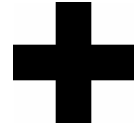




THE DOW CHEMICAL COMPANY MATERIAL SAFETY DATA SHEET



Product Name: D.E.H.* 29 EPOXY CURING AGENT
MSDS#: 1725

Effective Date: 08/30/2004
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Dow (hereinafter, and for purposes of this MSDS only, refers to The Dow Chemical Company and to Dow Chemical Canada Inc.) encourages and expects you to read and understand the entire MSDS, as there is important information throughout the document. Dow expects you to follow the precautions identified in this document unless your use conditions would necessitate other appropriate methods or actions.

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

1.1 IDENTIFICATION

Product Name D.E.H.* 29 EPOXY CURING AGENT

1.2 COMPANY IDENTIFICATION

The Dow Chemical Company
Midland, MI 48674

1.3 EMERGENCY TELEPHONE NUMBER

24-HOUR EMERGENCY TELEPHONE NUMBER: (989)636-4400.
Customer Information Number: 1-800-258-2436.

* or ® Indicates a Trademark of The Dow Chemical Company.

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2. COMPOSITION INFORMATION

Component	CAS #	Amount (%W/W)
Higher ethyleneamines	68131-73-7	>= 30 <= 75%
Pentaethylenehexamine mixture	4067-16-7	>= 15 <= 55%
Tetraethylenepentamine mixture	112-57-2	>= 2 <= 25%
Triethylenetetramine mixture	112-24-3	<= 2%

3. HAZARDS IDENTIFICATION

3.1 EMERGENCY OVERVIEW

Appearance Brown

Physical State Liquid

Odor Ammoniacal

Hazards of product CAUSES SEVERE EYE BURNS.
MAY CAUSE ALLERGIC SKIN REACTION.
VAPORS FROM HEATED MATERIAL MAY CAUSE ALLERGIC REACTION.
MAY CAUSE SKIN IRRITATION.
HARMFUL OR FATAL IF SWALLOWED; CAN ENTER LUNGS AND CAUSE DAMAGE.
ISOLATE AREA.
KEEP UPWIND OF SPILL.
STAY OUT OF LOW AREAS.

3.2 POTENTIAL HEALTH EFFECTS

Effects of Single Acute Overexposure

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Inhalation At room temperature, exposures to vapors are minimal due to physical properties; higher temperatures may generate vapor levels sufficient to cause irritation, respiratory sensitization in susceptible individuals, and other effects.

Eye Contact May cause pain disproportionate to the level of irritation to eye tissues. May cause severe irritation with corneal injury which may result in permanent impairment of vision, even blindness. Chemical burns may occur.

Skin Contact Prolonged or repeated exposure may cause skin irritation, even a burn. May cause more severe response on covered skin (under clothing, gloves). Skin contact may cause an allergic skin reaction.

Skin Absorption Prolonged skin contact is unlikely to result in absorption of harmful amounts.

Swallowing Low toxicity if swallowed. Swallowing may result in irritation or burns of the mouth, throat, and gastrointestinal tract. Aspiration into the lungs may occur during ingestion or vomiting, causing tissue damage or lung injury.

Chronic, Prolonged or Repeated Overexposure

Effects of Repeated Overexposure Repeated skin application to laboratory animals did not produce systemic toxicity.

Other Effects of Overexposure

Medical Conditions Aggravated by Exposure

Skin contact may aggravate preexisting dermatitis. Excessive exposure may aggravate preexisting asthma.

See Section 11 for toxicological information and additional information about potential health effects.

3.3 POTENTIAL ENVIRONMENTAL EFFECTS

See Section 12 for Ecological Information.

4. FIRST AID PROCEDURES

4.1 INHALATION

Move person to fresh air; if effects occur, consult a physician.

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4.2 EYE CONTACT

Wash immediately and continuously with flowing water for at least 30 minutes. Remove contact lenses after the first 5 minutes and continue washing. Obtain prompt medical consultation, preferably from an ophthalmologist.

4.3 SKIN CONTACT

Remove material from skin immediately by washing with soap and plenty of water. Remove contaminated clothing and shoes while washing. Seek medical attention if irritation persists. Wash clothing before reuse. Discard items which cannot be decontaminated, including leather articles such as shoes, belts and watchbands.

