

# Material Safety Data Sheet



## 1. CHEMICAL PRODUCT & COMPANY IDENTIFICATION

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24-Hour Emergency Phone Number: 989-636-4400

Product: DERAKANE\* 441-400 EPOXY VINYL ESTER RESIN

Product Code: 30532

Effective Date: 03/08/02      Date Printed: 12/26/02      MSD: 001550

The Dow Chemical Company, Midland, MI 48674

Customer Information Center: 800-258-2436

## 2. COMPOSITION/INFORMATION ON INGREDIENTS

Styrene monomer	CAS# 000100-42-5	30-60%*
Vinyl ester resin	CAS# 036425-15-7	40-70%

\*For specific percentage of styrene monomer found in this product, see section 15.

## 3. HAZARDS IDENTIFICATION

### EMERGENCY OVERVIEW

\*\*\*\*\*  
\* Straw-yellow viscous liquid. Pungent styrene odor. Flammable.      \*  
\* Reactive. Highly toxic to fish and/or other aquatic organisms.      \*  
\*      \*  
\*\*\*\*\*

POTENTIAL HEALTH EFFECTS (See Section 11 for toxicological data.)

EYE: May cause moderate irritation. May cause slight corneal injury. Vapors may irritate eyes. Vapors may cause lacrimation (tears).

SKIN: Prolonged exposure may cause skin irritation. Repeated exposure may cause skin burns. Material may stick to skin causing irritation upon removal. A single prolonged exposure is not likely to result in the material being absorbed through skin in harmful amounts.

INGESTION: Single dose oral toxicity is considered to be low. If aspirated (liquid enters the lung), may be rapidly absorbed through the lungs and result in injury to other body systems.

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INHALATION: Excessive vapor concentrations are attainable and could be hazardous on single exposure. Signs and symptoms of excessive exposure may be anesthetic or narcotic effects. Excessive exposure may cause irritation to upper respiratory tract (nose and throat).

SYSTEMIC (OTHER TARGET ORGAN) EFFECTS: Contains styrene, which, in animals has been reported to cause effects on the following organs: central nervous system, kidney, liver and respiratory tract. Lung effects have been observed in mice following repeated exposure to styrene. Styrene is reported to have caused hearing loss in laboratory animals upon exposure to high concentrations (>800 ppm); however, the relevance of this to humans is unknown. Some studies in humans allege that repeated exposure to styrene may result in minor, subclinical decreases in the ability to discriminate between colors.

CANCER INFORMATION: This mixture contains component(s) which are listed as potential carcinogens for hazard communication purposes under OSHA Standard 29 CFR 1910.1200. Component(s) listed by IARC: styrene. An increased incidence of lung tumors was observed in mice from a recent inhalation study on styrene. The relevance of this finding to humans is uncertain since data from other long-term animal studies and from epidemiology studies of workers exposed to styrene do not provide a basis to conclude that styrene is carcinogenic.

TERATOLOGY (BIRTH DEFECTS): In laboratory animals; styrene did not produce birth defects or any other effects on the fetus even at concentrations having an adverse effect on the mother.

REPRODUCTIVE EFFECTS: Contains components(s) which did not interfere with reproduction in animal studies. The component(s) is/are: styrene.

#### 4. FIRST AID

EYE: Irrigate with flowing water immediately and continuously for 15 minutes. Consult medical personnel.

SKIN: Wash off in flowing water or shower.

INGESTION: Do not induce vomiting. Call a physician and/or transport to emergency facility immediately.

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INHALATION: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, oxygen should be administered by qualified personnel. Call a physician or transport to a medical facility.

NOTE TO PHYSICIAN: If burn is present, treat as any thermal burn, after decontamination. Because rapid absorption may occur through lungs if aspirated and cause systemic effects, the decision of whether to induce vomiting or not should be made by a physician. If lavage is performed, suggest endotracheal and/or esophageal control. Danger from lung aspiration must be weighed against toxicity when considering emptying the stomach. No specific antidote. Supportive care. Treatment based on judgment of the physician in response to reactions of the patient.

## 5. FIRE FIGHTING MEASURES

### FLAMMABLE PROPERTIES

FLASH POINT: 74-84F  
METHOD USED: ASTM-D93, PMCC  
AUTOIGNITION TEMPERATURE: 914F (490C)based on styrene

### FLAMMABILITY LIMITS

LFL: 0.9% (based on styrene)  
UFL: 6.8% (based on styrene)

HAZARDOUS COMBUSTION PRODUCTS: Under fire conditions polymers decompose. The smoke may contain polymer fragments of varying compositions in addition to unidentified toxic and/or irritating compounds. Hazardous combustion products may include and are not limited to carbon dioxide, carbon monoxide.

