

3M General Offices
3M Center
St. Paul, Minnesota 55144-1000
612/733-1110
Duns No.: 00-617-3082

00-16
981

MATERIAL SAFETY
DATA SHEET



DIVISION: INDUSTRIAL CHEMICAL PRODUCTS DIVISION
TRADE NAME:
FC-26 FLUORAD Brand Fluorochemical Acid
3M I.D. NUMBER: ZF-0002-0376-8 98-0201-0402-6

ISSUED: DECEMBER 18, 1990
SUPERSEDES: DECEMBER 22, 1989
DOCUMENT: 10-3782-9

1. INGREDIENT	C.A.S. NO.	PERCENT	EXPOSURE LIMITS	
			VALUE UNIT	TYPE AUTH
Perfluorooctanoic Acid (C7F15COOH)	335-67-1	100.0	0.1 mg/m3	TWA 3M

SOURCE OF EXPOSURE LIMIT DATA:
- 3M: 3M Medical Department Guideline

2. PHYSICAL DATA

BOILING POINT:..... 187.00 C
VAPOR PRESSURE:..... ca. 10.0000 mmHg
Calc. @ R.T.
VAPOR DENSITY: N/D
EVAPORATION RATE:..... N/D
SOLUBILITY IN WATER: 0.1-1.0 %
SP. GRAVITY:..... ca. 1.700 Water = 1
(Liquid)
PERCENT VOLATILE: Negligible
VOLATILE ORGANICS: N/D
pH: ca. 1.00
VISCOSITY: N/D
APPEARANCE AND ODOR: Clear, colorless to pale yellow liquid @65 C. Pungent odor.

3. FIRE AND EXPLOSION HAZARD DATA

FLASH POINT:..... Non-Flammable
FLAMMABLE LIMITS - LEL: N/A
FLAMMABLE LIMITS - UEL: N/A
AUTOIGNITION TEMPERATURE: ... N/D
EXTINGUISHING MEDIA:
Water, CO2, Dry Chemical
SPECIAL FIRE FIGHTING PROCEDURES:
Self-contained breathing apparatus and full encapsulated suit
impervious to HF.
UNUSUAL FIRE AND EXPLOSION HAZARDS:
Toxic by-products, including HF, may be formed.
NFPA-HAZARD-CODES: HEALTH 4 FIRE 0 REACTIVITY 2
UNUSUAL REACTION HAZARD: A

4. REACTIVITY DATA

STABILITY: Stable
INCOMPATIBILITY - MATERIALS TO AVOID:
Strong Bases
HAZARDOUS POLYMERIZATION: Will Not Occur
HAZARDOUS DECOMPOSITION PRODUCTS:
Thermal decomposition may produce toxic materials including HF.

Abbreviations: N/D - Not Determined N/A - Not Applicable

03 007125

Produced Pursuant to the May 22, 2007 Settlement Agreement and Consent Order
between 3M and MPCA

3M_MPCA00041106

Exhibit
1446

State of Minnesota v. 3M Co.,
Court File No. 27-CV-10-28862

1446.0001

3M General Offices
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MSDS: FC-26 FLUORAD Brand Fluorochemical Acid
DECEMBER 18, 1990

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5. ENVIRONMENTAL INFORMATION

SPILL RESPONSE:

Ventilate. Observe precautions from other sections. Collect spilled material. Place in a polyethylene-lined metal container, and seal. Clean up residue with a soda ash solution.

RECOMMENDED DISPOSAL:

Carefully and with stirring and cooling, add waste product to a solution of soda ash and slaked lime. Confirm neutrality. Flush spent solutions and small product quantities, <5 gal., to a wastewater treatment system. Disposal alternative: Mix with flammable material and incinerate in a permitted hazardous waste incinerator. Combustion products will include HF. Since regulations vary, consult applicable regulations or authorities before disposal. U.S. EPA Hazardous Waste No.: D002 (Corrosive)

ENVIRONMENTAL DATA:

Chemical Oxygen Demand (COD): 2.7 g/Kg, 20-Day Biochemical Oxygen Demand (BOD20): <19 g/Kg, 96-Hr. LC50, Fathead Minnow (Pimephales promelas): 843 mg/l.

SARA HAZARD CLASS:

FIRE HAZARD: No PRESSURE: No REACTIVITY: Yes ACUTE: Yes CHRONIC: Yes

6. SUGGESTED FIRST AID

EYE CONTACT:

Immediately flush with plenty of water. Continue for 15 minutes. Call a physician.

SKIN CONTACT:

IMMEDIATELY wash affected area with soap and water.

INHALATION:

If symptoms occur, remove person to fresh air. If symptoms continue, call a physician.

IF SWALLOWED:

DO NOT INDUCE VOMITING. Give copious amounts of water. IMMEDIATELY call a physician or Poison Control Center.

OTHER FIRST AID:

NONE

7. PRECAUTIONARY INFORMATION

Do not get on skin, in eyes, or on clothing. Avoid breathing mists or vapors. Use only in well ventilated areas with sufficient local exhaust ventilation to maintain airborne levels at recognized health and safety levels. Wash thoroughly after using. Remove contaminated clothing and wash before reuse. Keep container closed when not in use. HEALTH HAZARD DATA CONTINUED: Acute intraperitoneal LD50 rat single dose perfluorooctanoic acid, 30 day observation period: 189

Abbreviations: N/D - Not Determined N/A - Not Applicable

03 007126

Produced Pursuant to the May 22, 2007 Settlement Agreement and Consent Order
between 3M and MPCA

3M_MPCA00041107

1446.0002

3M General Offices

3M Center
St. Paul, Minnesota 55144-1000
612/733-1110

Duns No.: 00-617-3082

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983

MATERIAL SAFETY
DATA SHEET

3M

MSDS: FC-26 FLUORAD Brand Fluorochemical Acid
DECEMBER 18, 1990

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7. PRECAUTIONARY INFORMATION (continued)

(175 to 208 95% confidence limits) milligrams per kilograms of body weight. According to Olson, C.T. and Anderson, M.E., Toxicology and Applied Pharmacology 70, 362-372 (1983). Please note that this data was misquoted in the prior MSDS.

SPECIAL PROTECTION:

EYE PROTECTION: Goggles or Face Shield.

SKIN PROTECTION: Rubber gloves, protective clothing.

VENTILATION: Local exhaust ventilation is recommended.

RESPIRATORY PROTECTION: Self contained breathing apparatus where local ventilation is not available.

8. HEALTH HAZARD DATA

EYE CONTACT: Causes severe eye burns upon contact with liquid vapors and/or mists.

SKIN CONTACT: Causes severe irritation and burns of the skin on direct contact.

INHALATION: FC-26 is irritating to the upper respiratory tract.

INGESTION: FC-26 can cause gastric burns on ingestion. Acute oral LD50 in the albino rat is between 500 and 1000 milligram per kilogram of body weight; FC-26 is considered slightly toxic from a single oral dose. CONTINUED IN PRECAUTIONS.

Abbreviations: N/D - Not Determined N/A - Not Applicable

The information on this Data Sheet represents our current data and best opinion as to the proper use in handling of this material under normal conditions. Any use of the material which is not in conformance with this Data Sheet or which involves using the material in combination with any other material or any other process is the responsibility of the user.

03 007127

Produced Pursuant to the May 22, 2007 Settlement Agreement and Consent Order
between 3M and MPCA

3M_MPCA00041108

1446.0003

F8100
F8098
F8212, F8213 OK 7-14-84 PAGE

3M INTERNAL MATERIAL SAFETY DATA SHEET

***FOR 3M INTERNAL USE ONLY*

91.0605 ISSUE DATE: 7-16-84 SUPERSEDES: NONE
 MATERIAL DESIGNATION: PERFLUOROOCCTANOYL CELL PRODUCT
 3M I.D. NUMBER: 41-2600-6915-2; 41-2700-3108-5
 NFPA DIAMOND CODE: HEALTH: 3 FIRE: 0 REACTIVITY: 0 OTHER: ===
 ***FOR 24-HOUR EMERGENCY INFORMATION ON HEALTH EFFECTS CALL: (612)733-2882*

1. INGREDIENTS	CAS NUMBER	%	TLV(R)(UNIT)
FLUOROCARBONS, INERT	===	30	NONE
PERFLUOROOCCTANOYL FLUORIDE	335-66-0	15	NONE
HYDROGEN FLUORIDE	7664-39-3	5	3 PPM (AS F)

2. PHYSICAL DATA

BOILING POINT: 120-350F SOLUBILITY IN WATER: INSOLUBLE
 VAPOR PRESSURE: === SPECIFIC GRAVITY(H2O=1): 1.5
 VAPOR DENSITY(AIR=1): === PERCENT VOLATILE: 30-60%
 EVAPORATION RATE: === VISCOSITY: WATER-LIKE
 PH: N.A.
 APPEARANCE AND ODOR: CLEAR LIQUID WITH STRONG HF ODOR.

3. FIRE AND EXPLOSION HAZARD DATA

FLASH POINT(TEST METHOD): NONFLAMMABLE FLA.LMT. LEL:=== UEL:=
 EXTINGUISHING MEDIA: NONFLAMMABLE.
 SPECIAL FIRE FIGHTING PROCEDURES: NONE
 UNUSUAL FIRE AND EXPLOSION HAZARDS: NONE EXPECTED, BUT SEE ALSO SECTION 7.

4. PRECAUTIONARY INFORMATION

WEAR FULL FACE SHIELD. WEAR IMPERVIOUS GLOVES AND ACID-RESISTANT PROTECTIVE CLOTHING AS NECESSARY TO PREVENT SKIN CONTACT. USE LOCAL EXHAUST VENTILATION ON OPEN CONTAINERS AND TRANSFER POINTS. IF VAPORS ARE NOT CONTROLLED, WEAR SUPPLIED AIR RESPIRATOR OR SUPPLIED AIR HOOD. KEEP CONTAINERS CLOSED.

(CONTINUED ON PAGE 2)

PRODUCT CODE: F-6915 FM-3109

5. HEALTH HAZARD DATA

EYE CONTACT: ***CORROSIVE*** CAUSES BURNS AND TISSUE DAMAGE ON CONTACT.
 SKIN CONTACT: ***CORROSIVE*** CAUSES BURNS AND TISSUE DAMAGE ON CONTACT.
 SEE NOTE BELOW.
 INHALATION: CAUSES SEVERE IRRITATION. ***NOTE: MAY CAUSE FATAL CALCIUM DEPLETION; CHRONIC EXPOSURE MAY CAUSE BONE AND JOINT CHANGES (FLUOROSIS).
 INGESTION: ***CORROSIVE*** CAUSES BURNS AND TISSUE DAMAGE. SEE NOTE ABOVE.
 SUGGESTED FIRST AID:

EYE CONTACT: IMMEDIATELY FLUSH WITH LARGE AMOUNTS OF WATER FOR AT LEAST TEN MINUTES AND GET MEDICAL ATTENTION.
 SKIN CONTACT: REMOVE CONTAMINATED CLOTHING. LAUNDRY BEFORE RE-USE. ACTIVATE SAFETY SHOWER. GET MEDICAL ATTENTION.
 INHALATION: MOVE AFFECTED INDIVIDUAL TO FRESH AIR. FOR BREATHING DIFFICULTY, KEEP INDIVIDUAL WARM AND QUIET, ADMINISTER OXYGEN AND GET MEDICAL ATTENTION.
 INGESTION: ***DO NOT INDUCE VOMITING.*** GIVE WATER OR MILK AND GET MEDICAL ATTENTION IMMEDIATELY.