4.4 SWALLOWING

Do not induce vomiting. Give one cup (8 ounces or 240 ml) of water or milk if available and transport to a medical facility. Do not give anything by mouth to an unconscious person.

4.5 NOTES TO PHYSICIAN

Due to irritant properties, swallowing may result in burns/ulceration of mouth, stomach and lower gastrointestinal tract with subsequent stricture. Aspiration of vomitus may cause lung injury. Suggest endotracheal/esophageal control if lavage is done.

If burn is present, treat as any thermal burn, after decontamination.

May cause respiratory sensitization or asthma-like symptoms. Bronchodilators, expectorants and antitussives may be of help.

No specific antidote.

Treatment of exposure should be directed at the control of symptoms and the clinical condition of the patient.

5. FIRE FIGHTING MEASURES

5.1 FLAMMABLE PROPERTIES - REFER TO SECTION 9, PHYSICAL AND CHEMICAL PROPERTIES

5.2 EXTINGUISHING MEDIA

Water fog or fine spray. Dry chemical fire extinguishers. Carbon dioxide fire extinguishers. Foam. Alcohol resistant foams (ATC type) are preferred. General purpose synthetic foams (including AFFF) or protein foams may function, but will be less effective.

5.3 FIRE FIGHTING PROCEDURES

Keep people away. Isolate fire and deny unnecessary entry. Use water spray to cool fire exposed containers and fire affected zone until fire is out and danger of reignition has passed. Fight fire from protected location or safe distance. Consider the use of unmanned hose holders or monitor nozzles. Immediately withdraw all personnel from the area in case of rising sound

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from venting safety device or discoloration of the container. Burning liquids may be extinguished by dilution with water. Do not use direct water stream. May spread fire. Move container from fire area if this is possible without hazard. Burning liquids may be moved by flushing with water to protect personnel and minimize property damage. Water should be applied in large quantities as a fine spray.

5.4 SPECIAL PROTECTIVE EQUIPMENT FOR FIREFIGHTERS

Wear positive-pressure self-contained breathing apparatus (SCBA) and protective fire fighting clothing (includes fire fighting helmet, coat, pants, boots, and gloves). Avoid contact with this material during fire fighting operations. If contact is likely, change to full chemical resistant fire fighting clothing with SCBA. If this is not available, wear full chemical resistant clothing with SCBA and fight fire from a remote location. For protective equipment in post-fire or non-fire clean up situations, refer to the relevant sections.

5.5 UNUSUAL FIRE AND EXPLOSION HAZARDS

Heat is generated when product mixes with water.
Container may rupture from gas generation in a fire situation.
Violent steam generation or eruption may occur upon application of direct water stream to hot liquids.

5.6 HAZARDOUS COMBUSTION PRODUCTS

During a fire, smoke may contain the original material in addition to combustion products of varying composition which may be toxic and/or irritating. Combustion products may include and are not limited to: Nitrogen oxides. Carbon monoxide. Carbon dioxide.

6. ACCIDENTAL RELEASE MEASURES

Steps to be Taken if Material is Released or Spilled:

Contain spilled material if possible. Small spills: Absorb with materials such as: Clay. Dirt. Milsorb®. Sand. Do NOT use absorbent materials such as: Cellulose. Sawdust. Wash the spill site with water. Remove with shovel. Collect in suitable and properly labeled containers. Large spills: Dike area to contain spill. Knock down and dilute vapors with water fog or spray. Collect with vacuum equipment. Ground and bond all containers and handling equipment. Wash the spill site with large quantities of water. See Section 13, Disposal Considerations, for additional information.

Personal Precautions: Isolate area. Refer to Section 7, Handling for additional precautionary measures. Keep unnecessary and unprotected personnel from entering the area. Keep personnel out of low areas. Keep upwind of spill. Ventilate area of leak or spill. Use appropriate safety equipment. For additional information, refer to Section 8, Exposure Controls and Personal Protection.

Environmental Precautions: Prevent from entering into soil, ditches, sewers, waterways and/or groundwater. See Section 12, Ecological Information.

