Material Safety Data Sheet

SECTION 1: PRODUCT AND COMPANY IDENTIFICATION

PRODUCT: FluoroSyl™ FSD4500
MANUFACTURER: Cytonix, LLC, 8000 Virginia Manor Road, Beltsville, MD 20705
PHONE: Business Office 301-470-6267, Product Information 703-929-5324, fax 301-470-6269
WEB ADDRESS: http://cytonix.com
PRODUCT CONTACT: mailto: elanza@cytonix.com
BUSINESS CONTACT: mailto: business@cytonix.com
REVISION DATE: 3-3-2010
PRODUCT USE: Protective Barrier or liquid repellant Coating. NOT INTENDED FOR USE AS PART OF A MEDICAL DEVICE OR DRUG.

SECTION 2: INGREDIENTS

INGREDIENT	Wt%	C.A.S. NUMBER
3,3-Dichloro-1,1,1,2,2-pentafluoropropane	20-80	422-56-0
1,3-Dichloro-1,1,2,2,3-pentafluoropropane	20-80	507-55-1
Perfluoropolyether di-Silane	0.2-20	PROPRIETARY

This formulation does not contain PFOA or PFOS and does not derive from compounds comprising these materials. The components of this product are in compliance with the chemical notification requirements of TSCA. All applicable chemical ingredients in this material are listed on the European Inventory of Existing Chemical Substances (EINECS), or are exempt polymers whose monomers are listed on EINECS. Volatile components of Fluoro-Compounds are VOC exempt per Federal Register August 25, 1997 [Volume 62, Number 164].

SECTION 3: HAZARDS IDENTIFICATION

3.1 EMERGENCY OVERVIEW
Specific Physical Form: liquid
Odor, Color, Grade: clear, colorless, with slight ethereal odor.
General Physical Form: Liquid
Immediate health, physical, and environmental hazards:
3.2 POTENTIAL HEALTH EFFECTS
Eye Contact: Contact with the eyes during product use is not expected to result in significant irritation.
Skin Contact: Contact with the skin during product use is not expected to result in significant irritation.
Inhalation: Thermal decomposition products harmful if inhaled.
Ingestion: No health effects are expected.
3.3 POTENTIAL ENVIRONMENTAL EFFECTS
This product comprises chemicals that may be resistant to biodegradation in the environment. Take precautions to prevent direct release of this product to the environment. Environmental data have not been determined for the fluoroaliphatic polymer.

SECTION 4: FIRST AID MEASURES

4.1 FIRST AID PROCEDURES
The following first aid recommendations are based on an assumption that appropriate personal and industrial hygiene practices are followed:
Eye Contact: In case of eye contact, immediately flush eyes with plenty of water for 15minutes. Call a physician.
Skin Contact: In case of skin contact, flush with water. Get medical attention if irritation is present.
Inhalation: If high concentrations are inhaled, immediately remove to fresh air. Keep persons calm. If not breathing,give artificial respiration. If breathing is difficult, give oxygen. Call a physician.
If Swallowed: No specific intervention is indicated, as the compound is not likely to be hazardous by ingestion. Consult a physician if necessary. Do not induce vomiting because the hazard of aspirating the material into the lungs is considered greater than swallowing it.

SECTION 5: FIRE FIGHTING MEASURES

5.1 FLAMMABLE PROPERTIES

Auto ignition temperature None [ASTM E659-84]

Flash Point *Not Applicable*

Flammable Limits - LEL None [ASTM E681-94, @100 C]

Flammable Limits - UEL None [ASTM E681-94, @100 C]

5.2 EXTINGUISHING MEDIA

Material will not burn.

5.3 PROTECTION OF FIRE FIGHTERS

Special Fire Fighting Procedures: Water may be used to blanket the fire. Exposure to extreme heat can give rise to thermal decomposition. Wear full protective equipment and a self-contained breathing apparatus.

Unusual Fire and Explosion Hazards: No unusual fire or explosion hazards are anticipated. Avoid breathing the products and substances that may result from the thermal decomposition of the product or the other substances in the fire zone.

SECTION 6: ACCIDENTAL RELEASE MEASURES

Accidental Release Measures: Observe precautions from other sections. Evacuate unprotected and untrained personnel from hazard area. The spill should be cleaned up by qualified personnel. Ventilate the area with fresh air. Contain spill. Working from around the edges of the spill inward, cover with bentonite, vermiculite, or commercially available inorganic absorbent material. Clean up residue with an appropriate organic solvent. Place in a metal container approved for transportation by appropriate authorities. Seal the container. Dispose of collected material as soon as possible.