OTHER FLAMMABILITY INFORMATION: Dense smoke is produced when product burns. Violent steam generation or eruption may occur upon application of direct water stream. Vapors are heavier than air and may travel a long distance and accumulate in low areas. Ignition and/or flash back may occur. Flammable mixtures may exist within the vapor space of containers at room temperature. Flammable concentrations of vapor can accumulate at temperatures above 74F. Spills of these organic liquids on hot fibrous insulations may lead to lowering of the autoignition temperatures possibly resulting in spontaneous combustion.

EXTINGUISHING MEDIA: Water fog or fine spray, carbon dioxide,

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dry chemical, foam. Water fog, applied gently may be used as a blanket for fire extinguishment. General purpose synthetic foams (including AFFF type) or protein foams are preferred if available. Alcohol resistant foams (ATC type) may function. Do not use direct water stream. Straight or direct water streams may not be effective to extinguish fire.

MEDIA TO BE AVOIDED: Do not use direct water stream.

FIRE FIGHTING INSTRUCTIONS: Keep people away. Isolate fire area and deny unnecessary entry. Burning liquids may be moved by flushing with water to protect personnel and minimize property damage. Water fog, applied gently may be used as a blanket for fire extinguishment. Eliminate ignition sources. Stay upwind. Keep out of low areas where gases (fumes) can accumulate. Do not use direct water stream. May spread fire. Water may not be effective in extinguishing fire. Move container from fire area if this is possible without hazard.

PROTECTIVE EQUIPMENT FOR FIRE FIGHTERS: Wear positive-pressure self-contained breathing apparatus (SCBA) and protective fire fighting clothing (includes fire fighting helmet, coat, pants, boots, and gloves). If protective equipment is not available or not used, fight fire from a protected location or safe distance.

#### 6. ACCIDENTAL RELEASE MEASURES (See Section 15 for Regulatory Information)

PROTECT PEOPLE: Do not breathe vapors. Vapor explosion hazard, keep out of sewers. Eliminate all sources of ignition in vicinity of spill or released vapor to avoid fire or explosion. For large spills, warn public of downwind explosion hazard. Check area with explosion meter before reentering area. Ground and bond all containers and handling equipment.

PROTECT THE ENVIRONMENT: For large spills, evacuate upwind of spills and contain with dike.

CLEANUP: Pump with explosion-proof equipment. If available use foam to smother and suppress. Remove residual with hot soapy water. Residual can be removed with solvent. Solvents are not recommended for cleanup unless the recommended exposure guidelines and safe handling practices for the specific solvent are followed. Consult appropriate solvent MSDS for handling information and exposure guidelines.

#### 7. HANDLING AND STORAGE

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HANDLING: Containers, even those that have been emptied, can contain vapors. Do not cut, drill, weld, or perform similar operations on or near empty containers. No smoking, open flames or sources of ignition in handling or storage area. Never use air pressure for transferring product. Electrically ground all equipment.

STORAGE: Store below 75F, Avoid storage in direct sunlight. Use of non-sparking or explosion proof equipment may be necessary depending upon the type of operation. Minimize sources of ignition, such as static buildup, heat, spark or flame. Keep containers tightly closed when not in use.

#### 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

ENGINEERING CONTROLS: Provide general and/or local exhaust ventilation to control airborne concentrations below the exposure guideline. Use only with adequate ventilation.

##### PERSONAL PROTECTIVE EQUIPMENT

EYE/FACE PROTECTION: Use chemical goggles. If vapor exposure causes eye discomfort, use a full-face respirator.

SKIN PROTECTION: Wear clean, long-sleeved, body covering clothing. Use gloves impervious to this material. When prolonged or frequently repeated contact could occur, use protective clothing impervious to this material. Selection of specific items such as faceshield, gloves, boots, apron, or full-body suit will depend on operation.

RESPIRATORY PROTECTION: Atmospheric levels should be maintained below the exposure guideline. When respiratory protection is required, use an approved air-purifying or positive-pressure supplied-air respirator depending on the potential airborne concentration. For emergency and other conditions where the exposure guideline may be greatly exceeded, use an approved positive-pressure self-contained air breathing apparatus or positive-pressure airline with auxiliary self-contained air supply. In confined or poorly ventilated areas, use an approved positive-pressure supplied-air respirator.

