



The MSDS format adheres to the standards and regulatory requirements of the United States and may not meet regulatory requirements in other countries.

DuPont  
Material Safety Data Sheet

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6091FR "VERTREL" XE  
Revised 27-SEP-2000

CHEMICAL PRODUCT/COMPANY IDENTIFICATION

Material Identification

"Vertrel" is a registered trademark of DuPont.

Formula : CF3CHFCHFCF2CF3,C2H5OH

Company Identification

MANUFACTURER/DISTRIBUTOR

DuPont Fluoroproducts  
1007 Market Street  
Wilmington, DE 19898

PHONE NUMBERS

Product Information : 1-800-441-7515 (outside the U.S.  
302-774-1000)  
Transport Emergency : CHEMTREC 1-800-424-9300(outside U.S.  
703-527-3887)  
Medical Emergency : 1-800-441-3637 (outside the U.S.  
302-774-1000)

COMPOSITION/INFORMATION ON INGREDIENTS

Components

Material	CAS Number	%
1,1,1,2,2,3,4,5,5,5-DECAFLUOROPENTANE (HFC-43-10mee)	138495-42-8	94.0-99.0
ETHANOL	64-17-5	1.0-6.0
METHANOL	67-56-1	0.1-0.6

HAZARDS IDENTIFICATION

# Potential Health Effects

Gross overexposure by inhalation to HFC-43-10mee may cause suffocation if air is displaced by vapors and central nervous system stimulation with increased activity or sleeplessness, tremors or convulsions. These effects may be followed by central nervous system depression with dizziness, confusion, incoordination, drowsiness or unconsciousness. Based on data from other fluorocarbons, gross overexposure to HFC-43-10mee may cause irregular heart beat with a strange sensation in the chest, "heart thumping" apprehension, lightheadedness, feeling of fainting, dizziness, weakness, sometimes progressing to loss of

## (HAZARDS IDENTIFICATION - Continued)

consciousness and death. Intentional misuse or deliberate inhalation may cause death without warning. Vapor reduces oxygen available for breathing and is heavier than air. Immediate effects of overexposure to HFC-43-10mee by skin contact may include slight irritation with itching, redness or swelling. Repeated and/or prolonged exposure may cause defatting of the skin with itching, redness or rash. Based on animal data, significant skin permeation, and systemic toxicity after skin contact, appears unlikely. Immediate effects of overexposure to HFC-43-10mee by eye contact may include eye irritation with tearing, pain or blurred vision. The major ingestion hazard of HFC-43-10mee is aspiration (liquid entering the lungs during ingestion or vomiting) which may result in "chemical pneumonia." Symptoms include coughing, gasping, choking, shortness of breath, bluish discoloration of the skin, rapid breathing and heart rate, and fever. Pulmonary edema or bleeding, drowsiness, confusion, coma and seizures may occur in more serious cases. Symptoms may develop immediately or as late as 24 hours after exposure, depending on how much chemical entered the lungs. Increased susceptibility to the effects of HFC-43-10mee may be observed in persons with pre-existing disease of the central nervous system or the cardiovascular system.

Short-term overexposure to Ethyl Alcohol by inhalation may cause irritation of the nose and throat with sneezing, sore throat or runny nose. Repeated or excessive over-exposure may cause central nervous system depression with dizziness, confusion, incoordination, drowsiness or unconsciousness and non-specific effects such as headache, nausea and weakness. Repeated and/or prolonged skin contact with Ethyl Alcohol may cause defatting of the skin with itching, redness or rash. There are inconclusive or unverified reports of human sensitization. Eye contact with Ethyl Alcohol may cause eye irritation with tearing, pain or blurred vision. Ingestion of Ethyl Alcohol may cause central nervous system depression with dizziness, confusion, incoordination, drowsiness or unconsciousness; irritation of the digestive tract with stomach pain, heartburn, nausea, vomiting or diarrhea; however there may be no symptoms at all; headache; and fatality from gross over-exposure. Repeated or excessive over-exposure may cause abnormal liver function with altered enzyme levels in the blood; structural (pathological) changes in heart muscle tissue; high blood pressure; altered white blood cell counts; effects on the endocrine and reproductive systems; and reduced fertility. Repeated gross over-exposure may cause effects on the brain; pathological changes in the liver and kidneys; and severe irritation of the digestive tract with stomach pain, nausea, vomiting, diarrhea or internal bleeding. Increased susceptibility to the effects of Ethyl Alcohol may be observed in persons with pre-existing disease of the liver, central nervous system, gastrointestinal tract, or reproductive organs.