6. ENVIRONMENTAL INFORMATION

SPILL RESPONSE: OBSERVE PRECAUTIONS FROM OTHER SECTIONS. CAREFULLY NEUTRALIZE WITH LIME. USE APPROPRIATE ABSORBENT MATERIAL IN CLEANUP PROCEDURE. COLLECT SPILLED MATERIAL. CLEAN UP RESIDUES WITH WATER. PLACE IN APPROVED METAL CONTAINER AND SEAL.
 RECOMMENDED DISPOSAL: RECLAIM, OR SEND TO 3M CHEMOLITE PLANT - BLDG. 47 OR TO A 3M APPROVED HAZARDOUS WASTE DISPOSAL FACILITY FOR INCINERATION.
 ENVIRONMENTAL DATA: SEE "CORROSIVE MATERIAL" AND "NON-REGULATED CHEMICALS" IN 3M WASTE DISPOSAL PROCEDURES MANUAL FOR LABELING/MARKING/PACKAGING/SHIPPING INFORMATION.
 HAZARDOUS WASTE NUMBER/CODE: D002, OR NONE IF NEUTRALIZED.

7. REACTIVITY DATA

STABILITY: STABLE
 INCOMPATIBILITY: ===
 HAZARDOUS POLYMERIZATION: WILL NOT OCCUR
 HAZARDOUS DECOMPOSITION PRODUCTS: HF, PERFLUOROISOBUTYLENE.

CONDITIONS TO AVOID:
 ===
 MATERIALS TO AVOID:
 ===
 CONDITIONS TO AVOID:
 ===

INFORMATION ON THIS DATA SHEET REPRESENTS OUR CURRENT DATA AND BEST JUDGEMENT AS TO THE PROPER USE IN HANDLING OF THIS PRODUCT UNDER NORMAL CONDITIONS.

ATTACHMENTS: Safety sheets for all materials.

REASON FOR ISSUE: (Revise Product Structure? YES NO)

1. To produce F-8288 Lot 101, a possible substitute 6% AFFF.

REFERENCE:

1. Factory Experiment for 41-2600-7047-3, Lot 18.
2. A request for material from T.K. Wilkinson dated 7/3/90.

MFG. FOR:

1. Customer Division: ICPD
2. Person: T. K. Wilkinson, Bldg. 236-3A-04

END PRODUCT USE:

AFFF fire extinguishing agent

OPERATING PROCEDURE:

I. PRE-RUN PREPARATION

NOTE: It is very important to keep FM-3820, F-10881, and batch from the sewer system. These materials will make tremendous quantities of foam at the waste treatment plant if any of them get into the sewer system. Therefore, carefully observe the following precautions during this run:

- A. Soak up any spills with Zorball, put in drums, and send to the incinerator for burning. Prevent spills.
- B. Do not pour any samples or above materials into the sewer or sinks. Any waste that must be disposed of should be drummed and sent to the incinerator for burning as 41-3900-6209-3.
- C. Concentrated product water flush of the equipment must be drummed and sent to the incinerator for burning as 41-3900-6209-3.
- D. Even with these precautions it is possible that some material will get into the sewer system. If that happens, do the following immediately:

Pour some Nalco Antifoamer, 11-0002-6306-8, into the sewer. There should be a drum, 400 lbs. available in Bldg. 4 when making any "Light Water" product.

Notify your Supervisor.

Notify the waste treatment plant. Explain what happened and the amount of antifoamer you have added to the sewer. Refer to Factory Service Procedures #6 and #7.

- E. Set aside 300 lbs. of DI water in a 55 gallon epon lined drum. This will be used as a flush for Charges "D", "F", and "H" that will be vacuum charged into BC-32.

OPERATING PROCEDURE: (continued)

II. CHARGING

1. Close the drain line. Add Charge **A (41-4100-0199-8)** DI Water, to BC-32. This can be accomplished by charging a weigh tank with the proper amount of D.I. water and then transferring it to the kettle.
2. **NOTE:** The solid urea (pellets) (RM-7054) absorb heat as they dissolve. The urea dissolves faster and in greater concentration in a hot solution. Therefore, after adding all of charge A to the kettle, set the agitator to 30 RPM (use just enough agitation to create a vortex for good mixing and adjust as necessary during the run) and heat the water in BC-32 up to 180°F.
3. When the batch is at 180°F, weigh Charge **B (11-0000-7054-7)** and charge it through the manway of BC-32. Allow this to mix until the Urea is totally dissolved. This should take approximately 15-20 minutes. Take a sample from the bottom of the kettle and see that the material is totally in solution.

If the Urea is not totally dissolved, mix for an additional 15 minutes and resample. Repeat this procedure until dissolving is complete.

4. After the Urea is dissolved, cool the solution down to 100°F. After the batch has cooled to below 100°F, isolate the kettle and pull vacuum to 15 mm Hg. Vacuum in charge **C (11-0000-8887-9)** that was taken from Bldg. 5 and then flush with Charge **D (41-4100-0199-8)**.

NOTE: PULL MORE VACUUM IF NEEDED WHEN VACUUM CHARGING.

5. After the 50 lb. water flush, vacuum in Charge **E (11-0003-2067-8)**. Sodium Octyl Sulfate and follow it with Charge **F (41-4100-0199-8)**.
6. Use the same vacuum technique to add Charge **G (11-0004-5666-2)** Witcolate 7093 and follow it with Charge **H (41-4100-0199-8)**.

NOTE: THE REMAINDER OF CHARGES MUST NOT BE VACUUM CHARGED TO THE KETTLE: USE MINIMUM AGITATION TO AVOID FOAMING PROBLEMS.

7. a. Weigh Charge I (11-0002-7513-8) Tolytriazole, on a gram scale and add to the kettle through the manway. Mix the batch for 5 minutes.
 - b. Weigh Charge J (41-2700-3820-5) Filmer, and add to the kettle through the manway. Mix the batch for 5 minutes.
 - c. Weigh Charge K (41-2601-0881-0) Foamer, and add to the kettle through the manway. Mix the batch for 5 minutes.
 - d. Weigh Charge L (11-0002-7198-8) Triethanolamine, and add to the kettle through the manway.
8. After the addition of Charge L, mix the batch for 90 minutes.

III. pH CHECK AND ADJUSTMENT (IF REQUIRED)

9. After agitating the batch for 90 minutes, take two 8-ounce representative samples from the kettle (top and bottom) and submit to QC Lab for "pH" (QCM 30.0). Do not wait for result, but record when received.
10. Agitate the batch for another 30 minutes and submit a second sample for "pH and pH correction (top and bottom)." If the two samples do not agree within 0.3 units, submit a third sample. After mixing another hour, sample for "pH and pH correction (QCM 30.0 and QCM 30.18)
11. Usually the pH will be within the 7.60 - 8.30 specification range. If not, the Lab will report a correction charge as "pounds of RM per 100 lbs. of batch". If the pH is low, the correction charge will be RM-244. If the pH is high, the correction charge will be RM-2706. Determine the batch weight in pounds (sum of all charges and normally shown to the right of "By-Product" on the Production Report).

RM-244 or RM-2706 Correction

$$\text{Correction lbs.} = \frac{(\text{pH correction amount from QC})}{100} \times (\text{Batch size})$$

Example: Batch size = 1600 lbs.; ph is high

pH correction from QC = 0.02 lbs.

100 lbs.

$$\text{Correction lbs.} = \frac{0.02}{100} \times (1600)$$

$$= 0.32 \text{ Lbs. of RM-2706}$$

(continued)

Step 11 (continued)

Expect 0 to 0.5 lbs. of a correction charge (Notify PE if more than 0.5 lb. correction is calculated)

NOTE: If the pH is low, the correction charge will be RM-244 (Charge I (11-0000-0244-1), 50% Aqueous Sodium Hydroxide.

If the pH is high, the correction charge will be RM-2706 (Charge J (11-0000-2706-7), Sulfuric Acid. Wear a face shield, rubber gloves and rubber jacket when handling RM-2706.

The calculation applies to both raw materials.

12. Pour the calculated correction into BC-32 and agitate for 20 minutes. After the correction addition, mix for 20 minutes and re-sample for pH (QCM 30.0). If the pH is in spec, mix an additional 15 minutes and sample again for "pH" (QCM 30.0). If it is still in spec and the results agree within 0.3 units, set up to drain. If pH is not in spec, return to Step 11 to resample for pH so an adjustment charge can be calculated.
13. Submit a sample to the QC Lab for Appearance (Visual & QCM 80.2)
14. After the batch has been adjusted into spec, refer to the draining instructions page for information.

IV. FINAL SAMPLES

15. When the batch meets the 7.60 - 8.30 pH specification and Appearance spec, drain the following samples from BC-32 thru a 10^µ micron Johns Manville 10 inch filter cartridge with plastic core.
 - a. Four 8-ounce glass with final labels. Submit through the tube to QC Lab.
 - b. Three at about 42.5 lbs. in 5-gallon white polyethylene pails 34-7010-1199-0 pail; 34-7010-3066-1 screw type cap, and label L type labels that are supplied in the planning packet.
 - c. One gallon in poly bottle to QC Lab. 34-7000-8192-9 bottle; 34-7002-2518-7 cap.

Have the Supervisor arrange to remove one 5-gallon pail to S-101 (warehouse) as soon as possible. He should advise Bldg. 41 Shipping Clerk the sample is at S-101 and to expedite its air shipment to Decatur for fire testing.

V. CLEANUP

16. After the kettle has been emptied of all product , rinse the kettle walls with a small amount of DI water. Drum the flush in 55 gallon drums that will be sent to the incinerator for disposal.

WASTE DISPOSAL:

After the rinse water has been collected from BC-32, put the proper label on the drums and write a removal slip for sending this waste to Bldg.# 47 for incineration.

DRAINING INFORMATION:

Container/Alternate: Blue 5 gallon plastic pail, plain no stencil
Hedwin code# 6097237

Liner: None

Filter/Alternate: 10 micron (26-1003-3456-9), Johns Manville

Customer Use Label: "L" Experimental supplied by customer

Weight Per Container: 42.5# per 5-gallon container
465# per 55-gallon drum

NOTE: Drain to 50, 5-gallon containers and
put the rest into 55 gallon Blue Poly
Overpack drums (34-7002-2745-6).

Draining Temperature: Ambient temperature (usually 60 - 80°F.).

Draining Pressure: Gravity

SAMPLE REQUIREMENT:

QC Lab: Four 8-ounce glass, 1-gallon poly bottle.

Warehouse: One 5-gallon pail at approx. 42.5 pounds to Box 2028
only history file.

Customer: None

Decatur: Two 5-gallon pails at approx. 42.5 pounds for
fire tests.

