Statements
 Flammable Liquid

See Sections 8 and 11 for further details.

Emergency Overview

NFPA Ratings (Scale 0-4); Health = 2; Fire = 3; Reactivity = 1 ~~W~~;

Liquid: Clear, colorless to pale yellow with a mild, unpleasant odor
 Highly flammable and corrosive liquid and vapor. May cause flash fire. Keep away from ignition sources. Static electricity may accumulate and ignite vapors. Protect from static electricity. May be difficult to extinguish--re-ignition may occur.
 Reacts violently with water--contact with water or moist air may liberate hydrogen fluoride gas which in contact with metal can generate flammable/explosive hydrogen gas.
The properties of this material have not been fully investigated. Use due caution in handling and use of this material.
 Vapor may be severely irritating to eyes, mucous membranes, and upper respiratory tract due to the possible formation of corrosive hydrofluoric acid when MSTFA reacts with the water in the human tissues. Harmful if inhaled or swallowed.
Emits toxic fumes under fire conditions—potential chemical or thermal decomposition products: carbon monoxide, carbon dioxide, silicon oxides, nitrogen oxides, and hydrogen fluoride, hexamethyldisiloxane, trifluoroacetamide
Standard chemical handling precautions: Avoid ingestion or breathing vapors or mists. Avoid contact with eyes, skin, and clothing. Wash thoroughly after handling.
Target organs: eyes, skin, mucous membranes, respiratory system, immune system.

See Sections 4, 5, 6, 8, 9, and 10.

Other Hazard Information

This compound has not fully been tested for toxicological, irritation, or similar tendencies.

Primary Route(s) of Entry: Eye or Skin contact, Inhalation

Corrosive hydrofluoric acid (strong acid) may be formed when MSTFA reacts with the water in the skin, eyes, and mucous membranes; Hydrofluoric acid is destructive to skin, eye, and mucous membranes.

Eye: Can cause severe irritation and possible dryness. Severe conjunctivitis and corneal damage may be possible.

Skin: Can cause moderate irritation and possible dryness. Prolonged or repeated skin contact may

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cause dermatitis with possible symptoms delayed for several hours. Prompt and thorough washing with soap and water will minimize or eliminate potential dermal effects.

Inhalation: Can cause irritation to mucous membranes and upper respiratory system. May be harmful or fatal if inhaled in large quantities due to spasm, inflammation and edema of the larynx and bronchi, chemical pneumonitis and pulmonary edema.

Ingestion: May cause irritation. May be harmful.

Acute: See above route.

Chronic: See above route. Decreased immune response has been reported in test animals.

Target Organs: eyes, skin, mucous membranes, respiratory system, immune system.

Pre-existing conditions that may be aggravated: respiratory, skin, or eye conditions.

Symptoms: Results of overexposure may include irritation, burning sensation, coughing, wheezing, laryngitis, shortness of breath, headache, nausea, vomiting and/or dizziness and/or suffocation.

See Section 11 for additional toxicological data.

SECTION 4 FIRST AID MEASURES.....

Eye contact: Immediately flush eyes with copious amounts of water or eyewash solution for at least 15 minutes; lift eyelids occasionally. If irritation persists, consult physician.

Skin contact: Immediately remove contaminated clothing and shoes, then wash skin with soap and copious amounts of water. If irritation persists, consult physician.

Inhalation: Remove to fresh air. If not breathing, give artificial respiration and keep person warm and at rest. If breathing is difficult, give oxygen; consult physician.

Ingestion: Wash out mouth with water provided person is conscious; consult physician, and give 2-4 cupfuls of milk or water; DO NOT induce vomiting without first consulting physician.

Wash contaminated clothing before reuse.

Physician note: Symptomatic and supportive care. No specific antidote, however can be treated same as hydrofluoric acid exposure. Treatment based on physician judgment in response to reactions of the patient.

SECTION 5 FIRE FIGHTING MEASURES.....

Flash Point: 73°F; 22.7°C *Method:* tcc *Flammable Limits:* upper: NE
 lower: 1.2 %

OSHA Flammability Class: IC *Autoignition:* NE

NFPA: See Section 3 **Hazards Identification Emergency Overview** above.