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7. HANDLING AND STORAGE

7.1 HANDLING

General Handling

Do not get in eyes.

Avoid prolonged or repeated contact with skin.

Avoid breathing vapor.

Do not swallow.

Wash thoroughly after handling.

Keep container closed.

Use with adequate ventilation.

Containers, even those that have been emptied, can contain vapors. Do not cut, drill, grind, weld, or perform similar operations on or near empty containers.

Do not use sodium nitrite or other nitrosating agents in formulations containing this product.

Suspected cancer-causing nitrosamines could be formed.

See Section 8, EXPOSURE CONTROLS AND PERSONAL PROTECTION.

Ventilation

Good general ventilation should be sufficient for most conditions. Local exhaust ventilation may be necessary for some operations.

Other Precautions

Spills of these organic materials on hot fibrous insulations may lead to lowering of the autoignition temperatures possibly resulting in spontaneous combustion.

7.2 STORAGE

Additional storage and handling information on this product may be obtained by calling your Dow sales or customer service contact. Ask for a product brochure. Store in the following material(s): Stainless steel. Carbon steel. Do not store in: Brass. Bronze. Copper. Copper alloys.

8. EXPOSURE CONTROLS AND PERSONAL PROTECTION

8.1 EXPOSURE LIMITS

Component	Exposure Limits	Skin. Form
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Triethylenetetramine mixture	1 ppm TWA8 AIHA WEEL	Yes
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In the Exposure Limits Chart above, if there is no specific qualifier (i.e., Aerosol) listed in the Form Column for a particular limit, the listed limit includes all airborne forms of the substance that can be inhaled.

A "Yes" in the Skin Column indicates a potential significant contribution to overall exposure by the cutaneous (skin) route, including mucous membranes and the eyes, either by contact with vapors or by direct skin contact with the substance. A "Blank" in the Skin Column indicates that exposure by the cutaneous (skin) route is not a potential significant contributor to overall exposure.

8.2 PERSONAL PROTECTION

Respiratory Protection: For emergency conditions, use an approved positive-pressure self-contained breathing apparatus.

Ventilation: Good general ventilation should be sufficient for most conditions. Local exhaust ventilation may be necessary for some operations.

Eye Protection: Use chemical goggles.
Eye wash fountain should be located in immediate work area.

Other Protective Equipment: Use protective clothing chemically resistant to this material. Selection of specific items such as faceshield, gloves, boots, apron, or full body suit will depend on operation.
Remove contaminated clothing immediately, wash skin area with soap and water, and launder clothing before reuse or dispose of properly. Items which cannot be decontaminated, such as shoes, belts and watchbands, should be removed and disposed of properly.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State: Liquid

Appearance: Brown

Odor: Ammoniacal

Flash Point - Closed Cup: 174 °C 345 °F , Pensky-Martens Closed Cup ASTM D 93

Flammable Limits In Air:

Lower No test data available.

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Upper *No test data available.*

Autoignition Temperature: *No test data available.*

Vapor Pressure: < 1 mmHg 20 °C

Boiling Point (760 mmHg): 395 °C 743 °F

Vapor Density (air = 1): 8

Specific Gravity (H2O = 1): 1.014 20 °C / 20 °C

Freezing Point: *Pour point* -32 °C -26 °F

Melting Point: *Not applicable (for liquids)*

Solubility in Water (by weight): 100 % 20 °C

pH: 13

Evaporation Rate (Butyl Acetate = 1): < 0.01

Percent Volatiles: 0.0 Wt%

10. STABILITY AND REACTIVITY

10.1 STABILITY/INSTABILITY Thermally stable at typical use temperatures.

Conditions to Avoid: Exposure to elevated temperatures can cause product to decompose. Generation of gas during decomposition can cause pressure in closed systems. Reaction with carbon dioxide may form an amine carbamate. Smoke may be generated depending on vapor pressure of mixture. Product absorbs carbon dioxide from the air.