Attn: J.T. Speake, QC Lab.
Air Ship ASAP

Periodic Samples During Draining:

4-ounce to QC Lab at beginning of draining the batch. The QC lab
will report pass or fail. If the app. fails, they will run QCM
80.2 to determine the % Sediment. If it passes the % Sediment
spec, it will be ok to continue draining the batch.

Storage: Inside - Protect from freezing.

SPECIFICATIONS FOR RELEASE:In-Process:

<u>Step</u>	<u>OCM #</u>	<u>Property</u>	<u>Specification</u>	<u>Test By</u>
9	30.0	pH at 25°C	Run and Record	QC
10	30.0	pH at 25°	Record (Expect 7.60 - 8.30)	QC
	30.18	pH correction charge	7.60 - 8.30 *	QC
12	30.0	pH at 25°C	7.60 - 8.30	QC
13	Visual	Appearance	Amber liquid free of insolubles	QC

* If not in specification, titrate to 7.95 pH.
Report to Production the pounds of RM-244 (if low) or RM-2706 (if high) per 100 lbs. of batch required for pH correction charge.

Final:

Visual	Appearance	Amber liquid free of insolubles	QC
2.9	Viscosity @ 25 ± 0.1°C	2 centistokes minimum	QC
2.9	Viscosity @ 5 ± 0.1°C	10 centistokes maximum	QC
30.0	pH @ 25 ± 1.0°C	7.50 - 8.40	QC
96.3.5	Varnish Color	Record	QC
14.0.1	Specific Gravity at 25 ± 1.0°C	Record (Expect 1.020 - 1.040)	QC
38.6	Surface Tension (6% solution @ 23 ± 2.0°C.)	17.0 dynes/cm maximum	QC
38.10	Interfacial Tension (6% solution @ 23 ± 2.0°C.)	5.0 dynes/cm maximum	QC
15.0	Refractive Index @ 25 ± 0.1°C	1.3580 minimum	QC
38.6.3	Spreading coefficient	3 dynes/cm minimum	
70.4.1	Total halides	250 ppm maximum	QC
53.14.1	Fluorine Content, %	R & R	QC

SPECIFICATIONS FOR RELEASE: (continued)

<u>Step</u>	<u>OCM #</u>	<u>Property</u>	<u>Specification</u>	<u>Test By</u>
	8.1.3	Foam Expansion, cc/gm (6% Solution @ 23 ± 5.0°C)		
		Fresh Water	6.0 minimum	QC
		Sea Water	6.0 minimum	
	8.1.3	25% Drain Time (6% Solution @ 23 ± 5.0°C)		
		Fresh Water	2.5 minutes minimum	QC
		Sea Water	2.5 minutes minimum	
	8.1.3	Film Sealability (6% Solution @ 23 ± 5.0°C)		
		Fresh Water	No sustained ignition	QC
		Sea Water	No sustained ignition	

THESE TESTS RUN AT DECATUR:

8.1.10	50 Ft ² Fire Test @ 6% premix	
	Sea Water, Report Fire Test No.	
	40 second summation	320% minimum
	25% Burnback	360 seconds minimum
	Time for extinguishment	50 seconds maximum

SPECIAL RETAIN REQUIREMENTS:

1 Year for 42.5 lb. 5-gallon pail, stored in Box 2028.
5 Years for 1 gallon bottle, stored in 41 basement.

AUTHORS:

Process Engineer R. M. Thornton Date 9/13/90
R. M. Thornton
Product Chemist E. A. Ziegler Date 9/13/90
E. A. Ziegler

APPROVED BY:

Process Engineering Supervisor: A. C. Hoffman Date 9/13/90
Health & Safety Eng.: yes no Gregory S. Smith Date 9/13/90
Bldg. Senior Supv.: yes no J. A. Sienkowski Date 9/13/90
Quality Engineering Supervisor: Robert L. Hall Date 9-13-90

ICPD - Environmental Protection Prod. _____ Date _____

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MATERIAL SAFETY 3M
 DATA SHEET 3M Center
 (Intermediate) St. Paul, Minnesota
 55144-1000
 1-800-364-3577 or (612) 737-6501 (24 hours)

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DIVISION: SPECIALTY MATERIALS DIVISION

MATERIAL:

FLUORO-CHEMICAL ACID F-6981 F-6982 F-6548 FM-3256 FM-3990 F-8713 F-
 8716F-8726 F-8748 FM-4589 F-9109

ID NUMBER: 41-2600-6548-1 41-2600-6981-4 41-2600-6982-2 41-2600-8713-9
 41-2600-8716-2 41-2600-8726-1 41-2600-8748-5 41-2600-9109-9
 41-2700-3256-2 41-2700-3990-6 41-2700-4589-5

ISSUED: October 30, 1997
 SUPERSEDES: March 07, 1997
 DOCUMENT: 04-1538-0

1. INGREDIENT	C.A.S. NO.	PERCENT
PERFLUOROOCTANOIC ACID.....	335-67-1	90
PERFLUORO COMPOUNDS, C5-18.....	86508-42-1	10
HYDROGEN FLUORIDE.....	7664-39-3	< 1

This product contains the following toxic chemical or chemicals subject to
 the reporting requirements of Section 313 of Title III of the Emergency
 Planning and Community Right-To-Know Act of 1986 and 40 CFR Part 372:
 HYDROGEN FLUORIDE

2. PHYSICAL DATA

BOILING POINT:..... 300 - 380 F
 VAPOR PRESSURE:..... 10 mmHg
 @90F
 VAPOR DENSITY:..... N/D
 EVAPORATION RATE:..... N/D
 SOLUBILITY IN WATER:..... slight
 SPECIFIC GRAVITY:..... ca. 1.5 Water=1
 PERCENT VOLATILE:..... 5 - 10 %
 pH:..... ca. 1
 VISCOSITY:..... N/D
 MELTING POINT:..... N/D

Abbreviations: N/D - Not Determined N/A - Not Applicable CA - Approximately

2. PHYSICAL DATA (continued)

APPEARANCE AND ODOR:

White to grayish waxy solids at room temperature with pungent odor.

3. FIRE AND EXPLOSION HAZARD DATA

FLASH POINT:..... NONFLAMMABLE

FLAMMABLE LIMITS - LEL:..... N/D

FLAMMABLE LIMITS - UEL:..... N/D

AUTOIGNITION TEMPERATURE:..... N/D

EXTINGUISHING MEDIA:

Water, Carbon dioxide, Dry chemical

SPECIAL FIRE FIGHTING PROCEDURES:

Wear full protective clothing, including helmet, self-contained, positive pressure or pressure demand breathing apparatus, bunker coat and pants, bands around arms, waist and legs, face mask, and protective covering for exposed areas of the head.

UNUSUAL FIRE AND EXPLOSION HAZARDS:

See Hazardous Decomposition section for products of combustion.

4. REACTIVITY DATA

STABILITY: Stable

INCOMPATIBILITY - MATERIALS/CONDITIONS TO AVOID:

Strong Bases.

HAZARDOUS POLYMERIZATION: Hazardous polymerization will not occur.

HAZARDOUS DECOMPOSITION PRODUCTS:

Hydrogen Fluoride, Toxic Vapors, Gases or Particulates.

5. ENVIRONMENTAL INFORMATION

SPILL RESPONSE:

Refer to other sections of this MSDS for information regarding physical and health hazards, respiratory protection, ventilation, and personal protective equipment. In the U.S.A., call (612) 733-1110 or (612) 733-6100 for 24-hour spill assistance. Ventilate area. Contain spill. Evacuate unprotected personnel from hazard area.

Abbreviations: N/D - Not Determined N/A - Not Applicable CA - Approximately

5. ENVIRONMENTAL INFORMATION (continued)

Carefully, with stirring and cooling, add waste product to a solution of soda ash (sodium carbonate) and slaked lime (calcium hydroxide). Confirm neutrality. Collect spilled material. Clean up residue with soda ash (sodium carbonate) solution. Place in a polyethylene-lined metal container. Do not seal for 48 hours.

RECOMMENDED DISPOSAL:

Incinerate in a permitted hazardous waste incinerator in the presence of a combustible material. Combustion products will include HF.

ENVIRONMENTAL DATA:

Not determined.

REGULATORY INFORMATION:

Volatile Organic Compounds: N/D.
VOC Less H₂O & Exempt Solvents: N/D.

Since regulations vary, consult applicable regulations or authorities before disposal. In the event of an uncontrolled release of this material, the user should determine if the release qualifies as a reportable quantity. U.S. EPA Hazardous Waste Number = D002 (Corrosive)

EPCRA HAZARD CLASS:

FIRE HAZARD: No PRESSURE: No REACTIVITY: No ACUTE: No CHRONIC: No

6. SUGGESTED FIRST AID

EYE CONTACT:

Immediately flush eyes with large amounts of water for at least 15 minutes. Get immediate medical attention.

SKIN CONTACT:

Immediately flush skin with large amounts of water for at least 15 minutes in a chemical safety shower while removing contaminated clothing and shoes. Get immediate medical attention. Wash contaminated clothing before reuse.

INHALATION:

If signs/symptoms occur, remove person to fresh air. If signs/symptoms continue, call a physician.

IF SWALLOWED:

If swallowed, do NOT induce vomiting. Give victim two glasses of water. Call a physician immediately. Never give anything by mouth to an unconscious person.

Abbreviations: N/D - Not Determined N/A - Not Applicable CA - Approximately

7. PRECAUTIONARY INFORMATION

EYE PROTECTION:

Avoid eye contact. The following should be worn alone or in combination, as appropriate, to prevent eye contact: Wear unvented goggles during operations in which exposure is likely. Wear full-face shield.

SKIN PROTECTION:

Avoid skin contact. Wear appropriate gloves when handling this material. A pair of gloves made from the following material(s) are recommended: butyl rubber, natural rubber. Use one or more of the following personal protection items as necessary to prevent skin contact: apron, coveralls.

RECOMMENDED VENTILATION:

Use with appropriate local exhaust ventilation. Provide sufficient ventilation to maintain emissions below recommended exposure limits. If exhaust ventilation is not adequate, use appropriate respiratory protection.

RESPIRATORY PROTECTION:

Avoid breathing of airborne material. Select one of the following NIOSH approved respirators based on airborne concentration of contaminants and in accordance with OSHA regulations: full-face supplied air respirator.

PREVENTION OF ACCIDENTAL INGESTION:

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

RECOMMENDED STORAGE:

Keep container closed when not in use. Keep container in well-ventilated area.

Corrosive

FIRE AND EXPLOSION AVOIDANCE:

Not applicable.

EXPOSURE LIMITS

INGREDIENT	VALUE	UNIT	TYPE	AUTH	SKIN*
PERFLUORO-OCTANOIC ACID.....	0.1	MG/M3	TWA	3M	Y
PERFLUORO COMPOUNDS, C5-18.....	NONE	NONE	NONE	NONE	
HYDROGEN FLUORIDE.....	3	PPM	CEIL	ACGIH	
	as F				
HYDROGEN FLUORIDE.....	3	PPM	TWA	OSHA	
	as F				

Abbreviations: N/D - Not Determined N/A - Not Applicable CA - Approximately

EXPOSURE LIMITS (continued)

INGREDIENT	VALUE	UNIT	TYPE	AUTH	SKIN*
HYDROGEN FLUORIDE.....	6	PPM	STEL	OSHA	
		as F			

* SKIN NOTATION: Listed substances indicated with 'Y' under SKIN refer to the potential contribution to the overall exposure by the cutaneous route including mucous membrane and eye, either by airborne or, more particularly, by direct contact with the substance. Vehicles can alter skin absorption.