## (HAZARDS IDENTIFICATION - Continued)

## Carcinogenicity Information

None of the components present in this material at concentrations equal to or greater than 0.1% are listed by IARC, NTP, OSHA or ACGIH as a carcinogen.

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FIRST AID MEASURES  
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## First Aid

## INHALATION

If inhaled, immediately remove to fresh air. Keep person calm. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Call a physician.

## SKIN CONTACT

Flush skin with water after contact. Wash contaminated clothing before reuse.

## EYE CONTACT

In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Call a physician.

## INGESTION

Material poses an aspiration hazard. If swallowed, do not induce vomiting. Immediately give 2 glasses of water. Never give anything by mouth to an unconscious person. Call a physician.

If vomiting occurs naturally, have victim lean forward to reduce the risk of aspiration.

## Notes to Physicians

THIS MATERIAL MAY MAKE THE HEART MORE SUSCEPTIBLE TO ARRHYTHMIAS. Catecholamines such as adrenaline, and other compounds having similar effects, should be reserved for emergencies and then used only with special caution.

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FIRE FIGHTING MEASURES  
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## Flammable Properties

Flammable limits in Air, % by Volume

LEL : None.

UEL : None.

Autodecomposition : Not determined

## (FIRE FIGHTING MEASURES - Continued)

Flash Point : None  
Method : Setaflash Closed Cup (ASTM D 3278)

Flash Point : None  
Method : Tag Open Cup (ASTM D 1310)

## AUTOIGNITION TEMPERATURE:

Has not yet been determined for "Vertrel" XE.

## Fire and Explosion Hazards:

Use water spray or fog to cool containers. Drums may rupture under fire conditions. Decomposition may occur.

## Extinguishing Media

Use media appropriate for surrounding material.

## Fire Fighting Instructions

Self-contained breathing apparatus (SCBA) is required if drums rupture and contents are spilled under fire conditions.

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ACCIDENTAL RELEASE MEASURES  
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## Safeguards (Personnel)

NOTE: Review FIRE FIGHTING MEASURES and HANDLING (PERSONNEL) sections before proceeding with clean-up. Use appropriate PERSONAL PROTECTIVE EQUIPMENT during clean-up.

## Initial Containment

Dike spill. Prevent material from entering sewers, waterways, or low areas.

## # Spill Clean Up

Immediately evacuate the area and provide maximum ventilation, especially in low places where heavy vapors might collect. Unprotected personnel should move upwind of spill. Only personnel equipped with proper respiratory and skin/eye protection should be permitted in area. Soak up with sawdust, sand, oil dry or other absorbent material. After all visible traces, including ignitable vapors, have been removed, thoroughly wet vacuum the area. Do not flush to sewer. If area of spill is porous, remove as much contaminated earth and gravel, etc. as necessary and place in closed containers for disposal.

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HANDLING AND STORAGE  
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## Handling (Personnel)

Avoid breathing vapors or mist. Avoid contact with eyes, skin, or clothing. Wash thoroughly after handling.

The use of gloves is recommended when working with the material containers. Material should not be dispensed from its container by pouring, except for small sample containers where fume hoods or where other ventilation is used to manage the exposure limits. The use of a drum pump is recommended for dispensing from shipping containers.

## Storage

Store in a clean, dry area. Do not allow stored product to exceed 52 C (125 F) to prevent leakage or potential rupture of container from pressure and expansion. Protect from freezing temperatures. If solvent is stored below -10 C (14 F), mix prior to use.

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EXPOSURE CONTROLS/PERSONAL PROTECTION  
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## Engineering Controls

Use only with adequate ventilation. Keep container tightly closed.

Vapors are heavier than air posing a hazard of asphyxia if they are trapped in enclosed or low places.

