



VERTREL® X-DA

6138FR Revised 17-OCT-2001

CHEMICAL PRODUCT/COMPANY IDENTIFICATION

Material Identification

CAS Number : 138495-42-8
Formula : CF₃CHFCHFCF₂CF₃
Molecular Weight : 252
CAS Name : Pentane, 1,1,1,2,2,3,4,5,5,5-decafluoro

Tradenames and Synonyms

"Vertrel" KCD-9561

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	CAS Number	%
1,1,1,2,2,3,4,5,5,5-decafluoropentane (HFC-43-10mee)	138495-42-8	99
NITROMETHANE	75-52-5	0.3-0.7

FLUOROSURFACTANT ADDITIVE (including volatiles)

0.05-0.20

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 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 by inhalation to Nitromethane may cause irritation of the nose and throat with sneezing, sore throat or runny nose. Based on animal data repeated and/or prolonged exposure may cause irritation of nose, throat, and lungs with cough, difficulty breathing or shortness of breath, pathological changes in the liver, central nervous system depression with dizziness, confusion, incoordination, drowsiness or unconsciousness, peripheral nervous system effects with tingling, pain, or loss of sensation in extremities which may be accompanied by weakness or loss of muscle control, altered blood cell counts, impaired functioning of the blood-forming system with alterations in blood cell counts and/or anemia, effects on the nervous

tissue, and clinical pathological changes of the thyroid. Skin contact with Nitromethane may cause skin irritation with itching, burning, redness, swelling or rash. Eye contact with Nitromethane may cause eye irritation with tearing, pain or blurred vision. Based on animal data, ingestion of Nitromethane may cause abnormal liver function with altered enzyme levels in blood, or abnormal kidney function with altered results on blood tests.

Carcinogenicity Information

The following components are listed by IARC, NTP, OSHA or ACGIH as carcinogens.

Material	IARC	NTP	OSHA	ACGIH
NITROMETHANE				2B

FIRST AID MEASURES

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.

FIRE FIGHTING MEASURES

Flammable Properties

Flammable Limits in Air, % by Volume:

LEL : None

UEL : None

Flash Point : None

Method : Tag Closed Cup (ASTM D 56)

Flash Point : None

Method : Tag Open Cup (ASTM D 1310)

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.

ACCIDENTAL RELEASE MEASURES

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.

HANDLING AND STORAGE

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.

EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls

Normal ventilation for standard manufacturing procedures is generally adequate. Local exhaust should be used when large amounts are released. Mechanical ventilation should be used in low or enclosed places.

Personal Protective Equipment

EYE/FACE PROTECTION:

Wear safety glasses or coverall splash goggles.

RESPIRATORS:

Wear NIOSH approved respiratory protection, as appropriate.

Self-contained breathing apparatus (SCBA) is required if a large release occurs.

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

Exposure Limits

"VERTREL" X-DA
PEL (OSHA) : None Established
TLV (ACGIH) : None Established
AEL * (DuPont) : 200 ppm, 8 & 12 Hr. TWA
400 ppm, Ceiling

Other Applicable Exposure Limits

NITROMETHANE
PEL (OSHA) : 100 ppm, 250 mg/m³, 8 Hr. TWA
TLV (ACGIH) : 20 ppm, 8 Hr. TWA, A3
AEL * (DuPont) : 10 ppm, 8 & 12 Hr. TWA

* 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.

PHYSICAL AND CHEMICAL PROPERTIES

Physical Data

Boiling Point : 55 C (131 F)
Vapor Pressure : 226 mm Hg @ 25 C (77 F)
pH : Neutral
Form : Liquid
Color : Clear, colorless
Density : 1.58 g/cm³ @ 25 C (77 F)
13.2 lb/gal

STABILITY AND REACTIVITY

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.

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.

TOXICOLOGICAL INFORMATION

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

Nitromethane

Inhalation 4 hour ALC: 6000 ppm in rats

Oral LD50: 1210 mg/kg in rats

Dermal LD50: > 2000 mg/kg in rabbits

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.

Nitromethane is a skin irritant, and a slight eye irritant, but is not a skin sensitizer in animals. Single inhalation exposure to Nitromethane caused upper respiratory tract irritation, liver and kidney effects, central nervous system depression, incoordination, eye irritation, and some

mortality. Repeated inhalation exposures caused loss of mobility in the hind limbs, alterations to the blood-forming system, altered hematology and clinical chemistry, respiratory injury, testicular effects, reduced sperm counts, altered estrous cycle, degeneration of the sciatic nerve, and spinal cord. Long-term exposure caused reduced weight gain, altered hematology, increased thyroid weight, decreased thyroxine levels and pathological changes of the lungs. Single ingestion exposure to high doses caused histopathological changes of the liver and kidney injury. Repeated exposures caused reduced weight gain, and liver injury. Repeated dermal exposure caused no significant toxicological effects. In one study, Nitromethane produced evidence of carcinogenic activity in male and female mice exposed to concentrations of 188, 375, or 750 ppm for 2 years, and in female rats exposed to concentrations of 94, 188, or 375 ppm for 2 years. There was no evidence of carcinogenic activity in male rats exposed for 2 years to concentrations of 94, 188, or 375 ppm. In a different study, with male and female rats exposure to concentrations of 100 or 200 ppm for 2 years did not produce evidence of carcinogenic activity. No adequate animal data are available to define the developmental or reproductive toxicity of Nitromethane. Tests have shown that Nitromethane did not cause genetic damage in bacterial or mammalian cell cultures.

ECOLOGICAL INFORMATION

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

Nitromethane:

96 hour LC50, fathead minnows: 1710 mg/L
48 hour LC50, Daphnia magna: 100 mg/L

DISPOSAL CONSIDERATIONS

Waste Disposal

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

TRANSPORTATION INFORMATION

Shipping Information

Not regulated in transportation by DOT/IMO/IATA.

REGULATORY INFORMATION

U.S. Federal Regulations

All Components Are Listed on the TSCA Public Inventory

TITLE III HAZARD CLASSIFICATIONS SECTIONS 311, 312

Acute : Yes
Chronic : No
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 - No

State Regulations (U.S.)

"WARNING - SUBSTANCES KNOWN TO THE STATE OF CALIFORNIA TO CAUSE CANCER - Nitromethane (75-52-5)"

OTHER INFORMATION

NFPA, NPCA-HMIS

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

Personal Protection Rating to be supplied by user, depending on use and conditions.

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Responsibility for MSDS:

MSDS Coordinator

DuPont Fluoroproducts

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End of MSDS