SOURCE OF EXPOSURE LIMIT DATA:

- ACGIH: American Conference of Governmental Industrial Hygienists
- OSHA: Occupational Safety and Health Administration
- 3M: 3M Recommended Exposure Guidelines
- NONE: None Established

8. HEALTH HAZARD DATA

EYE CONTACT:

Chemical Related Eye Burns (chemical corrosivity): signs/symptoms can include cloudy appearance of the cornea, chemical burns, pain, swelling, ulcers, impaired vision or loss of vision.

SKIN CONTACT:

Skin Burns (chemical corrosivity): signs/symptoms can include redness, swelling, itching, pain, blistering, ulceration, sloughing, and scar formation.

May be absorbed through the skin and persist in the body for an extended time.

INHALATION:

May be absorbed by inhalation and persist in the body for an extended time.

Single overexposure, above recommended guidelines, may cause:

Irritation (upper respiratory): signs/symptoms can include soreness of the nose and throat, coughing and sneezing.

Prolonged or repeated overexposure, above recommended guidelines, may cause:

Liver Effects: signs/symptoms can include yellow skin(jaundice) and tenderness of upper abdomen.

Abbreviations: N/D - Not Determined N/A - Not Applicable CA - Approximately

8. HEALTH HAZARD DATA (continued)

IF SWALLOWED:

Damage to Gastrointestinal Tissues: signs/symptoms can include pain, vomiting, nausea, abdominal tenderness, burns of mouth, difficulty swallowing, blood in vomitus, blood in feces, and ulceration.

OTHER HEALTH HAZARD INFORMATION:

This product is not known to contain any substances regulated under California Proposition 65.

SECTION CHANGE DATES

HEALTH HAZARD DATA SECTION CHANGED SINCE March 07, 1997 ISSUE

Abbreviations: N/D - Not Determined N/A - Not Applicable CA - Approximately

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3M provides information in electronic form as a service to its customers. Due to the remote possibility that electronic transfer may have resulted in errors, omissions or alterations in this information, 3M makes no representations as to its completeness or accuracy. In addition, information obtained from a database may not be as current as the information in the MSDS available directly from 3M.

2. PHYSICAL DATA (continued)

MELTING POINT:..... N/D

APPEARANCE AND ODOR:

Light colored, free flowing powder.

3. FIRE AND EXPLOSION HAZARD DATA

FLASH POINT:..... None

FLAMMABLE LIMITS - LEL:..... N/A

FLAMMABLE LIMITS - UEL:..... N/A

AUTOIGNITION TEMPERATURE:..... N/A

EXTINGUISHING MEDIA:

Water, Carbon dioxide, Dry chemical, Foam

SPECIAL FIRE FIGHTING PROCEDURES:

Wear full protective clothing, including helmet, self-contained, positive pressure or pressure demand breathing apparatus, bunker coat and pants, bands around arms, waist and legs, face mask, and protective covering for exposed areas of the head.

UNUSUAL FIRE AND EXPLOSION HAZARDS:

See Hazardous Decomposition section for products of combustion.

4. REACTIVITY DATA

STABILITY: Stable

INCOMPATIBILITY - MATERIALS/CONDITIONS TO AVOID:

Not applicable.

HAZARDOUS POLYMERIZATION: Hazardous polymerization will not occur.

HAZARDOUS DECOMPOSITION PRODUCTS:

Carbon Monoxide and Carbon Dioxide, Oxides of Sulfur, Hydrogen Fluoride, Toxic Vapors, Gases or Particulates.

5. ENVIRONMENTAL INFORMATION

SPILL RESPONSE:

Observe precautions from other sections. Vacuum, use wet sweeping compound or water to avoid dusting. CAUTION! A vacuum cleaner could be an ignition source. Clean up residue with water. Place in a

Abbreviations: N/D - Not Determined N/A - Not Applicable CA - Approximately

5. ENVIRONMENTAL INFORMATION (continued)

closed container.

RECOMMENDED DISPOSAL:

Do not release to waterways or sewer. Do not use in products or processes that could result in aquatic concentrations greater than 1/10 of the lowest EC50 or LC50 concentration. Incinerate in an industrial or commercial facility in the presence of a combustible material. Combustion products will include HF.

ENVIRONMENTAL DATA:

6-Hr. Aquatic Fish LC50, Fathead Minnow (*Pimephales promelas*)=38 mg/l, Bluegill Sunfish (*Lepomis macrochirus*)=68 mg/l, Rainbow Trout (*Salmo gairdneri*)=11 mg/l; 48-Hr. EC50, Daphnia Magna = 50 mg/l; COD=.004 g/g; BOD20 = Nil.

REGULATORY INFORMATION:

Volatile Organic Compounds: N/A.
VOC Less H2O & Exempt Solvents: N/A.

Since regulations vary, consult applicable regulations or authorities before disposal. U.S. EPA Hazardous Waste Number = None (Not U.S. EPA Hazardous).

This product complies with the chemical registration requirements of TSCA, EINECS, CDSL, AICS, MITI and Korea.

OTHER ENVIRONMENTAL INFORMATION:

This product contains one or more organic fluorochemicals that have the potential to resist degradation and persist in the environment.

EPCRA HAZARD CLASS:

FIRE HAZARD: No PRESSURE: No REACTIVITY: No ACUTE: Yes CHRONIC: Yes

6. SUGGESTED FIRST AID

EYE CONTACT:

Immediately flush eyes with large amounts of water for at least 15 minutes. Get immediate medical attention.

SKIN CONTACT:

Immediately flush skin with large amounts of water. Remove contaminated clothing. If irritation persists, call a physician. Wash contaminated clothing before reuse.

INHALATION:

If signs/symptoms occur, remove person to fresh air. If signs/symptoms continue, call a physician.

Abbreviations: N/D - Not Determined N/A - Not Applicable CA - Approximately

6. SUGGESTED FIRST AID (continued)

IF SWALLOWED:

If swallowed, call a physician immediately. Only induce vomiting at the instruction of a physician. Never give anything by mouth to an unconscious person.

7. PRECAUTIONARY INFORMATION

EYE PROTECTION:

Avoid eye contact. Wear vented goggles.

SKIN PROTECTION:

Avoid skin contact. Wear appropriate gloves when handling this material. A pair of gloves made from the following material(s) are recommended: butyl rubber. Use one or more of the following personal protection items as necessary to prevent skin contact: head covering, coveralls. Protective garments (other than gloves) should be made of either of the following materials: polyethylene/polyvinylidene chloride (Saranex).

RECOMMENDED VENTILATION:

If exhaust ventilation is not adequate, use appropriate respiratory protection. Provide ventilation adequate to control vapor concentrations below recommended exposure limits and/or control spray or mist.

RESPIRATORY PROTECTION:

Avoid breathing of vapors created during the cure cycle. Avoid breathing of airborne material. Select one of the following NIOSH approved respirators based on airborne concentration of contaminants and in accordance with OSHA regulations: half-mask dust and mist respirator, half-mask supplied air respirator, full-face dust and mist respirator, full-face supplied air respirator.

PREVENTION OF ACCIDENTAL INGESTION:

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

RECOMMENDED STORAGE:

Store away from areas where product may come into contact with food or pharmaceuticals. Store at room temperature. Keep container dry. Keep container closed when not in use.

FIRE AND EXPLOSION AVOIDANCE:

Nonflammable.

Abbreviations: N/D - Not Determined N/A - Not Applicable CA - Approximately

7. PRECAUTIONARY INFORMATION (continued)

OTHER PRECAUTIONARY INFORMATION:

No smoking: Smoking while using this product can result in contamination of the tobacco and/or smoke and lead to the formation of the hazardous decomposition products mentioned in section 4 of this MSDS.

HMIS HAZARD RATINGS: HEALTH: 2 FLAMMABILITY: 0 REACTIVITY: 0
PERSONAL PROTECTION: X (See precautions, section 7.)

EXPOSURE LIMITS

INGREDIENT	VALUE	UNIT	TYPE	AUTH	SKIN*
POTASSIUM PERFLUOROALKYL SULFONATE...	0.1	MG/M3	TWA	3M	Y
POTASSIUM PERFLUOROALKYL SULFONATE...	0.1	MG/M3	TWA	3M	Y
POTASSIUM PERFLUOROALKYL SULFONATE...	0.1	MG/M3	TWA	3M	Y
POTASSIUM PERFLUOROALKYL SULFONATE...	0.1	MG/M3	TWA	3M	Y
POTASSIUM PERFLUOROALKYL SULFONATE...	0.1	MG/M3	TWA	3M	Y

* SKIN NOTATION: Listed substances indicated with 'Y' under SKIN refer to the potential contribution to the overall exposure by the cutaneous route including mucous membrane and eye, either by airborne or, more particularly, by direct contact with the substance. Vehicles can alter skin absorption.

SOURCE OF EXPOSURE LIMIT DATA:

- 3M: 3M Recommended Exposure Guidelines

8. HEALTH HAZARD DATA

EYE CONTACT:

Mild Eye Irritation: signs/symptoms can include redness, swelling, pain, and tearing.

SKIN CONTACT:

Mild Skin Irritation (after prolonged or repeated contact): signs/symptoms can include redness, swelling, and itching.

May be absorbed through the skin and produce effects similiar to those caused by inhalation and/or ingestion.

INHALATION:

May be harmful if inhaled.

Single overexposure, above recommended guidelines, may cause:

Irritation (upper respiratory): signs/symptoms can include soreness of the nose and throat, coughing and sneezing.

Abbreviations: N/D - Not Determined N/A - Not Applicable CA - Approximately

8. HEALTH HAZARD DATA (continued)

IF SWALLOWED:

Animal studies conducted on organic fluorochemicals which are present in this product indicate effects including liver disturbances, weight loss, loss of appetite, lethargy, and neurological, pancreatic, adrenal and hematologic effects. There are no known human health effects from anticipated exposure to these organic fluorochemicals when used as intended and instructed.

Illness may result from a single swallowing of a moderate quantity of this material.

Ingestion may cause:

Aspiration Pneumonitis: signs/symptoms can include coughing, difficulty breathing, wheezing, coughing up blood and pneumonia, which can be fatal.

MUTAGENICITY:

Mutagenicity assays indicate the product is not mutagenic.

REPRODUCTIVE/DEVELOPMENTAL TOXINS:

Not teratogenic in the rat at oral doses below maternally toxic levels.

OTHER HEALTH HAZARD INFORMATION:

This product is not known to contain any substances regulated under California Proposition 65.

A Product Toxicity Summary Sheet is available.

This product contains one or more organic fluorochemicals that have the potential to be absorbed and remain in the body for long periods of time, either as the parent molecule or as metabolites, and may accumulate with repeated exposures. There are no known human health effects from anticipated exposure to these organic fluorochemicals when used as intended and instructed.