SECTION 7: HANDLING AND STORAGE

7.1 HANDLING

Avoid skin contact with hot material. For industrial or professional use only. Contents may be under pressure, open carefully. Store work clothes separately from other clothing, food and tobacco products. No smoking: Smoking while using this product can result in the formation of the hazardous decomposition products. Use general dilution ventilation and/or local exhaust ventilation to control airborne exposures to below Occupational Exposure Limits. If ventilation is not adequate, use respiratory protection equipment. Avoid continuous exposure of the material to heat above 200 C.

7.2 STORAGE

Keep container tightly closed. Keep container in well-ventilated area. Store away from heat. Store away from strong bases or alkali metals.

SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 ENGINEERING CONTROLS

Use with appropriate local exhaust ventilation. Provide local exhaust ventilation at transfer points. Provide appropriate local exhaust when product is heated.

8.2 PERSONAL PROTECTIVE EQUIPMENT

8.2.1 Eye/Face Protection

Avoid eye contact. Use Safety Glasses with side shields.

8.2.2 Skin Protection

Avoid skin contact with hot material. Wear Nitrile gloves when handling this material to prevent thermal burns.

8.2.3 Respiratory Protection

Under normal use conditions, airborne exposures are not expected to be significant enough to require respiratory protection. If thermal degradation products are expected, use full face supplied air respirator.

8.2.4 Prevention of Swallowing

Do not eat, drink or smoke when using this product. Wash exposed areas thoroughly with soap and water.

8.3 Exposure Guidelines:

AEL: 100 ppm (8h-TWA)

TLV-TWA(ACGIH): Not established

PEL-TWA(OSHA): Not established

EEL: 1000 ppm (time limit 15 min.); 2000 ppm (time limit 1 min.) Emergency Exposure Limits (EELs) are to be used for short-term emergency exposure control. They are concentrations of short periods which should not result in permanent adverse health effects or interfere with escape. They should not be confused with ACGIH TLV-TWA or TLV STEL values that are designed for repeated exposure guidelines.

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

Specific Physical Form: liquid
Odor, Color, Grade: clear, colorless, with slight ethereal odor.
General Physical Form: Liquid
Auto ignition temperature None [ASTM E659-84]
Flash Point *Not Applicable*
Flammable Limits - LEL None [ASTM E681-94, @100 C)]
Flammable Limits - UEL None [ASTM E681-94, @100 C)]
Boiling point 54 ºC @ 760 mm Hg
Density 1.55 g/ml
Vapor Density 7
Vapor Pressure 202 mm Hg @ 25 ºC
Specific Gravity 1.55
Melting point -135 ºC
Solubility In Water 0.033 g/100 g Water @ 25°C
Evaporation rate 0.9 [Diethyl Ether=1]
Volatile Organic Compounds Exempt
Percent volatile 80-99 %
Viscosity NA

SECTION 10: STABILITY AND REACTIVITY

Stability: Stable.
Materials and Conditions to Avoid: Strong bases and alkali metals.
Hazardous Polymerization: Hazardous polymerization will not occur.
Hazardous Thermal Decomposition Products: Hydrogen Fluoride at Elevated Temperatures.
Hazardous Decomposition: Hydrogen fluoride has an ACGIH Threshold Limit Value of 3 parts per million (as fluoride) as a Ceiling Limit and an OSHA PEL of 3 ppm of fluoride as an eight hour Time-Weighted Average and 6 ppm of fluoride as a Short Term Exposure Limit. The odor threshold for HF is 0.04 ppm, providing good warning properties for exposure.

SECTION 11: TOXICOLOGICAL INFORMATION

11.1 Route(s) of Entry:
Inhalation: Yes
Skin: Yes
Eye: Yes
Ingestion: Yes

11.2 Animal Data:
3,3-Dichloro-1,1,1,2, 2 -pentafluoropropane (HCFC-225ca)
Inhalation : 4-h LC50: 37,300 ppm in rats
Oral : LD50 : >5 g/kg in rats
Dermal : LD50: >2g/kg in rabbit.
Eye : Not irritant up to 0.1 ml in rabbit.