Extinguishing Media

Medium expansion (>30 :1) AFFF alcohol compatible foam, carbon dioxide, dry chemical powder, dry sand. Water may be effective for cooling, but may not effect extinguishment.

Special or Standard Fire Fighting Procedures

Wear self-contained breathing apparatus (SCBA) and protective clothing to prevent contact with skin and eyes should be worn in fighting large fires involving chemicals.

Evacuate unnecessary people from area. Isolate area and restrict entry.

Halogenated silane fires may be difficult to extinguish by conventional methods, as they may re-ignite. Do not put water directly on the fire due to violent reaction. Water may be used to knock down corrosive vapor cloud down wind of fire and to keep fire exposed containers cool.

Apply medium expansion (>30 :1) AFFF alcohol compatible foam. Application of foam may initially produce significant evolution of corrosive hydrofluoric acid vapors. The vapors will be reduced when uniform blanketing is achieved.

Do not allow extinguishing media to enter container.

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Unusual Fire and Explosion Hazards

- Flammable Liquid.
- Vapor-air mixtures may be explosive above flash point.
- Static electricity will accumulate and may ignite vapors. Use bonding and grounding or inert gas blanketing.
- Fire releases dense, irritating, and corrosive hydrogen fluoride fumes.
- Fluorosilanes can react vigorously with water.
- Do not put water directly on the fire. In some situations, it may be better to let the fire burn until expert assistance is obtained.
- Material may re-ignite after fire is extinguished. A fire guard should be posted during any clean up operation.
- Exposure to oxidizers or acids could start or accelerate fire conditions.
- Container explosion may occur under fire conditions.

Hazardous Combustion or Decomposition Products

May emit carbon monoxide, carbon dioxide, silicon oxides, nitrogen oxides, hydrogen fluoride, hexamethyldisiloxane (flammable), trifluoroacetamide; *May decompose on contact with water.*

SECTION 6 ACCIDENTAL RELEASE MEASURES

- Eliminate all ignition sources.
- Evacuate unnecessary people from area. Isolate spilled material.
- Ventilate area.
- Wear protective clothing to prevent contact with skin and eyes (lab coat, gloves, safety glasses).
- Wear NIOSH/MSHA approved respirator for organic/acid gas, dust, and mists to prevent inhalation.
- Use spark proof tools.
- A fire guard should be posted during any clean up operation.
- Special Note:* AFFF alcohol compatible foam may be applied as a fire prevention measure. If used, follow the instructions and precautions listed in Section 5 above and skip the following neutralization step.
- Neutralize with sodium bicarbonate or other suitable neutralizing agent.
- If neat or in solution, mix with sand or similar inert adsorbent material.
- Sweep up, seal in appropriate hazardous waste container, and hold for proper waste disposal.
- Wash spill site after material pickup is complete.
- Do not allow material to enter drains or water courses.

SECTION 7 HANDLING AND STORAGE

General Handling Measures

- Ground and bond containers or use inert gas purge when transferring or handling material.
- Use spark proof tools and explosion proof equipment.
- Empty containers retain product residue, (liquid/vapor), and can be dangerous.
- See Section 8 Below.

Special Storage or Instructions

Store in tinted glass bottle under nitrogen.

Special Handling Instructions

- Contact with water or moist air generates highly toxic and corrosive hydrogen fluoride gas, which in contact with metal may produce flammable or explosive hydrogen gas.
- Handle under nitrogen.
- Protect from moisture.
- Do not inhale vapors.

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SECTION 8 EXPOSURE CONTROLS, PERSONAL PROTECTION

Airborne Exposure Limits		TWA (8H)		STEL		Ceiling Limit		Ceiling (skin)	
		ppm	mg/m ³	ppm	mg/m ³	ppm	mg/m ³	ppm	mg/m ³
MSTFA 24589-78-4	OSHA PEL/VPEL	NE	NE	NE	NE	NE	NE	NE	NE
	ACGIH - TLV	NE	NE	NE	NE	NE	NE	NE	NE
Hydrogen Fluoride* 7664-39-3	OSHA PEL/VPEL	NE	NE	NE	NE	NE	NE	NE	NE
	ACGIH - TLV	3	2	6	NE	3	2.3	NE	NE

* Hydrogen fluoride may be formed on contact with humid air or water.