## Personal Protective Equipment

## EYE/FACE PROTECTION

Wear safety glasses or coverall chemical splash goggles.

## RESPIRATORS

Where there is potential for airborne exposures in excess of applicable limits, wear NIOSH approved respiratory protection.

## PROTECTIVE CLOTHING

Where there is potential for skin contact have available and wear as appropriate impervious gloves, apron, pants, and jacket.

Protective gloves and chemical splash goggles should be used when handling liquid.

## Exposure Guidelines

## Applicable Exposure Limits

1,1,1,2,2,3,4,5,5,5-DECAFLUOROPENTANE (HFC-43-10mee)  
 PEL (OSHA) : None Established  
 TLV (ACGIH) : None Established  
 AEL \* (DuPont) : 200 ppm, 8 & 12 Hr. TWA  
 400 ppm, Ceiling

## ETHANOL

PEL (OSHA) : 1,000 ppm, 1,900 mg/m<sup>3</sup>, 8 Hr. TWA  
 TLV (ACGIH) : 1,000 ppm, 1,880 mg/m<sup>3</sup>, 8 Hr. TWA, A4  
 AEL \* (DuPont) : 1000 ppm, 8 & 12 Hr. TWA

## METHANOL

PEL (OSHA) : 200 ppm, 260 mg/m<sup>3</sup>, 8 Hr. TWA  
 TLV (ACGIH) : 200 ppm, 8 Hr. TWA, Skin  
 STEL 250 ppm  
 AEL \* (DuPont) : 200 ppm, 8 & 12 Hr. TWA, Skin

\* AEL is DuPont's Acceptable Exposure Limit. Where governmentally imposed occupational exposure limits which are lower than the AEL are in effect, such limits shall take precedence.

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PHYSICAL AND CHEMICAL PROPERTIES  
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## Physical Data

Boiling Point : 52 C (126 F)  
 Vapor Pressure : 250 mm Hg @ 25 C (77 F)  
 Vapor Density : 7.3 (Air=1.0)  
 Freezing Point : <-80 C (<-112 F)  
 pH : Neutral  
 Form : Liquid  
 Color : Colorless  
 Density : 1.52 g/cm<sup>3</sup>  
 12.7 lb/gal

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STABILITY AND REACTIVITY  
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## Chemical Stability

Stable at normal temperatures and storage conditions.

## Incompatibility with Other Materials

Incompatible with alkali or alkaline earth metals - powdered  
 Al, Zn, Be, Na, Mg, etc.

Incompatible with strong bases such as NaOH, KOH, etc.

## (STABILITY AND REACTIVITY - Continued)

## # Decomposition

Decomposes with heat. High temperatures (open flames, glowing metal surfaces, etc.) can decompose HFC-43-10mee forming hydrofluoric acids and possibly carbonyl halides.

HFC-43-10mee is incompatible with strong bases and can react to form salts of hydrofluoric acid and unsaturated compounds of unknown toxicity.

## Polymerization

Polymerization will not occur.

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TOXICOLOGICAL INFORMATION  
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## # Animal Data

## HFC-43-10mee:

Oral LD50: > 5,000 mg/kg in rats  
Dermal ALD: > 5,000 mg/kg in rabbits  
Inhalation, 4 hour LC50: 11,100 ppm in rats

## Ethyl Alcohol:

Oral LD50: 11,500 mg/kg in rats  
Dermal LD50: > 20 mL/kg in rabbits  
Inhalation 8 hour ALC: > 16,000 ppm in rats

Animal testing indicates that HFC-43-10mee is a slight skin irritant and a mild eye irritant, but is not a skin sensitizer. Single exposure to 5,000 ppm HFC-43-10mee by inhalation caused tremors. A different single exposure study by inhalation in rats caused incoordination, hyperactivity and prostration; pathological examination of rats from this study revealed kidney and lung changes, and external hair loss. Repeated exposures to 1,900 - 3,500 ppm caused tremors or convulsions, behavioral effects, and altered clinical chemistry. These effects were temporary. In a different repeated exposure test the No-Observed-Adverse-Effect-Level (NOAEL) for convulsions was 1000 ppm. Results indicate convulsions is an acute effect of HFC-43-10mee. The 90-day No-Observed-Adverse-Effect-Level (NOAEL) is 500 ppm. In animal testing HFC-43-10mee produced developmental effects only at exposure levels producing other toxic effects in the adult animal. No animal data are available to define the carcinogenic or reproductive hazards of HFC-43-10mee. Tests have shown that HFC-43-10mee does not cause genetic damage in bacterial or mammalian cell cultures. It has not produced genetic damage in tests on animals.