The presence of organic fluorochemicals in the blood of the general population and subpopulations, such as workers, has been published dating back to the 1970's. 3M's epidemiological study of its own workers indicates no adverse effects.

SECTION CHANGE DATES

INGREDIENTS	SECTION CHANGED SINCE	January 29, 1998	ISSUE
ENVIRONMENTAL INFO.	SECTION CHANGED SINCE	January 29, 1998	ISSUE
SUGG. FIRST AID	SECTION CHANGED SINCE	January 29, 1998	ISSUE
PRECAUTIONARY INFO.	SECTION CHANGED SINCE	January 29, 1998	ISSUE

Abbreviations: N/D - Not Determined N/A - Not Applicable CA - Approximately

SECTION CHANGE DATES (continued)

HEALTH HAZARD DATA SECTION CHANGED SINCE January 29, 1998 ISSUE

Abbreviations: N/D - Not Determined N/A - Not Applicable CA - Approximately

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MATERIAL SAFETY
DATA SHEET



DIVISION: SPECIALTY CHEMICALS DIVISION

TRADE NAME:

FC-98 FLUORAD Brand Fluorochemical Surfactant

3M ID NUMBER/U.P.C.: 98-0207-0203-5 00-51135-09056-5 98-0207-0204-3 00-51135-09057-2
98-0211-0889-3 00-51135-09363-4

ISSUED: JANUARY 29, 1996

SUPERSEDES: FEBRUARY 20, 1995

DOCUMENT: 10-3797-7

1. INGREDIENT	C.A.S. NO.	PERCENT		
POTASSIUM PERFLUOROETHYL CYCLOHEXYL SULFONATE	67584-42-3	66.0	-	70.0
POTASSIUM PERFLUOROMETHYL CYCLOHEXYL SULFONATE	68156-07-0	18.0	-	22.0
POTASSIUM PERFLUORODIMETHYL CYCLOHEXYL SULFONATE	68156-01-4	9.0	-	13.0
POTASSIUM PERFLUOROCYCLOHEXYL SULFONATE	3107-18-4	1.0	-	3.0

2. PHYSICAL DATA

BOILING POINT:..... N/A
VAPOR PRESSURE:..... N/A
VAPOR DENSITY:..... N/A
EVAPORATION RATE:..... N/A
SOLUBILITY IN WATER:..... slight
SP. GRAVITY:..... ca. 0.6 Water = 1
 (Bulk)
PERCENT VOLATILE:..... 0 %
VOLATILE ORGANICS:..... N/A
VOC LESS H2O & EXEMPT SOLVENT N/A
PH:..... 6-8
 (0.1% Aqueous)
VISCOSITY:..... N/D
MELTING POINT:..... N/D
APPEARANCE AND ODOR: Free-flowing off-white powder, slight sulfide odor.

3. FIRE AND EXPLOSION HAZARD DATA

FLASH POINT:..... Setaflash
 None
FLAMMABLE LIMITS - LEL:..... N/A
FLAMMABLE LIMITS - UEL:..... N/A
AUTOIGNITION TEMPERATURE:... N/A
EXTINGUISHING MEDIA:
 Water, Carbon dioxide, Dry chemical, Foam
SPECIAL FIRE FIGHTING PROCEDURES:
 Wear full protective clothing, including helmet, self-contained, positive pressure or pressure demand breathing apparatus, bunker coat and pants, bands around arms, waist and legs, face mask, and protective covering for exposed areas of the head.
UNUSUAL FIRE AND EXPLOSION HAZARDS:
 See Hazardous Decomposition section for products of combustion.

Abbreviations: N/D - Not Determined N/A - Not Applicable

MATERIAL SAFETY
DATA SHEETMSDS: FC-98 FLUORAD Brand Fluorochemical Surfactant
JANUARY 29, 1996

PAGE: 2 of 5

4. REACTIVITY DATA

STABILITY: Stable**INCOMPATIBILITY - MATERIALS TO AVOID:**

Not applicable.

HAZARDOUS POLYMERIZATION: Will Not Occur**HAZARDOUS DECOMPOSITION PRODUCTS:**Carbon Monoxide and Carbon Dioxide, Oxides of Sulfur, Hydrogen
Fluoride, Toxic Vapors, Gases or Particulates.

5. ENVIRONMENTAL INFORMATION

SPILL RESPONSE:

Refer to other sections of this MSDS for information regarding physical and health hazards, respiratory protection, ventilation, and personal protective equipment. In the U.S.A., call (612) 733-1110 or (612) 733-6100 for 24-hour spill assistance. Use wet sweeping compound or water to avoid dusting. Clean up residue. Place in a U.S. DOT-approved container.

RECOMMENDED DISPOSAL:

Discharge spent solutions and small quantities (less than 5 gal.(19 L)) to a wastewater treatment system. Incinerate in a permitted hazardous waste incinerator in the presence of a combustible material. Combustion products will include HF. Dispose of waste product in a facility permitted to accept chemical waste.

ENVIRONMENTAL DATA:

96-Hr. LC50, Fathead Minnow(Pimephales promelas) = 155 mg/l; TOC = 0.17 g/g; COD = <0.004 g/g; BOD20 = Nil.

REGULATORY INFORMATION:

The components of this product are in compliance with TSCA, EINECS, CDSL, AICS and MITI.

EPCRA HAZARD CLASS:

FIRE HAZARD: No **PRESSURE:** No **REACTIVITY:** No **ACUTE:** Yes **CHRONIC:** Yes

6. SUGGESTED FIRST AID

EYE CONTACT:

Immediately flush eyes with large amounts of water for at least 15 minutes. Get immediate medical attention.

SKIN CONTACT:

Wash affected area with soap and water.

INHALATION:

If signs/symptoms occur, remove person to fresh air. If signs/symptoms continue, call a physician.

IF SWALLOWED:

If swallowed, do NOT induce vomiting. Give victim two glasses of

Abbreviations: N/D - Not Determined N/A - Not Applicable

MATERIAL SAFETY
DATA SHEETMSDS: FC-98 FLUORAD Brand Fluorochemical Surfactant
JANUARY 29, 1996

PAGE: 3 of 5

6. SUGGESTED FIRST AID (continued)

water. Call a physician immediately. Never give anything by mouth to an unconscious person.

7. PRECAUTIONARY INFORMATION**EYE PROTECTION:**

Avoid eye contact. Wear vented goggles.

SKIN PROTECTION:

Avoid skin contact. Wear appropriate gloves when handling this material. A pair of gloves made from the following material(s) are recommended: butyl rubber. Use one or more of the following personal protection items as necessary to prevent skin contact: head covering, coveralls. Protective garments (other than gloves) should be made of either of the following materials: polyethylene/polyvinylidene chloride (Saranex).

VENTILATION PROTECTION:

Use with appropriate local exhaust ventilation. Provide sufficient ventilation to maintain emissions below recommended exposure limits. If exhaust ventilation is not adequate, use appropriate respiratory protection.

RESPIRATORY PROTECTION:

Avoid breathing of airborne material. Select one of the following NIOSH approved respirators based on airborne concentration of contaminants and in accordance with OSHA regulations: half-mask high-efficiency filter respirator, half-mask supplied air respirator.

PREVENTION OF ACCIDENTAL INGESTION:

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

RECOMMENDED STORAGE:

Store at room temperature.

FIRE AND EXPLOSION AVOIDANCE:

No smoking while handling this material.

INGREDIENTS	EXPOSURE LIMITS		TYPE	AUTH	SKIN*
	VALUE	UNIT			
POTASSIUM PERFLUOROETHYL CYCLOHEXYL SULFONATE	0.1	mg/m3	TWA	3M	Y
POTASSIUM PERFLUOROMETHYL CYCLOHEXYL SULFONATE	0.1	mg/m3	TWA	3M	Y

Abbreviations: N/D - Not Determined N/A - Not Applicable

MATERIAL SAFETY
DATA SHEET**3M**MSDS: FC-98 FLUORAD Brand Fluorochemical Surfactant
JANUARY 29, 1996

PAGE: 4 of 5

7. PRECAUTIONARY INFORMATION (continued)

INGREDIENTS	EXPOSURE LIMITS		TYPE	AUTH	SKIN*
	VALUE	UNIT			
POTASSIUM PERFLUORODIMETHYL CYCLOHEXYL SULFONATE	0.1	mg/m3	TWA	3M	Y
POTASSIUM PERFLUOROCYCLOHEXYL SULFONATE	0.1	mg/m3	TWA	3M	Y

* SKIN NOTATION: Listed substances indicated with "Y" under SKIN refer to the potential contribution to the overall exposure by the cutaneous route including mucous membrane and eye, either by airborne or, more particularly, by direct contact with the substance. Vehicles can alter skin absorption.

SOURCE OF EXPOSURE LIMIT DATA:

- AIHA: American Industrial Hygiene Assoc. Workplace Environmental Exposure Level
- 3M: 3M Medical Department Guideline

8. HEALTH HAZARD DATA**EYE CONTACT:**

Moderate Eye Irritation: signs/symptoms can include redness, swelling, pain, tearing, and hazy vision.

SKIN CONTACT:

Product is not expected to be irritating to the skin.

May be absorbed through the skin and persist in the body for an extended time.

INHALATION:

Illness requiring medical attention may result from a single exposure by inhalation to moderate quantities of this material.

May be absorbed by inhalation and persist in the body for an extended time.

Single overexposure, above recommended guidelines, may cause:

Irritation (upper respiratory): signs/symptoms can include soreness of the nose and throat, coughing and sneezing.

WHILE THE FOLLOWING EFFECTS ARE ASSOCIATED WITH ONE OR MORE OF THE INDIVIDUAL INGREDIENTS IN THIS PRODUCT AND ARE REQUIRED TO BE INCLUDED ON THE MSDS BY THE U.S. OSHA HAZARD COMMUNICATION STANDARD, THEY ARE NOT EXPECTED EFFECTS DURING FORESEEABLE USE OF THIS PRODUCT.

Prolonged or repeated overexposure, above recommended guidelines, may cause:

Abbreviations: N/D - Not Determined N/A - Not Applicable

MATERIAL SAFETY
DATA SHEET**3M**MSDS: FC-98 FLUORAD Brand Fluorochemical Surfactant
JANUARY 29, 1996

PAGE: 5 of 5

8. HEALTH HAZARD DATA (continued)

Liver Effects: signs/symptoms can include yellow skin(jaundice) and tenderness of upper abdomen.

Lung Damage: signs/symptoms can include coughing, difficulty breathing, wheezing, tightness in chest, congestion, and coughing up of blood.

IF SWALLOWED:

Ingestion is not a likely route of exposure to this product.

Illness may occur after a single swallowing of relatively large quantities of this material.

OTHER HEALTH HAZARD INFORMATION:

A 3M Product Toxicity Summary Sheet is available.

SECTION CHANGE DATES

ENVIRON. DATA SECTION CHANGED SINCE FEBRUARY 20, 1995 ISSUE

Abbreviations: N/D - Not Determined N/A - Not Applicable

The information on this Data Sheet represents our current data and best opinion as to the proper use in handling of this material under normal conditions. Any use of the material which is not in conformance with this Data Sheet or which involves using the material in combination with any other material or any other process is the responsibility of the user.