Special/Other Control Measures

Odor threshold: NE

Personal Protective Equipment (PPE)

Chemical safety eyewear

Compatible chemical-resistant gloves: Rubber (e.g., natural rubber, neoprene, nitrile, or equivalent), Silver Shield®, Viton®, or 4H®

NIOSH/MSHA approved respirator for organic/acid gas, dust, and mists.

Protective Clothing (e.g., lab coat)

Other Standard Safety Equipment and Engineering Preventive Measures

Safety shower and eye wash

Mechanical exhaust required. Hood recommended.

Fume scrubber.

General Precautions and Handling Measures

Avoid ingestion, inhalation, contact with eyes, skin, and clothing and prolonged or repeated exposure.

Wash thoroughly after handling. Discard contaminated footwear.

SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES.....

Chemical Family: halogenated silyl acetamide

Use: Silylation Reagent for GC

Appearance, Odor, and Other Properties

Appearance:	clear, colorless to pale yellow liquid	Odor:	mild unpleasant odor
MP:	<32°F (<0°C)	bp (1atm):	265-269°F (130-132°C)
Water Reactive:	yes--readily hydrolyzes	Solubility in Water:	not soluble
FW:	199.25	Specific Gravity (H₂O = 1.0):	1.075
VP (mmHg):	8.8 (27°C)	Vapor Density (air=1):	6.87
% Volatiles:	<3%	Evap. Rate (BuAc = 1.0):	NE
pH:	NE	Refractive Index (n_D²⁰ =):	1.3802
Solubility in Organic Solvents: NE			

SECTION 10 STABILITY AND REACTIVITY

Stability

Stable if stored under nitrogen and protected from moisture.

Reacts with water or moist air and may generate highly toxic and corrosive hydrogen fluoride gas, which in contact with metal may produce flammable or explosive hydrogen gas.

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Incompatibilities

- Strong Oxidizers. Fire/explosion hazard.
- Strong Acids
- Alcohols, peroxides, alkalis, and compounds with liable or active hydrogen
- Heat--degrades at temperatures above 80°C.
- May decompose upon exposure to moist air or water.

Precautions

- Avoid incompatibilities.
- Protect from heat and ignition sources.
- Keep out of water supplies and sewers.

Hazardous Combustion or Decomposition Products

May emit carbon monoxide, carbon dioxide, silicon oxides, nitrogen oxides, hydrogen fluoride, hexamethyldisiloxane, trifluoroacetamide

Hazardous Polymerization

None

SECTION 11 TOXICOLOGICAL INFORMATION

To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

RTECS #

CAS #

AC9800000	MSTFA	24589-78-4
HO1575000	Hydrogen Fluoride*	7664-39-3

Only selected Registry of Toxic Effects of Chemical Substances data (RTECS) is presented here. See actual entry in RTECS for complete information.

**For reference only--Not expected to be present in compound. If so, then in trace quantities, only. Hydrogen fluoride may be formed on contact with humid air or water.*

Irritation Data

	eye	skin
MSTFA	NDA	NDA
Hydrogen Fluoride*	eye hum 50 mg sev	NDA

**For reference only--Not expected to be present in compound. If so, then in trace quantities, only. Hydrogen fluoride may be formed on contact with humid air or water.*

Toxicity Data

	oral	inhalation	dermal or other
MSTFA	NDA	NDA	ipr mus LDLo 1 g/kg
Hydrogen Fluoride*	orl man TDLo 143mg/kg	hl man TCLo 100 mg/m3/1M; ihl hmn LCLo 50ppm/30M; ihl rat LC50 1276ppm/1H	skn mus LDLo 500mg/kg

**For reference only--Not expected to be present in compound. If so, then in trace quantities, only. Hydrogen fluoride may be formed on contact with humid air or water.*

Carcinogenicity

	OSHA	IARC	NTP	ACGIH	NIOSH	Notes
MSTFA	NL	NL	NL	NL	NL	None
Hydrogen Fluoride*	NL	NL	NL	NL	NL	None

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Teratogenicity and Reproductive Effects

No data available.

Neurotoxicity

No data available.

Mutagenicity

No data available.

Miscellaneous

Tests with experimental animals reported decreased immune response. A hydrolysis related product, acetamide (CAS 60-35-5 RTECS AB4025000), is a cancer suspect agent, neoplastigen, and a teratogen.