Incompatible Materials: Heat is generated when mixed with water. Spattering and boiling can occur. Avoid contact with oxidizing materials. Avoid contact with: Acids. Acrylates. Alcohols. Aldehydes. Halogenated hydrocarbons. Ketones. Nitrites. Avoid contact with metals such as: Brass. Bronze. Copper. Copper and its alloys. Avoid contact with absorbent materials such as: Ground corn cobs. Moist organic absorbents. Peat moss. Sawdust.

Thermal Decomposition: Decomposition products depend upon temperature, air supply and the presence of other materials. Decomposition products can include and are not limited to: Ammonia. Ethylenediamine. Volatile amines.

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10.2 HAZARDOUS POLYMERIZATION Will not occur.

11. TOXICOLOGICAL INFORMATION

ACUTE TOXICITY

Peroral

Rat; LD50 = 1000 - 2000 mg/kg

Percutaneous

Rabbit; LD50 = > 2000 mg/kg

CHRONIC TOXICITY AND CARCINOGENICITY

Did not cause cancer in laboratory animals.

GENETIC TOXICOLOGY

In Vitro

In vitro genetic toxicity studies were positive.

12. ECOLOGICAL INFORMATION

12.1 ENVIRONMENTAL FATE

Based on stringent OECD test guidelines, this material cannot be considered as readily biodegradable; however, these results do not necessarily mean that the material is not biodegradable under environmental conditions.

Modified Sturm Test (OECD 301B)(% CO2 evolved)

	Day 5	Day 10	Day 15	Day 28
				9.5 %

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12.2 ECOTOXICITY

Material is moderately toxic to aquatic organisms on an acute basis (LC50/EC50 between 1 and 10 mg/L in the most sensitive species tested).

Toxicity to Aquatic Invertebrates

Daphnia magna; EC50

Result value: (5.1 - 58) mg/L

Toxicity to Fish

rainbow trout (*Oncorhynchus mykiss*); LC50

Result value: > 100 mg/L

Toxicity to Fish

zebra fish (*Brachydanio rerio*); LC50

Result value: (320 - 1000) mg/L

Toxicity to Fish

fathead minnow (*Pimephales promelas*); LC50

Result value: (2.1 - 14.2) mg/L

12.3 FURTHER INFORMATION

Chemical Oxygen Demand (COD) - measured: 1.93 mg/mg

No bioconcentration is expected because of the relatively high water solubility.

13. DISPOSAL CONSIDERATIONS

13.1 DISPOSAL

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

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CONDITION AS DESCRIBED IN MSDS SECTION 2 (Composition/ Information on Ingredients). FOR UNUSED & UNCONTAMINATED PRODUCT, the preferred options include sending to a licensed, permitted: 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 Group at 1-800-258-2436 or 1-989-832-1556 (U.S.), or 1-800-331-6451 (Canada) for further details .

14. TRANSPORT INFORMATION

14.1 U.S. D.O.T.

NON-BULK

Proper Shipping Name : NOT REGULATED

BULK

Proper Shipping Name : NOT REGULATED

This information is not intended to convey all specific regulatory or operational requirements/information relating to this product. Additional transportation system information can be obtained through an authorized sales or customer service representative. It is the responsibility of the transporting organization to follow all applicable laws, regulations and rules relating to the transportation of the material.

15. REGULATORY INFORMATION

15.1 FEDERAL/NATIONAL

OSHA HAZARD COMMUNICATION STANDARD

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

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SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT OF 1986 TITLE III (EMERGENCY PLANNING AND COMMUNITY RIGHT-TO-KNOW ACT OF 1986) SECTION 313

To the best of our knowledge this product does not contain chemicals at levels which require reporting under this statute.

SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT OF 1986 TITLE III (EMERGENCY PLANNING AND COMMUNITY RIGHT-TO-KNOW ACT OF 1986) SECTIONS 311 AND 312

Delayed (Chronic) Health Hazard : Yes

Fire Hazard : No

Immediate (Acute) Health Hazard : Yes

Reactive Hazard : No

Sudden Release of Pressure Hazard : No

TOXIC SUBSTANCES CONTROL ACT (TSCA)

This complex reaction polymer is listed on the TSCA Inventory as CASRN 68131-73-7. All components of this product are either listed on the TSCA Inventory or are not required to be. For information concerning alternate chemical identities associated with this product, contact Dow.