MATERIAL SAFETY DATA SHEET 3M
3M Center
St. Paul, Minnesota
55144-1000
1-800-364-3577 or (612) 737-6501 (24 hours)

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DIVISION: SPECIALTY CHEMICALS DIVISION

TRADE NAME:

FC-26 FLUORAD Brand Fluorochemical Acid

ID NUMBER/U.P.C.:

98-0201-0402-6 00-51135-09013-8 98-0211-8906-7 00-51135-09013-8

ZF-0002-0376-8

ISSUED: November 05, 1997

SUPERSEDES: July 09, 1997

DOCUMENT: 10-3782-9

1. INGREDIENT	C.A.S. NO.	PERCENT
PERFLUOROOCTANOIC ACID (C7F15COOH).....	335-67-1	100.0

2. PHYSICAL DATA

BOILING POINT:..... 187 C
VAPOR PRESSURE:..... ca. 10 mmHg
Calc @ 20 C.
VAPOR DENSITY:..... N/D
EVAPORATION RATE:..... N/D
SOLUBILITY IN WATER:..... slight
SPECIFIC GRAVITY:..... ca. 1.7 Water=1
(Liquid)
PERCENT VOLATILE:..... Negligible
pH:..... ca. 1
VISCOSITY:..... N/D
MELTING POINT:..... N/D

APPEARANCE AND ODOR:

Clear, colorless to pale yellow liquid @65 C. Pungent odor.

Abbreviations: N/D - Not Determined N/A - Not Applicable CA - Approximately

3. FIRE AND EXPLOSION HAZARD DATA

FLASH POINT:..... Non-Flammable (Setaflash)
FLAMMABLE LIMITS - LEL:..... N/A
FLAMMABLE LIMITS - UEL:..... N/A
AUTOIGNITION TEMPERATURE:..... N/A

EXTINGUISHING MEDIA:

Non-combustible. Choose material suitable for surrounding fire.

SPECIAL FIRE FIGHTING PROCEDURES:

Wear full protective clothing, including helmet, self-contained, positive pressure or pressure demand breathing apparatus, bunker coat and pants, bands around arms, waist and legs, face mask, and protective covering for exposed areas of the head.

UNUSUAL FIRE AND EXPLOSION HAZARDS:

See Hazardous Decomposition section for products of combustion.

4. REACTIVITY DATA

STABILITY: Stable

INCOMPATIBILITY - MATERIALS/CONDITIONS TO AVOID:

Strong Bases.

HAZARDOUS POLYMERIZATION: Hazardous polymerization will not occur.

HAZARDOUS DECOMPOSITION PRODUCTS:

Carbon Monoxide and Carbon Dioxide, Hydrogen Fluoride, Toxic Vapors, Gases or Particulates.

5. ENVIRONMENTAL INFORMATION

SPILL RESPONSE:

Refer to other sections of this MSDS for information regarding physical and health hazards, respiratory protection, ventilation, and personal protective equipment. Ventilate area. Contain spill. Evacuate unprotected personnel from hazard area. Cover with soda ash (sodium carbonate) or sodium bicarbonate. Collect spilled material. Clean up residue with soda ash (sodium carbonate) solution. Place in a polyethylene-lined metal container. Do not seal for 48 hours.

RECOMMENDED DISPOSAL:

Incinerate in a permitted hazardous waste incinerator in the presence of a combustible material. Combustion products will include HF.

Abbreviations: N/D - Not Determined N/A - Not Applicable CA - Approximately

5. ENVIRONMENTAL INFORMATION (continued)

ENVIRONMENTAL DATA:

SUPPORTING DATA (FROM FX-1001):

BIODEGRADATION:

Theoretical Oxygen Demand (ThOD): 0.107 g/g
Chemical Oxygen Demand (COD): Nil
20-Day Biochemical Oxygen Demand (BOD20): Nil

AQUATIC TOXICITY:

Fathead Minnow (*Pimephales promelas*) 96-hr LC50: 843 mg/L

REGULATORY INFORMATION:

Volatile Organic Compounds: 1700 gms/liter South Coast Air Quality Mgmt
Dist Method.
VOC Less H2O & Exempt Solvents: N/A.

Since regulations vary, consult applicable regulations or authorities
before disposal. U.S. EPA Hazardous Waste Number = D002 (Corrosive)

This product complies with the chemical registration requirements of
TSCA, EINECS, AICS, MITI and Korea.

OTHER ENVIRONMENTAL INFORMATION:

This substance did not degrade significantly in a ready
biodegradation test.

This compound is completely fluorinated (perfluorinated), or it
contains perfluorinated portions. Perfluoroalkyl groups resist
degradation in most natural environments.

This substance has minimal toxicity to aquatic organisms (100 mg/L <
Lowest LC50, EC50, or IC50 < or = 1000 mg/L).

Bioassays have been run on organisms from less than three phyla.
Organisms from taxa that were not tested may show greater
sensitivity.

No data are available on the toxicity effects of this substance on
wastewater treatment system organisms.

EPCRA HAZARD CLASS:

FIRE HAZARD: No PRESSURE: No REACTIVITY: Yes ACUTE: Yes CHRONIC: Yes

Abbreviations: N/D - Not Determined N/A - Not Applicable CA - Approximately

6. SUGGESTED FIRST AID

EYE CONTACT:

Immediately flush eyes with large amounts of water for at least 15 minutes. Get immediate medical attention.

SKIN CONTACT:

Immediately flush skin with large amounts of water for at least 15 minutes in a chemical safety shower while removing contaminated clothing and shoes. Get immediate medical attention. Wash contaminated clothing before reuse.

INHALATION:

If signs/symptoms occur, remove person to fresh air. If signs/symptoms continue, call a physician.

IF SWALLOWED:

If swallowed, do NOT induce vomiting. Give victim two glasses of water. Call a physician immediately. Never give anything by mouth to an unconscious person.

7. PRECAUTIONARY INFORMATION

EYE PROTECTION:

Avoid eye contact. The following should be worn alone or in combination, as appropriate, to prevent eye contact: Wear vented goggles. Wear full-face shield.

SKIN PROTECTION:

Avoid skin contact. Wear appropriate gloves when handling this material. A pair of gloves made from the following material(s) are recommended: butyl rubber, natural rubber. Use one or more of the following personal protection items as necessary to prevent skin contact: apron, coveralls.

RECOMMENDED VENTILATION:

Use with appropriate local exhaust ventilation. Provide sufficient ventilation to maintain emissions below recommended exposure limits. If exhaust ventilation is not adequate, use appropriate respiratory protection.

RESPIRATORY PROTECTION:

Avoid breathing of airborne material. Select one of the following NIOSH approved respirators based on airborne concentration of contaminants and in accordance with OSHA regulations: full-face supplied air respirator.

Abbreviations: N/D - Not Determined N/A - Not Applicable CA - Approximately

7. PRECAUTIONARY INFORMATION (continued)

PREVENTION OF ACCIDENTAL INGESTION:

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

RECOMMENDED STORAGE:

Store away from heat. Keep container closed when not in use. Keep container in well-ventilated area.

Corrosive

FIRE AND EXPLOSION AVOIDANCE:

Keep container tightly closed. Nonflammable.

OTHER PRECAUTIONARY INFORMATION:

No smoking: Smoking while using this product can result in contamination of the tobacco and/or smoke and lead to the formation of the hazardous decomposition products mentioned in section 4 of this MSDS.

HMIS HAZARD RATINGS: HEALTH: 3 FLAMMABILITY: 0 REACTIVITY: 2
PERSONAL PROTECTION: X (See precautions, section 7.)

EXPOSURE LIMITS

INGREDIENT	VALUE	UNIT	TYPE	AUTH	SKIN*
PERFLUOROOCCTANOIC ACID (C7F15COOH)...	0.1	MG/M3	TWA	3M	Y

* SKIN NOTATION: Listed substances indicated with 'Y' under SKIN refer to the potential contribution to the overall exposure by the cutaneous route including mucous membrane and eye, either by airborne or, more particularly, by direct contact with the substance. Vehicles can alter skin absorption.

SOURCE OF EXPOSURE LIMIT DATA:

- 3M: 3M Recommended Exposure Guidelines

8. HEALTH HAZARD DATA

EYE CONTACT:

Chemical Related Eye Burns (chemical corrosivity): signs/symptoms can include cloudy appearance of the cornea, chemical burns, pain, tearing, ulcers, impaired vision or loss of vision.

SKIN CONTACT:

Skin Burns (chemical corrosivity): signs/symptoms can include redness, swelling, itching, pain, blistering, ulceration, sloughing, and scar formation.

Abbreviations: N/D - Not Determined N/A - Not Applicable CA - Approximately

8. HEALTH HAZARD DATA (continued)

May be absorbed through the skin and persist in the body for an extended time.

INHALATION:

May be absorbed by inhalation and persist in the body for an extended time.

Single overexposure, above recommended guidelines, may cause:

Irritation (upper respiratory): signs/symptoms can include soreness of the nose and throat, coughing and sneezing.

Prolonged or repeated overexposure, above recommended guidelines, may cause:

Liver Effects: signs/symptoms can include yellow skin(jaundice) and tenderness of upper abdomen.

IF SWALLOWED:

Ingestion is not a likely route of exposure to this product.

Illness may occur after a single swallowing of relatively large quantities of this material.

Ingestion may cause:

Damage to Gastrointestinal Tissues: signs/symptoms can include pain, vomiting, nausea, abdominal tenderness, burns of mouth, difficulty swallowing, blood in vomitus, blood in feces, and ulceration.

OTHER HEALTH HAZARD INFORMATION:

This product is not known to contain any substances regulated under California Proposition 65.

A Product Toxicity Summary Sheet is available.

SECTION CHANGE DATES

HEALTH HAZARD DATA SECTION CHANGED SINCE July 09, 1997 ISSUE

Abbreviations: N/D - Not Determined N/A - Not Applicable CA - Approximately

The information in this Material Safety Data Sheet (MSDS) is believed to be correct as of the date issued. 3M MAKES NO WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OR COURSE OF PERFORMANCE OR USAGE OF TRADE. User is responsible for determining whether the 3M product is fit for a particular purpose and suitable for user's method of use or application. Given the variety of factors that can affect the use and application of a 3M product, some of which are uniquely within the user's knowledge and control, it is essential that the user evaluate the 3M product to determine whether it is fit for a particular purpose and suitable for user's method of use or application.

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*** 3M Internal Use Only ***

MATERIAL SAFETY 3M
DATA SHEET 3M Center
(Intermediate) St. Paul, Minnesota
55144-1000
1-800-364-3577 or (651) 737-6501 (24 hours)

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- 2) neither the copy nor the original is resold or otherwise
distributed with the intention of earning a profit thereon.

DIVISION: SPECIALTY MATERIALS MANUFACTURING DIV.