1,3-Dichloro-1,1,2,2, 3 -pentafluoropropane (HCFC-225cb)
Inhalation : 4-h LC50: 36,800 ppm in rats
Oral : LD50 : >5 g/kg in rats
Dermal : LD50: >2g/kg in rabbit.
Eye : Not irritant up to 0.1 ml in rabbit.
Data from acute toxicity studies indicate that HCFC-225ca and HCFC-225cb have very low acute toxicity. Neither isomer causes eye irritation nor dermal toxicity in standardized tests; skin application of both isomers at high doses (2,000 mg/kg body weight) produces no adverse effects. Therefore, the dermal LD50s are greater than 2,000 mg/kg body weight. Oral administration of either isomer at high doses (5,000 mg/kg body weight) does not cause any mortality and the oral LD50s are greater than 5,000 mg/kg body weight. Both isomers also have very low acute inhalation toxicity as measured by the concentration that cause 50% mortality in experimental animals, the LC50, listed above. Cardiac sensitization response in dogs is observed at approximately 15,000 ppm for the mixture of HCFC-225ca/HCFC-225cb (45/55 %) and 20,000 ppm for HCFC-225cb. In 28-day inhalation studies with rat, the activity and responsiveness of the animals was reduced at 5,000 ppm or greater for each isomer. Toxicity was otherwise confined to the liver; liver enlargement and induction of peroxisomes was seen following treatment with either of the isomers. HCFC-225ca was more potent than HCFC-225cb in eliciting these liver effects. In 90-day study

of HCFC-225ca/HCFC-225cb mixture (45/55 %) with rat, toxic effects were observed in liver; liver enlargement and induction of peroxisomes. In 28-day study with marmoset, exposure to HCFC-225ca at 1,000 ppm caused effects on the liver, such as slight fat deposition associated with changes in serum biochemical parameters. In the same study, exposure to HCFC-225cb at 5,000 ppm caused somnolence during exposure and an increase of cytochrome P-450, indicative of an adaptive response to HCFC-225cb. However, no liver enlargement was seen and virtually no peroxisome induction was observed in either isomer. Animal testing with HCFC-225ca/HCFC-225cb(=45/55) mixture indicates that the compounds are not teratogenic.

The compounds do not produce genetic damage in bacterial cell cultures (Ames Assay), CHL, and in-vivo unscheduled DNA syntheses assay. In one in-vitro study with mammalian cell cultures (human lymphocytes) HCFC-225ca caused genetic damage while HCFC- 225cb elicited a marginal response. However, the overall evidence from these studies implies that neither isomer is genotoxic.

11.3 Carcinogenicity
All ingredients are not listed by NTP, IARC or OSHA as carcinogens.

SECTION 12: ECOLOGICAL INFORMATION
12.1 SNAP Acceptable: HCFC-225ca and HCFC-225cb are listed as SNAP acceptable substitutes for CFCs in the Solvent Cleaning Sector of the Clean Air Act.
12.2 Non-VOC: HCFC-225ca and HCFC-225cb are exempted from VOC regulations in the Clean Air Act.
12.3 Warning: This substance has a low but negative impact on ozone in the upper atmosphere.

SECTION 13: DISPOSAL CONSIDERATIONS
13.1 Waste Disposal Method: Reclaim if feasible. As a disposal alternative, incinerate in an industrial or commercial facility in the presence of a combustible material. Combustion products will include HF.
13.2 EPA Hazardous Waste Number: Not regulated

SECTION 14: TRANSPORT INFORMATION
UN No.: Not established
ADR / RID Status: Not regulated
IMDG Status: Not regulated
ICAO / IATA Status: Not regulated
US DOT Status: Not regulated

SECTION 15: REGULATORY INFORMATION
15.1 Europe:
EEC Classification: Not classified
Hazard Symbol: Not established
Risk phrases: Not established
Safety phrases: Not established, but recommend don't breath gas/fumes/vapor/spray, toxic in contact with skin and if swallowed), irritation to eyes and respiratory system.
Council Directive 92/32/EEC Status: These chemicals are listed on the EINECS (HCFC-225ca:

207-016-9, HCFC-225cb: 208-076-9).
15.2 United States:
SNAP Acceptable: HCFC-225ca and HCFC-225cb are listed as SNAP acceptable substitutes for CFCs in the Solvent Cleaning Sector of the Clean Air Act.
Non-VOC: HCFC-225ca and HCFC-225cb are exempted from VOC regulations in the Clean Air Act.
TSCA Status: These chemicals are listed on the TSCA Inventory.
SARA Section 302: None of the chemicals are Section 302 hazard.
SARA Section 311, 312: Acute = Yes
Chronic = Yes
Fire = No
Reactivity = No
Pressure = No
SARA Section 313 = Yes

15.3 This MSDS has been prepared to meet the U.S. OSHA Hazard Communication Standard, 29 CFR 1910.1200.

SECTION 16: OTHER INFORMATION

NFPA Hazard Classification
Health: 2 Flammability: 0 Reactivity: 0 Special Hazards: None
HMIS Hazard Classification
Health: 2 Flammability: 0 Reactivity: 0 Protection: X - See PPE section.

DISCLAIMER: The information in this Material Safety Data Sheet (MSDS) is believed to be correct as of the date issued.