EXPOSURE GUIDELINE(S): Styrene, monomer: ACGIH TLV is 20 ppm TWA, 40 ppm STEL, skin. ACGIH classifies as A4. OSHA PEL is 50 ppm TWA, 100 ppm STEL. The styrene PEL and STEL are in accordance with the OSHA-industry agreement dated March, 1996.

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A "Skin" notation following the exposure guideline refers to the potential for dermal absorption of the material. It is intended to alert the reader that inhalation may not be the only route of exposure and that measures to minimize dermal exposures should be considered.

#### 9. PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE: Straw yellow, viscous liquid.  
ODOR: Pungent styrene odor.  
VAPOR PRESSURE: 7 mmHg @ 20C\*  
VAPOR DENSITY: 3.6\*  
BOILING POINT: 294F, 146C\*  
SOLUBILITY IN WATER: Insoluble.  
SPECIFIC GRAVITY: 1.020-1.060

\*Based on Styrene

#### 10. STABILITY AND REACTIVITY

CHEMICAL STABILITY: Avoid storage in direct sunlight and at temperatures above 120F, 49C.

INCOMPATIBILITY WITH OTHER MATERIALS: Oxidizing material.

HAZARDOUS DECOMPOSITION PRODUCTS: Refer to section 5 for hazardous combustion products.

HAZARDOUS POLYMERIZATION: May occur. Avoid contact with metal salts such as ferric and aluminum chlorides, unintended contact with peroxides, and depletion of inhibitor levels. Avoid exposure to direct sunlight or temperatures above 120F (49C).

#### 11. TOXICOLOGICAL INFORMATION (See Section 3 for Potential Health Effects. For detailed toxicological data, write or call the address or non-emergency number shown in Section 1)

SKIN: The LD50 for skin absorption in rabbits is expected to be >2000 mg/kg.

INGESTION: The oral LD50 for rats is expected to be > 4000 mg/kg.

MUTAGENICITY: For styrene: In vitro mutagenicity studies were

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inconclusive. Animal mutagenicity studies were inconclusive.

12. ECOLOGICAL INFORMATION (For detailed Ecological data, write or call the address or non-emergency number shown in Section 1)

ENVIRONMENTAL FATE

MOVEMENT & PARTITIONING: Based on information for styrene. Bioconcentration potential is low (BCF less than 100 or Log Pow less than 3). Potential for mobility in soil is low (Koc between 500 and 2000).

DEGRADATION & PERSISTENCE: Based on information for styrene. Material is readily biodegradable. Passes OECD test(s) for ready biodegradability. Material is ultimately biodegradable. Reaches more than 70% mineralization in OECD test(s) for inherent biodegradability.

ECOTOXICITY: Based on information for styrene. Material is highly toxic to aquatic organisms on an acute basis (LC50/EC50 between 0.1 and 1 mg/L in most sensitive species).

13. DISPOSAL CONSIDERATIONS (See Section 15 for Regulatory Information)

DISPOSAL METHOD: DO NOT DUMP INTO ANY SEWERS, ON THE GROUND, OR INTO ANY BODY OF WATER. All disposal methods must be in compliance with all Federal, State/Provincial and local laws and regulation. Regulations may vary in different locations. Waste characterizations and compliance with applicable laws are the responsibility solely of the waste generator.

THE DOW CHEMICAL COMPANY HAS NO CONTROL OVER THE MANAGEMENT PRACTICES OR MANUFACTURING PROCESSES OF PARTIES HANDLING OR USING THIS MATERIAL. THE INFORMATION PRESENTED HERE PERTAINS ONLY TO THE PRODUCT AS SHIPPED IN ITS INTENDED CONDITION AS DESCRIBED IN SECTION 2 (Composition/Information On Ingredients).

FOR UNUSED OR UNCONTAMINATED PRODUCT, the preferred options include sending to a licensed, permitted recycler, reclaimer, incinerator or other thermal destruction device.

As a service to its customers, Dow can provide names of information resources to help identify waste management companies and other facilities which recycle, reprocess, or manage chemicals or plastics, and that manage used drums. Telephone Dow's Customer Information Center at 800-258-2436

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or 989-832-1556 for further details.

14. TRANSPORT INFORMATION

DEPARTMENT OF TRANSPORTATION (D.O.T.): For D.O.T. regulatory information, if required, consult transportation regulations, product shipping papers or contact your Dow representative.

CANADIAN TDG INFORMATION: For TDG regulatory information, if required, consult transportation regulations, product shipping papers or contact your Dow representative.