EUROPEAN INVENTORY OF EXISTING COMMERCIAL CHEMICAL SUBSTANCES (EINECS)

The components of this product are on the EINECS inventory or are exempt from EINECS inventory requirements.

CEPA - DOMESTIC SUBSTANCES LIST (DSL)

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

15.2 STATE/LOCAL

PENNSYLVANIA (WORKER AND COMMUNITY RIGHT-TO-KNOW ACT): PENNSYLVANIA HAZARDOUS SUBSTANCES LIST AND/OR PENNSYLVANIA ENVIRONMENTAL HAZARDOUS SUBSTANCE LIST:

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The following product components are cited in the Pennsylvania Hazardous Substance List and/or the Pennsylvania Environmental Substance List, and are present at levels which require reporting.

Component	CAS #	Amount
Tetraethylenepentamine mixture	112-57-2	<= 25.0000%
Triethylenetetramine mixture	112-24-3	<= 2.0000%

PENNSYLVANIA (WORKER AND COMMUNITY RIGHT-TO-KNOW ACT): PENNSYLVANIA SPECIAL HAZARDOUS SUBSTANCES LIST:

To the best of our knowledge this product does not contain chemicals at levels which require reporting under this statute.

CALIFORNIA PROPOSITION 65 (SAFE DRINKING WATER AND TOXIC ENFORCEMENT ACT OF 1986)

WARNING: This product contains a chemical(s) known to the State of California to cause cancer.

Component	CAS #	Amount
Nickel	7440-02-0	<= 0.0020%

CALIFORNIA SCAQMD RULE 443.1 (SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT RULE 443.1 LABELING OF MATERIALS CONTAINING ORGANIC SOLVENTS)

VOC: Vapor pressure <0.01 mmHg at 20°C
20 g/l VOC
20 g/l less water and less exempted solvents

This section provides selected regulatory information on this product including its components. This is not intended to include all regulations. It is the responsibility of the user to know and comply with all applicable rules, regulations and laws relating to the product being used.

16. OTHER INFORMATION

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16.1 ADDITIONAL INFORMATION

ADDITIONAL INFORMATION: Additional product safety information on this product may be obtained by calling Dow's Customer Information Group at 1-800-258-2436 (U.S.) or 1-800-331-6451 (Canada).

Ask for the brochure:

Ethyleneamines (Family Brochure)

Ethyleneamines Storage & Handling (Brochure)

Ethyleneamines Workplace Monitoring Methods (Brochure)

16.2 HAZARD RATING SYSTEM

ratings for this product are: H - 2 F - 1 R - 0

These ratings are part of a specific hazard communication program and should be disregarded where individuals are not trained in the use of this hazard rating system. You should be familiar with the hazard communication programs applicable to your workplace.

16.3 RECOMMENDED USES AND RESTRICTIONS

FOR INDUSTRY USE ONLY

16.4 REVISION

Version: 8.0

Revision: 08/30/2004

Most recent revision(s) are noted by the bold, double bars in left-hand margin throughout this document.

16.5 LEGEND

Bacterial/NA	Non Acclimated Bacteria
F	Fire
H	Health
IHG	Industrial Hygiene Guideline
N/A	Not available
NFPA	National Fire Protection Association
O	Oxidizer
R	Reactivity

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TS	Trade secret
VOL/VOL	Volume/Volume
W	Water Reactive
W/W	Weight/Weight

NOTICE: Dow urges each customer or recipient of this MSDS to study it carefully and consult appropriate expertise, as necessary or appropriate, to become aware of and understand the data contained in this MSDS and any hazards associated with the product. The information herein is provided 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 between various locations. It is the buyer's/user's responsibility to ensure that its activities comply with all federal, state, provincial or local laws. The information presented here pertains only to the product as shipped. Since conditions for use of the product are not under the control of Dow, it is the buyer's/user's duty to determine the conditions necessary for the safe use of this product., Due to the proliferation of sources for information such as manufacturer-specific MSDSs, Dow is not and cannot be responsible for MSDSs obtained from any source other than Dow. If you have obtained a Dow MSDS from a non-Dow source or if you are not sure that a Dow MSDS is current, please contact Dow for the most current version.