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: N,N-DIETHYLETHANOLAMINE (DEEA)

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.
2. COMPOSITION INFORMATION

<table>
<thead>
<tr>
<th>Component</th>
<th>CAS #</th>
<th>Amount (%W/W)</th>
</tr>
</thead>
<tbody>
<tr>
<td>N,N-Diethylmonoethanolamine</td>
<td>100-37-8</td>
<td>100 %</td>
</tr>
</tbody>
</table>

3. HAZARDS IDENTIFICATION

3.1 EMERGENCY OVERVIEW

Appearance  
Colorless to yellow

Physical State  
Liquid

Odor  
Ammoniacal

Hazards of product  
COMBUSTIBLE LIQUID AND VAPOR. CAUSES EYE AND SKIN BURNS. HARMFUL OR FATAL IF SWALLOWED. HARMFUL IF INHALED OR ABSORBED THROUGH SKIN. EVACUATE AREA. KEEP UPWIND OF SPILL. STAY OUT OF LOW AREAS.

ASPIRATION HAZARD. CAN ENTER LUNGS AND CAUSE DAMAGE.

3.2 POTENTIAL HEALTH EFFECTS

Effects of Single Acute Overexposure

Inhalation  
May cause irritation of the respiratory tract, experienced as nasal discomfort and discharge, coughing, and possibly accompanied by chest pain. There may be difficulty in breathing.
MATERIAL SAFETY DATA SHEET

Product Name: N,N-DIETHYLETHANOLAMINE (DEEA)  Effective Date: 12/18/2003
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Eye Contact  Liquid causes severe irritation, experienced as discomfort or pain, excess blinking and tear production, marked excess redness and swelling of the conjunctiva, and chemical burns of the cornea. Corneal injury may be severe, extensive, and, if not treated promptly, could result in permanent impairment of vision. Vapor may cause temporary disturbance of vision. (See "Notes to Physician"). High vapor concentrations may cause irritation, experienced as stinging, excess blinking and tear production, with excess redness of the conjunctiva.

Skin Contact  Causes chemical burns with discomfort or pain, severe excess redness and swelling, tissue destruction, fissures, ulceration, and possibly bleeding into the inflamed area.

Skin Absorption  Prolonged or widespread contact may result in the absorption of potentially harmful amounts of material.

Swallowing  Moderately toxic. Causes severe irritation or chemical burns of the mouth, throat, esophagus, and stomach, with pain or discomfort in the mouth, throat, chest, and abdomen, nausea, vomiting, diarrhea, dizziness, drowsiness, thirst, faintness, weakness, circulatory collapse, and coma. Aspiration into the lungs may occur during ingestion or vomiting, resulting in lung injury.

Chronic, Prolonged or Repeated Overexposure

Effects of Repeated Overexposure  Repeated skin contact may cause a dermatitis. Prolonged and/or repeated overexposure to vapor may cause inflammation of the nose and upper respiratory tract.

Other Effects of Overexposure  This material did not show a skin sensitizing potential in a guinea-pig maximization test.

Medical Conditions Aggravated by Exposure

Skin contact may aggravate an existing dermatitis. Inhalation of material may aggravate asthma and inflammatory or fibrotic pulmonary disease.

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

Remove to fresh air. Give artificial respiration if not breathing. Obtain medical attention.
4.2 EYE CONTACT
Immediately flush eyes with water and continue washing for at least 15 minutes. DO NOT remove contact lenses, if worn. Obtain medical attention without delay, preferably from an ophthalmologist.

4.3 SKIN CONTACT
Immediately remove contaminated clothing and shoes. Wash skin thoroughly with soap and water for at least 15 minutes. Obtain medical attention without delay. Wash clothing before reuse. Discard contaminated leather articles such as shoes and belt.

