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## MATERIAL SAFETY DATA SHEET

<b>SECTION 1. PRODUCT IDENTIFICATION</b>
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<b>PRODUCT NAME:</b>	<b>Deoxo-Fluor™ Fluorinating Reagent</b>		
<b>CHEMICAL NAME:</b>	Bis-(2-methoxyethyl)aminosulfur trifluoride		
<b>FORMULA:</b>	C <sub>6</sub> H <sub>14</sub> O <sub>2</sub> F <sub>3</sub> NS		
<b>CA INDEX NAME:</b>	Sulfur, trifluoro[2-methoxy- <i>N</i> -(2-methoxyethyl)ethanaminato -κN] -, (T-4)		
<b>MANUFACTURER:</b>	<b>Air Products and Chemicals, Inc.</b> 7201 Hamilton Boulevard Allentown, PA 18195 -1501		
<b>PRODUCT INFORMATION:</b>	1-800-752-1597	or	www.airproducts.com
<b>MSDS NUMBER:</b>	1016	<b>REVISION:</b>	4
<b>REVIEW DATE:</b>	March 2003	<b>REVISION DATE:</b>	March 2003

<b>SECTION 2. COMPOSITION/INFORMATION ON INGREDIENTS</b>
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**CAS NUMBER:** 202289-38-1

**EXPOSURE LIMITS:**  
**OSHA:** Not established      **ACGIH:** Not established

Deoxo-Fluor™ Fluorinating Reagent reacts with water and with water vapor, generating hydrogen fluoride. ACGIH recommends a 3 ppm ceiling limit for hydrogen fluoride in air.

<b>SECTION 3. HAZARD IDENTIFICATION</b>
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### EMERGENCY OVERVIEW

Toxic, corrosive, water-reactive liquid. Direct skin or eye contact can cause severe burns. Harmful by inhalation and ingestion. Reacts violently with water, forming hydrogen fluoride. Keep away from moisture.

### EMERGENCY TELEPHONE NUMBERS

(800) 523-9374      in Continental U.S., Canada and Puerto Rico  
(610) 481-7711      other locations

### POTENTIAL HEALTH EFFECTS INFORMATION:

**EYE CONTACT:** Corrosive to the eyes.

**INGESTION:** Toxic if ingested.

**INHALATION:** Toxic if inhaled.

**SKIN CONTACT:** Corrosive to the skin.

**CARCINOGENICITY:** Unknown

## SECTION 4. FIRST AID

**Prompt medical attention is required in all cases of exposure to Deoxo -Fluor™ Fluorinating Reagent. Effects may be delayed.**

**EYE CONTACT:** While holding eyelids open, flush eyes with water until calcium gluconate solution is available. Seek medical treatment immediately. Trained personnel should administer 1% calcium gluconate solution by **continuous** drip.

**INGESTION:** Do not induce vomiting. Dilute acid by drinking water, several ounces of Milk of Magnesia, milk, Mylanta, or several vials of calcium gluconate. Gastric lavage with lime (calcium oxide) water may be performed by a physician.

**INHALATION:** Move exposed personnel to uncontaminated area. Seek prompt medical attention. If not breathing, give artificial respiration. Mouth to mouth resuscitation is not recommended. If breathing is difficult, give oxygen. Continue with administration of oxygen while waiting for medical attention. If airway obstruction occurs the placement of an artificial airway, by an emergency medical technician, may be necessary. Trained personnel should administer 2.5% calcium gluconate by nebulizer with patient in sitting position.

**SKIN CONTACT:** Flush with copious amounts of water until treatment is available. Remove contaminated clothing. With gloved hand apply 2.5% calcium gluconate gel to the burn area. An alternative treatment is immersion in an iced solution of 0.2% Hyamine 1622 (benzethonium chloride) or 0.13% Zephiran (benzalkonium chloride). If immersion is impractical, soaked compresses of the same solutions should be applied to the area. Immersion or compresses must be used continuously for two hours. Compresses should be changed every two minutes. Burns covering an area greater than eight square inches require immediate treatment by a physician. A physician should be consulted for all exposures.

**NOTE TO PHYSICIAN:** If pain persists after above topical treatments, it may be necessary to inject 5% aqueous calcium gluconate beneath, around and into the burn area. This will more likely be necessary in the treatment of extensive burns or small burns where treatment has been delayed.

The patients should be observed for clinical symptoms of hypocalcemia following ingestion or inhalation or following extensive burns. Serum calcium, potassium and magnesium determinations must be performed immediately and periodically to monitor for hypocalcemia and electrolyte imbalance. EKGs should be done immediately and periodically to monitor for arrhythmias, hypocalcemia and hyperkalemia.

