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

Vydax(R) NRT 960
05577945 Revised 24-SEP-2008

CHEMICAL PRODUCT/COMPANY IDENTIFICATION

Company Identification

MANUFACTURER/DISTRIBUTOR
DuPont
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	%
2,3-dihydrodecafluoropentane	138495-42-8	60-80
1,1,1,2-Tetrafluoroethane	811-97-2	10-35
Polytetrafluoroethylene	9002-84-0	0.8-1.2

HAZARDS IDENTIFICATION

Potential Health Effects

Gross overexposure by inhalation 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.

Inhalation of fluorine containing compounds released as decomposition products above 290 °C (554 °F) may cause lung irritation and pulmonary edema which require medical treatment. Inhalation of gases and fumes from overheated or burning product may cause polymer fume fever, fever, chills, and sometimes cough, and lasting approximately 24 hours. Repeated episodes of polymer fume fever may cause persistant lung effects.

Based on data from other fluorocarbons, gross overexposure may be associated with irregular heartbeat or heart rhythm, which may produce heart palpitation, dizziness, weakness,

(HAZARDS IDENTIFICATION - Continued)

unconsciousness and death. It is unlikely that concentrations sufficient to produce irregular heartbeat or heart rhythm would be achieved without first producing other signs of toxicity.

Immediate effects of overexposure 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 by eye contact may include eye irritation with tearing, pain or blurred vision.

The major ingestion hazard 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 this product may be observed in persons with pre-existing disease of the central nervous system or the cardiovascular system.

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.

FIRST AID MEASURES

First Aid

INHALATION

If inhaled, remove to fresh air. 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

(FIRST AID MEASURES - Continued)

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

INGESTION

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

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

Flash Point: None

Containers may rupture under fire conditions. Decomposition may occur.

Extinguishing Media

Use media appropriate for surrounding material.

Fire Fighting Instructions

Evacuate personnel to a safe area. Wear self-contained breathing apparatus (SCBA) and full protective equipment.

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.

Evacuate personnel, thoroughly ventilate area, use self-contained breathing apparatus.

(ACCIDENTAL RELEASE MEASURES - Continued)

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)

Do not inhale. Avoid contact with eyes, skin or clothing. Wash thoroughly after handling. Wash clothing after use.

Handling (Physical Aspects)

Keep container tightly closed.

Storage

Keep away from heat, sparks and flames. Store in a well ventilated place. Store below 120 F (49 C). Do NOT expose to direct sunlight.

Do NOT puncture.

EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls

Use sufficient ventilation to keep employee exposure below recommended limits.

Personal Protective Equipment

EYE/FACE PROTECTION

Wear safety glasses. Where splash potential exists, wear chemical splash goggles.

RESPIRATORS

Wear NIOSH approved respiratory protection, as appropriate.

PROTECTIVE CLOTHING

(EXPOSURE CONTROLS/PERSONAL PROTECTION - Continued)

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

Exposure Guidelines

Applicable Exposure Limits

2,3-dihydrodecafluoropentane

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

1,1,1,2-Tetrafluoroethane

PEL	(OSHA)	: None Established
TLV	(ACGIH)	: None Established
AEL *	(DuPont)	: 1000 ppm, 8 & 12 Hr. TWA
WEEL	(AIHA)	: 1000 ppm, 8 Hr. TWA

Polytetrafluoroethylene

PEL	(OSHA)	: None Established
TLV	(ACGIH)	: None Established
AEL *	(DuPont)	: 10 mg/m3, 8 Hr. TWA, total dust 5 mg/m3, 8 Hr. TWA, respirable dust

* 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 deg C (2,3-dihydrodecafluoropentane)
Vapor Pressure: 96 psia @ 25 deg C (Dymel 134A)
Volatiles: 95-98%
Density: ~1.5 g/cc
Form: Aerosol

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.

(STABILITY AND REACTIVITY - Continued)

Decomposition

Decomposes with heat. Decomposition products are hazardous. This material can decompose by high temperatures (open flames, glowing metal surfaces, etc.)forming hydrofluoric acid and possibly carbonyl halides.

TOXICOLOGICAL INFORMATION

Animal Data

2,3-Dihydrodecafluoropentane:

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

Animal testing indicates that 2,3-Dihydrodecafluoropentane is a slight skin irritant and a mild eye irritant, but is not a skin sensitizer.

2,3-Dihydrodecafluoropentane did not cause cardiac sensitization in dogs exposed to 1000 or 5000 ppm. The cardiac sensitization potential was not evaluated at or above 10,000 ppm due to clinical signs consistent with central nervous system toxicity.

Single exposure to 5,000 ppm 2,3-Dihydrodecafluoropentane by inhalation caused 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 clinical chemistry.

In developmental toxicity studies with laboratory animals, 2,3-Dihydrodecafluoropentane was not uniquely toxic to the developing fetus. No animal data are available to define the carcinogenic or reproductive hazards of 2,3-Dihydrodecafluoropentane. Tests have shown that 2,3-Dihydrodecafluoropentane does not cause genetic damage in bacterial or mammalian cell cultures. It has not produced genetic damage in tests on animals.