4.4 SWALLOWING
DO NOT INDUCE VOMITING. Do not give anything to drink. Obtain medical attention without delay.

4.5 NOTES TO PHYSICIAN
There is no specific antidote. Treatment of overexposure should be directed at the control of symptoms and the clinical condition of the patient. The hazards of this material are due mainly to its severely irritant properties on skin and mucosal surfaces. Due to the severely irritating or corrosive nature of the material, swallowing may lead to ulceration and inflammation of the upper alimentary tract with hemorrhage and fluid loss. Also, perforation of the esophagus or stomach may occur, leading to mediastinitis or peritonitis and the resultant complications. Any material aspirated during vomiting may cause lung injury. Therefore, emesis should not be induced mechanically or pharmacologically. If it is considered necessary to evacuate the stomach contents, this should be done by means least likely to cause aspiration (e.g., gastric lavage after endotracheal intubation). Exposure to the vapor may cause minor transient edema of the corneal epithelium. This condition, referred to as "glaucopsia", "blue haze" or "blue-gray haze", produces a blurring of vision against a general bluish haze and the appearance of halos around bright objects. The effect disappears spontaneously within a few hours of the end of an exposure and leaves no sequelae. Although not detrimental to the eye per se, glaucopsia predisposes an affected individual to physical accidents and reduces the ability to undertake skilled tasks, such as driving a motorized vehicle.

5. FIRE FIGHTING MEASURES
5.1 FLAMMABLE PROPERTIES - REFER TO SECTION 9, PHYSICAL AND CHEMICAL PROPERTIES

5.2 EXTINGUISHING MEDIA
Extinguish fires with water spray or apply alcohol-type or all-purpose-type foam by manufacturer's recommended techniques for large fires. Use carbon dioxide or dry chemical media for small fires.

5.3 FIRE FIGHTING PROCEDURES
No information currently available.

5.4 SPECIAL PROTECTIVE EQUIPMENT FOR FIREFIGHTERS
Use self-contained breathing apparatus and protective clothing.

5.5 UNUSUAL FIRE AND EXPLOSION HAZARDS
During a fire, oxides of nitrogen may be produced.

This material may produce a floating fire hazard in extreme fire conditions.

5.6 HAZARDOUS COMBUSTION PRODUCTS
Burning can produce the following products: Carbon monoxide and/or carbon dioxide. Oxides of nitrogen. Carbon monoxide is highly toxic if inhaled; carbon dioxide in sufficient concentrations can act as an asphyxiating agent. Acute overexposure to the products of combustion may result in irritation of the respiratory tract.

6. ACCIDENTAL RELEASE MEASURES

Steps to be Taken if Material is Released or Spilled:
- Contain spilled material if possible. Pump with explosion-proof equipment. If available, use foam to smother or suppress. Collect in suitable and properly labeled containers. See Section 13, Disposal Considerations, for additional information.

Personal Precautions:
- Evacuate area. Refer to Section 7, Handling for additional precautionary measures. Keep personnel out of low areas. Keep upwind of spill. Ventilate area of leak or spill. No smoking in area. Only trained and properly protected personnel must be involved in clean-up operations. Eliminate all sources of ignition in vicinity of spill or released vapor to avoid fire or explosion. Ground and bond all containers and handling equipment.
- Vapor explosion hazard. Keep out of sewers. 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.
7. HANDLING AND STORAGE

7.1 HANDLING

General Handling
Keep away from heat, sparks and flame.
Do not get in eyes, on skin, on clothing.
Do not swallow.
Avoid breathing vapor.
Wash thoroughly after handling.
Keep container closed.
Use with adequate ventilation.
Do not use sodium nitrite or other nitrosating agents in formulations containing this product.
Suspected cancer-causing nitrosamines could be formed.
No smoking, open flames or sources of ignition in handling and storage area.
Vapors are heavier than air and may travel a long distance and accumulate in low lying areas.
Ignition and/or flash back may occur.
Use of non-sparking or explosion-proof equipment may be necessary, depending upon the type of operation.
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.
See Section 8, EXPOSURE CONTROLS AND PERSONAL PROTECTION.

Ventilation
This material should be handled in covered vapor-tight equipment, in which case general (mechanical) room ventilation is expected to be satisfactory. Do not use in systems where steam is used for direct humidification of public or private buildings.