Symptoms, Acute and Chronic Effects

See specific route responses in Section 3 **Hazards Identification** above.

SECTION 12 ECOLOGICAL INFORMATION.....

Ecotoxicity:

MSTFA: No data available.

Keep out of water supplies and sewers. Prevent any contamination of underground water. Hydrolyses to hexamethyldisiloxane.

Environmental Fate

No data available.

Standard Chemical Precautions

Keep out of air, water, and soil

SECTION 13 DISPOSAL CONSIDERATIONS

That which cannot be recovered or recycled, should be disposed of in accordance with all applicable Federal, State, and local environmental regulations.

RCRA waste code(s): D001

RCRA Hazard Class (40CFR 261): Ignitable

SECTION 14 TRANSPORT INFORMATION.....

Ship in accordance with all applicable local, State, Federal, and International transportation regulations.

The following is a summary only. Check regulations for complete information:

U. S. Department of Transportation (49CFR171.101)

Shipping Name: Flammable Liquids, n.o.s., (N-Methyltrimethylsilyltrifluoroacetamide)

ID Number: UN 1993

Hazard Class or Division: 3 - Flammable liquid

Packing Group: PG II

(Small quantity provisions (49CFR173.4) apply depending upon the amount being shipped.)

SECTION 15 REGULATORY INFORMATION

Reviews, Standards, and Regulations

..... MSTFA

..... 24589-78-4

TSCA:..... Y*

*EPA TSCA Section 8(b) chemical inventory. This compound is sold strictly for research and development use.

EINECS:..... Y

Number.....246-331-6

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..... MSTFA
 24589-78-4
 State Lists:..... NL
 States..... NL on CA, FL, MA, MN, NJ, PA
 CA No Significant Risk Level..... NL
 OSHA Process Safety [29 CFR 1910.119]:..... NL
 Clean Air Act
 [Section 112r (40 CFR 68)]:..... NL
 TQ (lbs)..... NA
 Contains Ozone Depleters (Class I or Class II)..... NL
 Clean Air Act [Section 103 (40 CFR 302.4)]:..... NL
 CERCLA [Section 103 (40 CFR 302.4)]:..... NL
 RQ (lbs)..... NA
 RCRA Waste Code..... NA
 SARA Title III Notification [40 CFR 302.4]:
 Section 302/304 (EHS) Ingredient [40 CFR 355.3]..... NL
 TPQ (lbs)..... NA
 RQ (lbs)..... NA
 Section 313 Ingredient [40 CFR 372.65]..... NL

Hazard Classes

Sara Title III	Acute	Chronic	Fire	Pressure	Reactivity
	Y	Y	N	N	Y
NFPA	Health	Flammability	Reactivity	Special Hazards	
	2	3	0	W	
HMIS	3	3	0	Xi	

Risk Phrases:

Caution: The properties of this material have not been fully investigated.
 R10..... Flammable
 R35/36/37..... Irritating to eyes, skin, and respiratory system.

Safety Phrases:

S7/8/9..... Keep container tightly closed and dry.
 S9..... Keep container in a well-ventilated place.
 S16..... Keep away from sources of ignition--no smoking.
 S23..... Do not breathe vapors.
 S24/25..... Avoid contact with skin and eyes.
 S26..... In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
 S33..... Take precautionary measures against static discharges.
 S36/37/39..... Wear suitable protective clothing, gloves, and eye/face protection.

SECTION 16 OTHER INFORMATION

Miscellaneous

The health and toxicological hazards of this compound have not been fully investigated; therefore, this substance must be handled only by, or under close supervision of those qualified in the handling and use of potentially hazardous substances.

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This MSDS was revised as follows: (07/15/2004)

Section

- 1-16 Updated style font and heading.
 - 8 Updated Limits table format. Addition of CAS # for HF. Elimination of duplicated explanation of NE. Added discard contaminated footwear.
 - 11 Removed duplication of information already in Section 3. Added HF data to this section.
 - 14 Removed duplicate labeling information.
- Minor changes to the abbreviations in the footer and format. (done: 7/22/08)

1-16 Header, Footer Added catalog numbers addressed by this MSDS and minor spelling corrections. (done: 3/11/10)

Disclaimer

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Approved of by: M. Bryce-Fritts, CHMM

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