## (TOXICOLOGICAL INFORMATION - Continued)

Animal testing indicates Ethyl Alcohol is a moderate eye irritant but not a skin irritant. Long-term skin contact caused temporary irritation of the skin. Single exposure by ingestion caused prostration and altered kidney function. Repeated exposure caused liver effects; reduced weight gain; altered immune system, endocrine system, and kidney function; and altered clinical chemistry. Long-term exposure caused altered heart function. Single exposure by inhalation caused incoordination, behavioral effects, narcosis, and altered hematology. Repeated exposure caused liver effects, altered hematology, and irritation of the respiratory tract. No adequate animal data are available to define the carcinogenic potential of Ethyl Alcohol. Tests have shown Ethyl Alcohol to cause developmental and reproductive toxicity in animals. Tests in bacterial cell cultures are generally negative. In mammalian cell cultures Ethyl Alcohol has caused genetic toxicity. It has produced genetic damage in tests on animals. Animal data indicate that Ethyl Alcohol causes permanent genetic damage in reproductive cells of mammals (heritable genetic damage).

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ECOLOGICAL INFORMATION  
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## Ecotoxicological Information

## Aquatic Toxicity:

## HFC-43-10mee:

96 hour LC50, fathead minnows: 27.2 mg/L  
96 hour LC50, rainbow trout: 13.9 mg/L  
48 hour LC50, Daphnia magna: 11.7 mg/L

## Ethyl Alcohol:

96 hour LC50, fathead minnows: 14,200 mg/L

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DISPOSAL CONSIDERATIONS  
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## Waste Disposal

Treatment, storage, transportation, and disposal must be in accordance with applicable Federal, State/Provincial, and Local regulations.

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TRANSPORTATION INFORMATION  
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## Shipping Information

DOT/IMO/IATA  
Not Regulated.

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REGULATORY INFORMATION  
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## U.S. Federal Regulations

All Components Are Listed on the TSCA Public Inventory

TITLE III HAZARD CLASSIFICATIONS SECTIONS 311, 312

Acute : Yes  
Chronic : Yes  
Fire : No  
Reactivity : No  
Pressure : No

1,1,1,2,2,3,4,5,5,5-DECAFLUOROPENTANE (CAS# 138495-42-8) is controlled by TSCA Section 5, Significant New Use Rule (SNUR; 40 CFR 721.5645) The approved uses are: precision and general cleaning, carrier fluid, displacement drying, printed circuit board cleaning, particulate removal and film cleaning, process medium, heat transfer fluid (dielectric and non-dielectric), and test fluid. Processors and users of this substance must also comply with the applicable general SNUR requirements set forth in 40 CFR 721 subpart A, including export notification requirements if applicable (40 CFR 721.20), and the applicable record keeping requirements set forth at 40 CFR 721.125.

## LISTS:

SARA Extremely Hazardous Substance -No  
CERCLA Hazardous Substance -Yes\*

\*Methanol Component Only

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OTHER INFORMATION  
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## NFPA, NPCA-HMIS

NPCA-HMIS Rating  
Health : 1  
Flammability : 0  
Reactivity : 1

Personal Protection rating to be supplied by user depending on use conditions.

(Continued)

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The data in this Material Safety Data Sheet relates only to the specific material designated herein and does not relate to use in combination with any other material or in any process.

Responsibility for MSDS : MSDS Coordinator  
> : DuPont Fluoroproducts  
Address : Wilmington, DE 19898  
Telephone : (800) 441-7515

# Indicates updated section.

This information is based upon technical information believed to be reliable. It is subject to revision as additional knowledge and experience is gained.

End of MSDS