If additional information is needed call the Air Products' emergency number (Section 3) or consult the Air Products' Safetygram 29 "Treatment Protocol for Hydrofluoric Acid Burns."

## SECTION 5. FIRE AND EXPLOSION

**FLASHPOINT:**

No flash observed up to 100 °C

**AUTOIGNITION:**

Unknown

**FLAMMABLE RANGE:**

Unknown

**EXTINGUISHING MEDIA:** Carbon Dioxide or dry chemical. **Do not use water.**

**HAZARDOUS COMBUSTION PRODUCTS** Hydrogen fluoride, sulfur oxides and organic amines.

**SPECIAL FIRE FIGHTING INSTRUCTIONS:** Wear self-contained breathing apparatus and protective clothing to prevent contact with skin and eyes.

**UNUSUAL FIRE AND EXPLOSION HAZARDS:** Combustion products are highly corrosive.

## SECTION 6. ACCIDENTAL RELEASE MEASURES

Evacuate the area. Wear self-contained breathing apparatus, splash suit, rubber boots, and heavy rubber gloves. **Do not use water.** Cover spill with dry powdered limestone (calcium carbonate), sand, or soda ash. Place in covered (not sealed) Teflon, Polypropylene or HDPE containers and transport outdoors. Neutralize material prior to disposal (see Section 13. Disposal Considerations). After material pickup is complete, ventilate area and wash spill site with a dilute caustic solution, such as bicarbonate.

## SECTION 7. HANDLING AND STORAGE

**STORAGE:** Product must be packaged and stored in a moisture free environment. Products should be isolated from the ambient air by using a dry, inert atmosphere, such as nitrogen or argon. Package container must be Teflon, Polypropylene, or HDPE.

**HANDLING:** Work in an inert, moisture free atmosphere, such as a glove box. When using heat baths with this material do not use silicone oil as the heat transfer fluid. Fluorinated oils or high boiling hydrocarbon oils make acceptable heat transfer fluids. Deoxo-Fluor reacts violently with silicone oil, which may result in a fire.

## SECTION 8. PERSONAL PROTECTION/EXPOSURE CONTROLS

### ENGINEERING CONTROLS:

**VENTILATION:** Use in a well ventilated area.

### RESPIRATORY PROTECTION:

**EMERGENCY USE:** Half-face respiration with acid gas cartridge during cleanup or Self Contained Breathing Apparatus (SCBA) during emergency situations.

**PROTECTIVE GLOVES:** Wear chemical resistant gloves and splash suit. Wash equipment after use.

**EYE PROTECTION:** Wear safety goggles and face shield (8 inch minimum).

## SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

**APPEARANCE, ODOR AND STATE:** Yellow to brown liquid at room temperature, which may fume slightly in moist air. Sharp acidic odor associated with the resulting formation of hydrogen fluoride.

**MOLECULAR WEIGHT:** 221.23

**BOILING POINT/Decomposition:**  $>72\text{ }^{\circ}\text{C}$  ( $162\text{ }^{\circ}\text{F}$ )

**SPECIFIC GRAVITY (WATER=1):** 1.2

**FREEZING POINT/MELTING POINT:** Unknown

**VAPOR PRESSURE (AT 20 °C):** Unknown

**SOLUBILITY:** Miscible with hexane, ethers, halogenated organics, toluene, and other common organic solvents. Note: Reacts violently with water.

## SECTION 10. STABILITY AND REACTIVITY

**CHEMICAL STABILITY:** Stable at room temperature in the absence of moisture. However, refrigeration to  $(0\text{ }^{\circ}\text{C}-4\text{ }^{\circ}\text{C})$  is recommended for long-term storage (over months).

**CONDITIONS TO AVOID:** Avoid contact with moisture. Avoid elevated temperatures. Pure Deoxo-Fluor has been shown to undergo decomposition, which may be rapid, when heated above  $100\text{ }^{\circ}\text{C}$  in a confined vessel.

**INCOMPATIBILITY (Materials to Avoid):** Water, aqueous acids, aqueous bases, silicone oil.

**REACTIVITY:** Reacts with alcohols, aldehydes, ketones and carboxylic acids. Reacts violently with water to form hydrogen fluoride. Reacts with silicone oil, which may result in a fire.

**A) HAZARDOUS DECOMPOSITION PRODUCTS:** Toxic gases: hydrogen fluoride, sulfur oxyfluorides and sulfur oxides.

**B) HAZARDOUS POLYMERIZATION:** Not known to occur.

### SECTION 11. TOXICOLOGICAL INFORMATION

The toxicological properties of this product have not been fully investigated.