7.2 STORAGE

Additional storage and handling information on this product may be obtained by calling your Dow sales or customer service contact.

8. EXPOSURE CONTROLS AND PERSONAL PROTECTION

8.1 EXPOSURE LIMITS

<table>
<thead>
<tr>
<th>Component</th>
<th>Exposure Limits</th>
<th>Skin.</th>
<th>Form</th>
</tr>
</thead>
<tbody>
<tr>
<td>N,N-Diethylmonoethanolamine</td>
<td>2 ppm TWA8 ACGIH</td>
<td>Yes</td>
<td></td>
</tr>
</tbody>
</table>
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: Use self-contained breathing apparatus in high vapor concentrations.

Ventilation: This material should be handled in covered vapor-tight equipment, in which case general (mechanical) room ventilation is expected to be satisfactory. Do not use in systems where steam is used for direct humidification of public or private buildings.

Eye Protection: Monogoggles

Protective Gloves: Butyl Nitrile (NBR)

Other Protective Equipment: Eye Bath, Safety Shower

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State: Liquid

Appearance: Colorless to yellow

Odor: Ammoniacal

Flash Point - Closed Cup: 50 °C 120 °F Tag Closed Cup
**Flash Point - Open Cup:** 54 °C 130 °F *Tag Open Cup*

**Flammable Limits In Air:**
- Lower: 6.7 %(V) *(Measured)*
- Upper: 11.7 %(V) *(Measured)*

**Autoignition Temperature:** *No test data available.*

**Vapor Pressure:** 1.3 mmHg 20 °C

**Boiling Point (760 mmHg):** 162 °C 324 °F

**Vapor Density (air = 1):** 4

**Specific Gravity (H2O = 1):** 0.884 20 °C / 20 °C

**Freezing Point:** *Pour point* -78 °C -108 °F

**Melting Point:** *Not applicable.*

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

**pH:** *No test data available.*

**Molecular Weight:** 117 g/mol

**Octanol/Water Partition Coefficient - Calculated by Structural Fragment Method:** 0.46

**Evaporation Rate (Butyl Acetate = 1):** 0.2

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## 10. STABILITY AND REACTIVITY

### 10.1 STABILITY/INSTABILITY

**Stable.**

**Incompatible Materials:** Strong oxidizing agents. Strong acids.

### 10.2 HAZARDOUS POLYMERIZATION

Will not occur.
11. TOXICOLOGICAL INFORMATION

ACUTE TOXICITY

Peroral

Rat; LD50 = 2.46 (1.88 - 3.23) g/kg; administered as a 10% dilution in water.

Percutaneous

Rabbit; LD50 = 1.26 (0.85 - 1.87) ml/kg; 24 h occluded.

Inhalation

Saturated Vapor Study, 4 hr exposure   static generation of substantially saturated vapor   Rat;
Room temperature

Mortality: 0/6

Inhalation

Saturated Vapor Study, 8 hr exposure   static generation of substantially saturated vapor   Rabbit;
Room temperature

Mortality: 1/5

IRRITATION

Skin.: Rabbit; 4 h occluded
Results: severe erythema and edema with necrosis, ulceration and scabbing

Eye: Rabbit; 0.1 ml; 50% suspension in water
Results: severe corneal injury with corneal vascularization, deformation and opacification; iritis;
severe conjunctival irritation with necrosis and purulent discharge
SIGNIFICANT DATA WITH POSSIBLE RELEVANCE TO HUMANS
Contains one or more amines which may react with nitrites to form nitrosamines. Some nitrosamines have been shown to be carcinogenic in laboratory animals. Diethylethanolamine is not mutagenic in a variety of in vitro and in vivo assays. This material has been shown to cause testicular and thyroid atrophy in laboratory animals by chronic feeding. These effects, however, were not observed in a subchronic inhalation study. No adverse effects were noted in the offspring of rats exposed to diethylethanolamine by inhalation during pregnancy. A similar material, N,N-dimethylethanolamine, has been demonstrated to be a cause of occupational asthma [M. Valliers et al., (1977) American Review of Respiratory Disease 115:867-871].