MATERIAL:

PERFLUOROBUTYRIC ACID F-7154 FM-3124 FM-3918

ID NUMBER: 41-2600-7154-7 41-2700-3123-4 41-2700-3124-2 41-2700-3341-2
41-2700-3918-7

ISSUED: May 12, 2000

SUPERSEDES: December 06, 1999

DOCUMENT: 04-1540-6

1. INGREDIENT	C.A.S. NO.	PERCENT
PERFLUOROBUTANOIC ACID.....	375-22-4	70 - 100
OTHER PERFLUORO ACIDS.....	Unknown	< 20
SULFURIC ACID.....	7664-93-9	5 - 10
HYDROGEN FLUORIDE.....	7664-39-3	< 1

This product contains the following toxic chemical or chemicals subject to
the reporting requirements of Section 313 of Title III of the Emergency
Planning and Community Right-To-Know Act of 1986 and 40 CFR Part 372:

SULFURIC ACID
HYDROGEN FLUORIDE

2. PHYSICAL DATA

BOILING POINT:..... ca. 248 F
VAPOR PRESSURE:..... N/D
VAPOR DENSITY:..... N/D
EVAPORATION RATE:..... N/D
SOLUBILITY IN WATER:..... apprec.
SPECIFIC GRAVITY:..... ca. 1.6 Water=1
PERCENT VOLATILE:..... 90 - 100 %
pH:..... ca. 1
VISCOSITY:..... water-like
MELTING POINT:..... N/D

Abbreviations: N/D - Not Determined N/A - Not Applicable CA - Approximately

2. PHYSICAL DATA (continued)

APPEARANCE AND ODOR:
Colorless acid with strong butyric odor.

3. FIRE AND EXPLOSION HAZARD DATA

FLASH POINT:..... N/A
FLAMMABLE LIMITS - LEL:..... N/A
FLAMMABLE LIMITS - UEL:..... N/A
AUTOIGNITION TEMPERATURE:..... N/D

EXTINGUISHING MEDIA:
Carbon dioxide, Dry chemical, Foam

SPECIAL FIRE FIGHTING PROCEDURES:
Wear full protective clothing, including helmet, self-contained, positive pressure or pressure demand breathing apparatus, bunker coat and pants, bands around arms, waist and legs, face mask, and protective covering for exposed areas of the head.

UNUSUAL FIRE AND EXPLOSION HAZARDS:
See Hazardous Decomposition section for products of combustion.

4. REACTIVITY DATA

STABILITY: Stable

INCOMPATIBILITY - MATERIALS/CONDITIONS TO AVOID:
Strong Bases.

HAZARDOUS POLYMERIZATION: Hazardous polymerization will not occur.

HAZARDOUS DECOMPOSITION PRODUCTS:
Carbon Monoxide and Carbon Dioxide, Oxides of Sulfur, Hydrogen Fluoride.

5. ENVIRONMENTAL INFORMATION

SPILL RESPONSE:
Refer to other sections of this MSDS for information regarding physical and health hazards, respiratory protection, ventilation, and personal protective equipment. Ventilate area. Contain spill. Evacuate unprotected personnel from hazard area. Cover with soda ash (sodium carbonate) or sodium bicarbonate. Collect spilled material.

Abbreviations: N/D - Not Determined N/A - Not Applicable CA - Approximately

5. ENVIRONMENTAL INFORMATION (continued)

Clean up residue with soda ash (sodium carbonate) solution. Place in a polyethylene-lined metal container. Do not seal for 48 hours.

RECOMMENDED DISPOSAL:

Incinerate in a permitted hazardous waste incinerator. Combustion products will include HF.

ENVIRONMENTAL DATA:

Not determined.

REGULATORY INFORMATION:

Volatile Organic Compounds: N/D.
VOC Less H2O & Exempt Solvents: N/D.

Since regulations vary, consult applicable regulations or authorities before disposal. In the event of an uncontrolled release of this material, the user should determine if the release qualifies as a reportable quantity. U.S. EPA Hazardous Waste Number = D002 (Corrosive)

EPCRA HAZARD CLASS:

FIRE HAZARD: No PRESSURE: No REACTIVITY: Yes ACUTE: Yes CHRONIC: Yes

6. SUGGESTED FIRST AID

EYE CONTACT:

Immediately flush eyes with large amounts of water for at least 15 minutes. Get immediate medical attention.

SKIN CONTACT:

Immediately flush skin with large amounts of water for at least 15 minutes in a chemical safety shower while removing contaminated clothing and shoes. Get immediate medical attention. Wash contaminated clothing before reuse.

INHALATION:

Remove person to fresh air. If not breathing, give artificial respiration. If breathing is difficult, get immediate medical attention.

IF SWALLOWED:

If swallowed, do NOT induce vomiting. Give victim two glasses of water. Call a physician immediately. Never give anything by mouth to an unconscious person.

Abbreviations: N/D - Not Determined N/A - Not Applicable CA - Approximately

 7. PRECAUTIONARY INFORMATION

EYE PROTECTION:

Avoid eye contact. The following should be worn alone or in combination, as appropriate, to prevent eye contact: Wear unvented goggles during operations in which exposure is likely. Wear full-face shield.

SKIN PROTECTION:

Avoid skin contact. Wear appropriate gloves when handling this material. Use one or more of the following personal protection items as necessary to prevent skin contact: apron, full-body suit, booties, head covering.

RECOMMENDED VENTILATION:

Provide appropriate local exhaust ventilation at transfer points. Provide appropriate local exhaust ventilation on open containers. Provide sufficient ventilation to maintain emissions below recommended exposure limits. If exhaust ventilation is not adequate, use appropriate respiratory protection.

RESPIRATORY PROTECTION:

Avoid breathing of vapors, mists or spray. Select one of the following NIOSH approved respirators based on airborne concentration of contaminants and in accordance with OSHA regulations: full-face supplied air respirator.

PREVENTION OF ACCIDENTAL INGESTION:

Do not ingest.

RECOMMENDED STORAGE:

Keep container closed when not in use. Keep container in well-ventilated area.

FIRE AND EXPLOSION AVOIDANCE:

Not applicable.

EXPOSURE LIMITS

INGREDIENT	VALUE	UNIT	TYPE	AUTH	SKIN*
PERFLUOROBUTANOIC ACID.....	0.1	MG/M3	TWA	3M	Y
OTHER PERFLUORO ACIDS.....	NONE	NONE	NONE	NONE	
SULFURIC ACID.....	1	MG/M3	TWA	ACGIH	
		A2 for mists			
SULFURIC ACID.....	3	MG/M3	STEL	ACGIH	
		A2 for mists			
SULFURIC ACID.....	1	MG/M3	TWA	OSHA	
HYDROGEN FLUORIDE.....	3	PPM	CEIL	ACGIH	
		as F			
HYDROGEN FLUORIDE.....	3	PPM	TWA	OSHA	

 Abbreviations: N/D - Not Determined N/A - Not Applicable CA - Approximately

EXPOSURE LIMITS (continued)

INGREDIENT	VALUE	UNIT	TYPE	AUTH	SKIN*
		as F			
HYDROGEN FLUORIDE.....	6	PPM	STEL	OSHA	
		as F			

* SKIN NOTATION: Listed substances indicated with 'Y' under SKIN refer to the potential contribution to the overall exposure by the cutaneous route including mucous membrane and eye, either by airborne or, more particularly, by direct contact with the substance. Vehicles can alter skin absorption.

SOURCE OF EXPOSURE LIMIT DATA:

- 3M: 3M Recommended Exposure Guidelines
- ACGIH: American Conference of Governmental Industrial Hygienists
- OSHA: Occupational Safety and Health Administration

- NONE: None Established

8. HEALTH HAZARD DATA

EYE CONTACT:

Chemical Related Eye Burns (chemical corrosivity): signs/symptoms can include cloudy appearance of the cornea, chemical burns, pain, tearing, ulcers, impaired vision or loss of vision.

SKIN CONTACT:

Skin Burns (chemical corrosivity): signs/symptoms can include redness, swelling, itching, pain, blistering, ulceration, sloughing, and scar formation.

May be absorbed through the skin and persist in the body for an extended time.

INHALATION:

Irritation (upper respiratory): signs/symptoms can include soreness of the nose and throat, coughing and sneezing.

Lung Damage: signs/symptoms can include coughing, difficulty breathing, wheezing, tightness in chest, congestion, and coughing up of blood.

May be absorbed by inhalation and persist in the body for an extended time.

IF SWALLOWED:

Ingestion is not a likely route of exposure to this product.

Ingestion may cause:

Damage to Gastrointestinal Tissues: signs/symptoms can include

Abbreviations: N/D - Not Determined N/A - Not Applicable CA - Approximately

8. HEALTH HAZARD DATA (continued)

pain, vomiting, nausea, abdominal tenderness, burns of mouth,
difficulty swallowing, blood in vomitus, blood in feces, and
ulceration.

SECTION CHANGE DATES

HEADING SECTION CHANGED SINCE December 06, 1999 ISSUE

Abbreviations: N/D - Not Determined N/A - Not Applicable CA - Approximately

The information in this Material Safety Data Sheet (MSDS) is believed to be correct as of the date issued. 3M MAKES NO WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OR COURSE OF PERFORMANCE OR USAGE OF TRADE. User is responsible for determining whether the 3M product is fit for a particular purpose and suitable for user's method of use or application. Given the variety of factors that can affect the use and application of a 3M product, some of which are uniquely within the user's knowledge and control, it is essential that the user evaluate the 3M product to determine whether it is fit for a particular purpose and suitable for user's method of use or application.

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MATERIAL SAFETY DATA SHEET 3M
3M Center
St. Paul, Minnesota
55144-1000
(612) 733-1110

DIVISION: SPECIALTY CHEMICALS DIVISION
TRADE NAME:

FC-23 FLUORAD Brand Fluorochemical Acid
3M ID NUMBER/U.P.C.:
98-0201-0302-8 00-51135-09012-1 98-0211-0332-4 00-51135-09214-9
98-0211-0635-0 00-51135-09285-9 98-0211-0883-6 00-51135-09358-0
98-0211-7915-9 00-51135-10777-5
ISSUED: February 20, 1995
SUPERSEDES: June 07, 1994
DOCUMENT: 10-3780-3

1. INGREDIENT	C.A.S. NO.	PERCENT
PERFLUOROBUTYRIC ACID (C3F7COOH)	375-22-4	100.0

The ingredients of this product are included on TSCA.

2. PHYSICAL DATA

BOILING POINT: 120 C @735 mm
VAPOR PRESSURE: ca. 10 mmHg
Calc. @ R.T.
VAPOR DENSITY: ca. 7.0 Air=1
Calc. @ R.T.
EVAPORATION RATE: < 1.0 BuOAc=1
SOLUBILITY IN WATER: complete
SPECIFIC GRAVITY: ca. 1.6 Water=1
PERCENT VOLATILE: 100 %
VOLATILE ORGANIC COMPOUNDS: 1600 gms/liter
VOC LESS H2O & EXEMPT SOLVENTS: 1600 gms/liter
pH: 1
VISCOSITY: N/D
MELTING POINT: N/A

APPEARANCE AND ODOR:

Clear Colorless liquid, sharp odor similar to butyric acid.