**Single Dose Oral Toxicity in Rats/LD<sub>50</sub> in Rats:** LD<sub>50</sub> > 50, but < 200 mg/Kg of body weight.

**DOT Test for Skin Corrosivity:** Product is corrosive.

### SECTION 12. ECOLOGICAL INFORMATION

The ecological effects of this product have not been fully investigated.

### SECTION 13. DISPOSAL CONSIDERATIONS

**WASTE DISPOSAL METHOD:** Do not return unused product or empty containers to supplier. To the Deoxo-Fluor reagent or residues of the reagent in containers etc., that are to be disposed of, add acetonitrile to result in an approximately 20% by volume solution of the Deoxo Fluor reagent in acetonitrile. Externally cool the solution to about 0 °C and then slowly add small portions a 2 molar equivalent of methanol, with stirring. Neutralize the resulting solution by the addition of an aqueous sodium bicarbonate until carbon dioxide evolution ceases and the resulting mixture is neutral or slightly basic. The neutralization reaction is vigorous; proper precautions must be taken. Proper personal protective equipment (i.e., acid suit, rubber gloves, face shield) is required. Neutralization procedure must be done in an area with adequate forced ventilation. Empty containers should be rinsed with acetonitrile prior to disposal. The resulting neutralized product mixture and its containers should be disposed of in accordance with federal, state, and local regulations.

### SECTION 14. TRANSPORTATION

**SHIPPING NAME:** Corrosive liquids, water -reactive, n.o.s., [Bis -(2-methoxyethyl) aminosulfur trifluoride]

**HAZARD CLASS:** 8, 4.3

**IDENTIFICATION NUMBER:** UN3094

**SHIPPING LABEL(S):** Corrosive, Dangerous When Wet, Poison Inhalation Hazard

**PACKING GROUP:** Packing Group I

**NAERG:** #138

### SECTION 15. REGULATORY INFORMATION

#### U.S. FEDERAL REGULATIONS:

#### **EPA - ENVIRONMENTAL PROTECTION AGENCY**

**CERCLA:** Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (40 CFR Parts 117 and 302)  
Reportable Quantity: Not established

**SARA TITLE III:** Superfund Amendment and Reauthorization Act

**SECTION 302/304:** Requires emergency planning on threshold planning quantities (TPQ) and release reporting based on reportable quantities (RQ) of EPA's extremely hazardous substances (40 CFR Part 355).

Extremely Hazardous Substances: Not applicable  
Threshold Planning Quantity (TPQ): Not applicable

**SECTION 311/312:** Requires submission of material safety data sheets (MSDSs) and chemical inventory reporting with identification of EPA defined hazard classes (40 CFR Part 370). The hazard classes for this product are:

IMMEDIATE HEALTH:	YES	PRESSURE:	NO
ACUTE:	YES	REACTIVITY:	YES

DELAYEDHEALTH: UNKNOWN FIRE: YES

**SECTION313:** Requiresubmissionofannualreportsofreleaseoftoxicchemicalsthat appearin40CFR372.

RequiredreportingunderSection313:NO

**40CFRPART68:** RiskManagementProgramsforChemicalAccidental ReleasePrevention. Ischemicalaregulatedsubstance:NO

**TSCA:** ToxicSubstanceControlAct

Thischemicalisintendedsolelyforuseasapharmaceuticalintermediateandis exemptfromTSCA'sPre -ManufacturingNotificationRequirement(40CFR720.3 (e)(6)).

**CLEANAIRACT**

AIRTOXICS:Thisproductdoesnotcontainanymaterialsconsideredahazardousair pollutantunderSection112oftheCleanAirActAmendmentsof1990.

ThisproductisnotregulatedunderSection112.r.

**OSHA -OCCUPATIONALSAFETY ANDHEALTHADMINISTRATION:**

**29CFRPart1910.119:** ProcessSafetyManagementofHighlyHazardousChemicals. RequiresfacilitiestodevelopaprocesssafetymanagementprogrambasedonThreshold Quantities(TQ)ofhighlyhazardouschemicals.

ThischemicalisnotlistedinAppendixAasahighlyhazardouschemical.

**STATE REGULATIONS:**

Proposition65:ThisproductdoesNOTcontainanylistedsubstancewhichthe StateofCaliforniarequiresunderthisstatute.

**SECTION16.OTHERINFORMATION**

**RevisionInformation:**Section14 -Shippingnameandlabels