12. ECOLOGICAL INFORMATION

12.1 ENVIRONMENTAL FATE

BOD (% Oxygen consumption)

<table>
<thead>
<tr>
<th></th>
<th>Day 5</th>
<th>Day 10</th>
<th>Day 15</th>
<th>Day 20</th>
<th>Day 28/30</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>5 %</td>
<td>5 %</td>
<td></td>
<td>76 %</td>
<td></td>
</tr>
</tbody>
</table>

12.2 ECOTOXICITY

Toxicity to Micro-organisms
Bacterial/NA; IC50
Result value: > 1000 mg/L

Toxicity to Aquatic Invertebrates
Daphnia; 48 h; LC50
Result value: 44.1 mg/L

Toxicity to Fish
Fathead Minnow; 96 h; LC50
Result value: 73 mg/L

12.3 FURTHER INFORMATION
Theoretical Oxygen Demand (THOD) - calculated: 2.33 mg/mg

Octanol/Water Partition Coefficient - Calculated by Structural Fragment Method: 0.46

## 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 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:** 2-DIETHYLAMINOETHANOL  
**Hazard Class:** 8., 3  
**ID Number:** UN2686  
**Packing Group:** PG II

**BULK**

**Proper Shipping Name:** 2-DIETHYLAMINOETHANOL  
**Hazard Class:** 8., 3  
**ID Number:** UN2686  
**Packing Group:** PG II
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.

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

- Delayed (Chronic) Health Hazard : Yes
- Fire Hazard : Yes
- Immediate (Acute) Health Hazard : Yes
- Reactive Hazard : No
- Sudden Release of Pressure Hazard : No

**TOXIC SUBSTANCES CONTROL ACT (TSCA)**

All components of this product are on the TSCA Inventory or are exempt from TSCA Inventory requirements under 40 CFR 720.30.

**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.

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**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.

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**15.2 State/Local**

**Pennsylvania (Worker and Community Right To Know Act): Pennsylvania Hazardous Substances List and/or Pennsylvania Environmental Hazardous Substance List:**

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.

<table>
<thead>
<tr>
<th>Component</th>
<th>CAS #</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>N,N-Diethylmonoethanolamine</td>
<td>100-37-8</td>
<td>&lt;= 100.0000%</td>
</tr>
</tbody>
</table>

**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.

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**California Proposition 65 (Safe Drinking Water and Toxic Enforcement Act of 1986)**

This product contains no listed substances known to the State of California to cause cancer, birth defects or other reproductive harm, at levels which would require a warning under the statute.

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**California SCAQMD Rule 443.1 (South Coast Air Quality Management District Rule 443.1, Labeling of Materials Containing Organic Solvents)**
16. OTHER INFORMATION

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:
Ethanolamines (Family Brochure)

16.2 HAZARD RATING SYSTEM

NFPA ratings for this product are: H - 3  F - 2  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
Do not use in systems where steam is used for direct humidification of public or private buildings.

16.4 REVISION

Version: 5.0
Revision: 12/18/2003
16.5 LEGEND

<table>
<thead>
<tr>
<th>Term</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bacterial/NA</td>
<td>Non Acclimated Bacteria</td>
</tr>
<tr>
<td>F</td>
<td>Fire</td>
</tr>
<tr>
<td>H</td>
<td>Health</td>
</tr>
<tr>
<td>IHG</td>
<td>Industrial Hygiene Guideline</td>
</tr>
<tr>
<td>N/A</td>
<td>Not available</td>
</tr>
<tr>
<td>NFPA</td>
<td>National Fire Protection Association</td>
</tr>
<tr>
<td>O</td>
<td>Oxidizer</td>
</tr>
<tr>
<td>R</td>
<td>Reactivity</td>
</tr>
<tr>
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<tr>
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<tr>
<td>W</td>
<td>Water Reactive</td>
</tr>
<tr>
<td>W/W</td>
<td>Weight/Weight</td>
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</tbody>
</table>

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.