3. FIRE AND EXPLOSION HAZARD DATA

FLASH POINT: Non-Flammable
FLAMMABLE LIMITS - LEL: N/A
FLAMMABLE LIMITS - UEL: N/A
AUTOIGNITION TEMPERATURE: N/A

Abbreviations: N/D - Not Determined N/A - Not Applicable

3. FIRE AND EXPLOSION HAZARD DATA (continued)

EXTINGUISHING MEDIA:

Water, Carbon dioxide, Dry chemical

SPECIAL FIRE FIGHTING PROCEDURES:

Wear full protective clothing, including helmet, self-contained, positive pressure or pressure demand breathing apparatus, bunker coat and pants, bands around arms, waist and legs, face mask, and protective covering for exposed areas of the head.

UNUSUAL FIRE AND EXPLOSION HAZARDS:

See Hazardous Decomposition section for products of combustion.

4. REACTIVITY DATA

STABILITY: Stable

INCOMPATIBILITY - MATERIALS/CONDITIONS TO AVOID:

Strong Bases.

HAZARDOUS POLYMERIZATION: Hazardous polymerization will not occur.

HAZARDOUS DECOMPOSITION PRODUCTS:

Carbon Monoxide and Carbon Dioxide, Hydrogen Fluoride, Toxic Vapors, Gases or Particulates.

5. ENVIRONMENTAL INFORMATION

SPILL RESPONSE:

Refer to other sections of this MSDS for information regarding physical and health hazards, respiratory protection, ventilation, and personal protective equipment. In the U.S.A., call (612) 733-1110 or (612) 733-6100 for 24-hour spill assistance. Cover with soda ash (sodium carbonate) or sodium bicarbonate. Carefully, with stirring and cooling, add waste product to a solution of soda ash (sodium carbonate) and slaked lime (calcium hydroxide). Confirm neutrality. Collect spilled material. Clean up residue with soda ash (sodium carbonate) solution. Place in a polyethylene-lined metal container.

RECOMMENDED DISPOSAL:

Discharge neutralized waste product to a wastewater treatment system. Incinerate in a permitted hazardous waste incinerator in the presence of a combustible material. Combustion products will include HF.

Confirm neutrality.

Abbreviations: N/D - Not Determined N/A - Not Applicable

5. ENVIRONMENTAL INFORMATION (continued)

ENVIRONMENTAL DATA:

Flush neutralized solutions to a wastewater treatment system. LC50 Fathead minnow (*Pimephales promelas*) of neutralized product - >2,000 mg/l. Neutralized FC-23 at 1,000 mg/l had no acute inhibitory effect on activated sludge respiration rate.

EPCRA HAZARD CLASS:

FIRE HAZARD: No PRESSURE: No REACTIVITY: Yes ACUTE: Yes CHRONIC: Yes

6. SUGGESTED FIRST AID

EYE CONTACT:

Immediately flush eyes with large amounts of water for at least 15 minutes. Get immediate medical attention.

SKIN CONTACT:

Immediately flush skin with large amounts of water. Remove contaminated clothing. If irritation persists, call a physician. Wash contaminated clothing before reuse.

INHALATION:

If signs/symptoms occur, remove person to fresh air. If signs/symptoms continue, call a physician.

IF SWALLOWED:

If swallowed, do NOT induce vomiting. Give victim two glasses of water. Call a physician immediately. Never give anything by mouth to an unconscious person.

7. PRECAUTIONARY INFORMATION

EYE PROTECTION:

Avoid eye contact. The following should be worn alone or in combination, as appropriate, to prevent eye contact: Wear vented goggles. Wear full-face shield.

SKIN PROTECTION:

Avoid skin contact. Wear appropriate gloves when handling this material. A pair of gloves made from the following material(s) are recommended: butyl rubber. Use one or more of the following personal protection items as necessary to prevent skin contact: apron, coveralls.

Abbreviations: N/D - Not Determined N/A - Not Applicable

7. PRECAUTIONARY INFORMATION (continued)

RECOMMENDED VENTILATION:

Use with appropriate local exhaust ventilation. Provide sufficient ventilation to maintain emissions below recommended exposure limits. If exhaust ventilation is not adequate, use appropriate respiratory protection.

RESPIRATORY PROTECTION:

Avoid breathing of airborne material. Select one of the following NIOSH approved respirators based on airborne concentration of contaminants and in accordance with OSHA regulations: half-mask organic vapor and acid gas respirator, full-face organic vapor and acid gas respirator.

PREVENTION OF ACCIDENTAL INGESTION:

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

RECOMMENDED STORAGE:

Keep container closed when not in use.

FIRE AND EXPLOSION AVOIDANCE:

Keep container tightly closed.

EXPOSURE LIMITS

INGREDIENT	VALUE	UNIT	TYPE	AUTH	SKIN*
PERFLUOROBUTYRIC ACID (C3F7COOH).....	0.1	MG/M3	TWA	3M	Y

* SKIN NOTATION: Listed substances indicated with 'Y' under SKIN refer to the potential contribution to the overall exposure by the cutaneous route including mucous membrane and eye, either by airborne or, more particularly, by direct contact with the substance. Vehicles can alter skin absorption.

SOURCE OF EXPOSURE LIMIT DATA:

- 3M: 3M Recommended Exposure Guidelines

8. HEALTH HAZARD DATA

EYE CONTACT:

Chemical Related Eye Burns (chemical corrosivity): signs/symptoms can include cloudy appearance of the cornea, chemical burns, pain, tearing, ulcers, impaired vision or loss of vision.

Abbreviations: N/D - Not Determined N/A - Not Applicable

8. HEALTH HAZARD DATA (continued)

SKIN CONTACT:

Skin Burns (chemical corrosivity): signs/symptoms can include redness, swelling, itching, pain, blistering, ulceration, sloughing, and scar formation.

May be absorbed through the skin and persist in the body for an extended time.

INHALATION:

May be absorbed by inhalation and persist in the body for an extended time.

Single overexposure, above recommended guidelines, may cause:

Irritation (upper respiratory): signs/symptoms can include soreness of the nose and throat, coughing and sneezing.

IF SWALLOWED:

Ingestion is not a likely route of exposure to this product.

Ingestion may cause:

Damage to Gastrointestinal Tissues: signs/symptoms can include pain, vomiting, nausea, abdominal tenderness, burns of mouth, difficulty swallowing, blood in vomitus, blood in feces, and ulceration.

Esophageal Burns: signs/symptoms can include pain in throat, difficult swallowing and blood in sputum.

Burns of the Oral Tissues: signs/symptoms can include pain, burns of tongue and inside of mouth, redness and tissue loss.

SECTION CHANGE DATES

HEADING	SECTION CHANGED SINCE June 07, 1994	ISSUE

Abbreviations: N/D - Not Determined N/A - Not Applicable

The information on this Data Sheet represents our current data and best opinion as to the proper use and handling of this product under normal conditions. Any use of the product which is not in conformance with this Data Sheet or which involves using the product in combination with any other product or any other process is the responsibility of the user.

INTERNAL MATERIAL SAFETY DATA SHEET

FOR 3M INTERNAL USE ONLY

91.0601 ISSUE DATE: 7/16/1984 SUPERSEDES: NONE
 MATERIAL DESIGNATION: INERT FLUOROCARBON
 3M I.D. NUMBER: 41-2600-6057-3; 41-2600-6069-8;
 41-2600-6070-6; 41-2600-6078-9
 NFPA DIAMOND CODE: HEALTH: 1 FIRE: 0 REACTIVITY: 0 OTHER: ===
 FOR 24-HOUR EMERGENCY INFORMATION ON HEALTH EFFECTS CALL: (612)733-2882

1. INGREDIENTS	CAS NUMBER	%	TLV(R) (UNIT)
FLUROCHEMICAL INERT LIQUID	===	100	NONE

PHYSICAL DATA

BOILING POINT: 130-220F SOLUBILITY IN WATER: INSOLUBLE
 VAPOR PRESSURE: === SPECIFIC GRAVITY (H2O=1): 1.2
 VAPOR DENSITY (AIR=1): === PERCENT VOLATILE: 70-80%
 EVAPORATION RATE: === VISCOSITY: WATER-LIKE
 PH: N.A.
 APPEARANCE AND ODOR: CLEAR, COLORLESS, ODORLESS LIQUID

3. FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (TEST METHOD): NONFLAMMABLE FLA.LMT. LEL:=== UEL:===
 EXTINGUISHING MEDIA: WON'T BURN.
 SPECIAL FIRE FIGHTING PROCEDURES: NONE
 UNUSUAL FIRE AND EXPLOSION HAZARDS: NONE EXPECTED, BUT SEE ALSO SECTION 7.

4. PRECAUTIONARY INFORMATION

AVOID EYE CONTACT. WEAR IMPERVIOUS GLOVES AS GOOD PRACTICE. WEAR SUPPLIED AIR RESPIRATOR IF THERMAL DECOMPOSITION OCCURS.

(CONTINUED ON PAGE 2)

PRODUCT CODE: F-6057 F-6069 F-6070 F-6078

5. HEALTH HAZARD DATA

EYE CONTACT: NO HAZARD KNOWN.
 SKIN CONTACT: NO HAZARD KNOWN.
 INHALATION: THERMAL DECOMPOSITION PRODUCTS MAY BE HARMFUL.
 INGESTION: NO HAZARD EXPECTED.
 SUGGESTED FIRST AID:

EYE CONTACT: IMMEDIATELY FLUSH WITH LARGE AMOUNTS OF WATER FOR AT LEAST 15 MINUTES AND GET MEDICAL ATTENTION.
 SKIN CONTACT: WASH AFFECTED SKIN AREA WITH SOAP AND WATER.
 INHALATION: MOVE AFFECTED INDIVIDUAL TO FRESH AIR. FOR BREATHING DIFFICULTY, KEEP INDIVIDUAL WARM AND QUIET, ADMINISTER OXYGEN AND GET MEDICAL ATTENTION.
 INGESTION: GIVE WATER OR MILK AND GET MEDICAL ATTENTION IMMEDIATELY.

6. ENVIRONMENTAL INFORMATION

SPILL RESPONSE: OBSERVE PRECAUTIONS FROM OTHER SECTIONS. USE APPROPRIATE ABSORBENT MATERIAL AS NEEDED IN CLEAN-UP PROCEDURE. COLLECT SPILLED MATERIAL.
 RECOMMENDED DISPOSAL: SEND TO 3M CHEMOLITE PLANT - BLDG. 47, OR TO A 3M APPROVED CHEMICAL WASTE DISPOSAL FACILITY FOR DISPOSAL.
 ENVIRONMENTAL DATA: SEE 'NON-REGULATED CHEMICALS' IN 3M WASTE DISPOSAL PROCEDURES MANUAL FOR LABELING/MARKING/PACKAGING/SHIPPING DATA. HAZARDOUS WASTE NUMBER/CODE: NONE

7. REACTIVITY DATA

STABILITY: STABLE (CONDITIONS TO AVOID):
 ===
 INCOMPATIBILITY: === (MATERIALS TO AVOID):
 ===
 HAZARDOUS POLYMERIZATION: WILL NOT OCCUR (CONDITIONS TO AVOID):
 ===
 HAZARDOUS DECOMPOSITION PRODUCTS: HF, PERFLUOROISOBUTYLENE.

INFORMATION ON THIS DATA SHEET REPRESENTS OUR CURRENT DATA AND BEST JUDGEMENT AS TO THE PROPER USE IN HANDLING OF THIS PRODUCT UNDER NORMAL CONDITIONS.