1,1,1,2-tetrafluoroethane:

Inhalation 4 hour ALC: 567,000 ppm in rats

A short duration spray of 1,1,1,2-tetrafluoroethane vapor produced very slight eye irritation. Animal testing indicates 1,1,1,2-tetrafluoroethane is a slight skin irritant, but not a skin sensitizer.

(TOXICOLOGICAL INFORMATION - Continued)

Single inhalation exposures caused lethargy, narcosis, increased respiratory difficulties, incoordination, tremors, lack of response to sound and salivation; following the cessation of treatment most animals returned to normal. Death occurred at very high concentrations (> 500,000 ppm) in some animals. Single exposure to near lethal doses caused pulmonary edema. Repeated exposure caused increased weight of the adrenals, liver and spleen, and decreased uterine and prostate weight. Repeated dosing of higher concentrations caused temporary tremors and incoordination. In other repeated exposure studies with rats exposed to concentrations of 49,500 ppm, and mice exposed up to 300,000 ppm, no significant differences were seen between exposed and control animals; in a different study mice exposed to concentrations up to 350,000 ppm there were mortalities, tremors and incoordination in the 350,000 ppm group. Head shaking and salivation occurred in dogs exposed to 150,000 ppm for 7 days; other parameters such as hematology, clinical chemical, body weight, and food consumption were unaffected. Testicular hormonal levels were affected in male rats and pituitary hormone changes occurred in female rats in a 2-week inhalation study but there were no other treatment-related changes. In a long-term inhalation study in rats and mice no treatment-related effects were seen. No signs of neurological disturbances were seen in an inhalation study to access neurotoxicity in rats.

Cardiac sensitization, a potentially fatal disturbance of heart rhythm associated with a heightened sensitivity to the action of epinephrine, occurred in dogs at concentrations of 75,000 ppm and higher.

In a two-year inhalation study, 1,1,1,2-tetrafluoroethane at a concentration of 50,000 ppm, produced an increase in late-occurring benign testicular tumors, testicular hyperplasia and testicular weight. The no-effect-level for this study was 10,000 ppm. Animal data show slight fetotoxicity but only at exposure levels producing other toxic effects in the adult animal. Reproductive data on male mice and male or female rats show no change in reproductive performance. Tests have shown that 1,1,1,2-tetrafluoroethane does not cause genetic damage in bacterial or mammalian cell cultures, or in animals. In animal testing testing, 1,1,1,2-tetrafluoroethane has not caused permanent genetic damage in reproductive cells of mammals (has not produced heritable genetic damage).

Polytetrafluoroethylene:

Animal testing indicates that PTFE is not a skin irritant.

Repeated exposure to PTFE by ingestion caused no significant toxicological effects. Possible effects on white blood cell counts were found in rats fed 25% PTFE in the diet for 90

(TOXICOLOGICAL INFORMATION - Continued)

days, however any changes were within normal variability and were considered to be of no toxicological significance.

In rats, single exposure to dusts of undegraded PTFE by inhalation caused irritation of the lungs. Exposure to thermal decomposition products of PTFE caused lung injury whose severity depends upon the temperature and exposure conditions. Birds appear to be especially susceptible to the toxic effects of fluoropolymer decomposition products. In rats, exposure to freshly formed low molecular weight polymer fragments (fume) produced by continuous heating of the polymer above 400 degrees C may produce acute pulmonary inflammation. When the concentration of fluoropolymer fragment fumes increases, deaths may occur from pulmonary edema and hemorrhage. Exposure to fume aged for several minutes, markedly reduces the toxicity. At higher temperatures involving gross thermal decomposition of the polymer, deaths occurred due to pulmonary edema from lethal concentrations of fluoropolymer fume and/or fluorinated gas decomposition products.

No adequate animal data are available to define the carcinogenicity or developmental hazards of PTFE. No adequate reports of genetic testing were found. No animal data are available to define the reproductive toxicity of PTFE.

ECOLOGICAL INFORMATION

Ecotoxicological Information

Aquatic Toxicity:

2,3-Dihydrodecafluoropentane:

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

1,1,1,2-tetrafluoroethane:

48 hour EC50 - Daphnia magna: 980 mg/L
96 hour LC50 - Rainbow trout: 450 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

DOT/IATA

Proper Shipping Name: Aerosols, Non-flammable
Hazard Class: 2.2
UN Number: 1950
Packing Group: N/A
Label: Non-flammable gas

IMDG

Proper Shipping Name: Aerosols
Hazard Class: 2.2
UN Number: 1950
Packing Group: N/A
Label: Non-flammable gas

REGULATORY INFORMATION

U.S. Federal Regulations

TSCA Inventory Status : Listed.

TITLE III HAZARD CLASSIFICATIONS SECTIONS 311, 312

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

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

(REGULATORY INFORMATION - Continued)

set forth at 40 CFR 721.125.

OTHER INFORMATION

NFPA, NPCA-HMIS

NPCA-HMIS Rating
Health : 2
Flammability : 0
Reactivity : 0

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

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.

Responsible for MSDS : MSDS Coordinator
Address : DuPont Chemical Solution Enterprise
> : Chambers Works and Jackson Lab
Telephone : (856) 540-3512

# 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