15. REGULATORY INFORMATION (Not meant to be all-inclusive--selected regulations represented)

NOTICE: The information herein is presented in good faith and believed to be accurate as of the effective date shown above. However, no warranty, express or implied is given. Regulatory requirements are subject to change and may differ from one location to another; it is the buyer's responsibility to ensure that its activities comply with federal, state or provincial, and local laws. The following specific information is made for the purpose of complying with numerous federal, state or provincial, and local laws and regulations. See other sections for health and safety information.

U.S. REGULATIONS

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SARA 313 INFORMATION: This product contains the following substances subject to the reporting requirements of Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR Part 372:

CHEMICAL NAME	CAS NUMBER	CONCENTRATION
STYRENE	000100-42-5	25 -60 %

The following products are represented by master #1550. The specific amount of styrene monomer found within each product is:  
XUS 71928.00 EXP VER (30085).....33%  
DERAKANE (R) 411-350 VER (15989).....45%  
DERAKANE (R) 441-400 (30532).....33%  
DERAKANE (R) 411-C-50 VER (19634).....50%  
DERAKANE (R) 411-C-45 VER (19635).....45%  
INTERMEDIATE 71928.00 (30085).....33%  
XUS 19016.00 EXP VER (46520).....34%



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REGULATORY INFORMATION (CONTINUED)

DERAKANE 411PC-100 (46871).....	53%
XUS 19033.00 EXP VER (51662).....	45%
XU 19056.00 DEV. VER (54435).....	53%
XUS 19050.00 EXP VER (51865).....	30%
XU 19057.00 EXP VER (54904).....	52.8%
XU 71928.04 EXP VER (58731).....	39.0%
XZ 92508.00 EXP VER (53165).....	33%

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SARA HAZARD CATEGORY: This product has been reviewed according to the EPA "Hazard Categories" promulgated under Sections 311 and 312 of the Superfund Amendment and Reauthorization Act of 1986 (SARA Title III) and is considered, under applicable definitions, to meet the following categories:

- An immediate health hazard
- A delayed health hazard
- A fire hazard
- A reactive hazard

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TOXIC SUBSTANCES CONTROL ACT (TSCA):

All ingredients are on the TSCA inventory or are not required to be listed on the TSCA inventory.

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STATE RIGHT-TO-KNOW: The following product components are cited on certain state lists as mentioned. Non-listed components may be shown in the composition section of the MSDS.

CHEMICAL NAME	CAS NUMBER	LIST
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STYRENE	000100-42-5	NJ1 NJ2 NJ3 PA1 PA3

NJ1=New Jersey Special Health Hazard Substance (present at greater than or equal to 0.1%).  
NJ2=New Jersey Environmental Hazardous Substance (present at greater than or equal to 1.0%).

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REGULATORY INFORMATION (CONTINUED)

NJ3=New Jersey Workplace Hazardous Substance (present at greater than or equal to 1.0%).  
PA1=Pennsylvania Hazardous Substance (present at greater than or equal to 1.0%).  
PA3=Pennsylvania Environmental Hazardous Substance (present at greater than or equal to 1.0%).

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OSHA HAZARD COMMUNICATION STANDARD:

This product is a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200.

CANADIAN REGULATIONS  
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WHMIS INFORMATION: The Canadian Workplace Hazardous Materials Information System (WHMIS) Classification for this product is:

- B2 - flammable liquid with a flash point less than 37.8C
  - D2A - possible, probable or known human carcinogen according to classifications by IARC or ACGIH
  - D2B - eye or skin irritant
- Refer elsewhere in the MSDS for specific warnings and safe handling information. Refer to the employer's workplace education program.

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CPR STATEMENT: This product has been classified in accordance with the hazard criteria of the Canadian Controlled Products Regulations (CPR) and the MSDS contains all the information required by the CPR.

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HAZARDOUS PRODUCTS ACT INFORMATION: This product contains the following ingredients which are Controlled Products and/or on the Ingredient Disclosure List (Canadian HPA section 13 and 14):

COMPONENTS:	CAS #	AMOUNT(%w/w)
STYRENE	000100-42-5	30-60%

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CANADIAN ENVIRONMENTAL PROTECTION ACT (CEPA):

All substances in this product are listed on the Canadian Domestic Substances List (DSL) or are not required to be listed.

16. OTHER INFORMATION

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REVISION INDICATOR: Revised Section 15.

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The Information Herein Is Given In Good Faith, But No Warranty,  
Express Or Implied, Is Made. Consult The Dow Chemical Company  
For Further Information.