



SILVER FERN CHEMICAL

Material Safety Data Sheet

DEA (DIETHANOLAMINE)

SECTION 1: IDENTIFICATION

Product Name: DEA (All grades)

Chemical Family: Ethanolamines

CAS Number: 111-42-2

Chemical Name: 2,2'iminobisethanol

Synonyms: Diethanolamine

Company

Silver Fern Chemical, Inc.
2226 Queen Anne Avenue North
Suite #C
Seattle WA 98109, USA

Business Contact

Customer Service: 206-282-3376
info@silverfernchemical.com

24 Hour Emergency Contact

Infotrac 800-535-5053
Outside USA & Canada 352-323-3500

SECTION 2: HAZARD IDENTIFICATION

Emergency Overview

This material is HAZARDOUS by OSHA Hazard Communication definition.

Signal Word

WARNING.

Hazards

Severe eye irritant. Skin irritant. Not expected to be a sensitizer. Respiratory tract irritant. CNS depressant. Irritating to gastrointestinal tract.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 1



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Reactivity: 0

Personal Protection: E

National Fire Protection Association (U.S.A.):

Health: 3

Flammability: 1

Reactivity: 0

Physical State

Liquid.

Odor

Ammonia-like.

Odor Threshold

No value available.

Potential Health Effects

Routes of Exposure

Eye. Inhalation. Skin.

Signs and Symptoms of Acute Exposure

See component summary.

• Diethanolamine 111-42-2

Skin irritant. Severe eye irritant. Breathing mist or vapors may cause mucous membrane or upper respiratory tract irritation. Not expected to be a sensitizer. Harmful if swallowed.

Skin

Skin irritant. Not expected to be a sensitizer. The substance is poorly absorbed through skin.

Inhalation

Exposure to vapor may cause irritation of the eyes, nose, or throat. At high concentrations, respiratory distress, cardiac effects, congested lungs, liver, and spleen, enlarged kidneys, thymic hemorrhage and death.

Eye

Corrosive to eyes. Severe eye irritant.



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Ingestion

Ingestion may cause discomfort and irritation of the gastrointestinal tract, respiratory difficulty, and damage to the liver and kidneys.

Chronic Health Effects

See component summary.

• Diethanolamine 111-42-2

Repeated and/or prolonged contact with skin may cause inflammation, hyperkeratosis, acanthosis and ulceration. Primary target organs following repeated exposures are liver, kidney and skin.

Conditions Aggravated by Exposure

Any pre-existing disorders or diseases of the liver, kidneys, reproductive system, and blood. Certain sensitive individuals and individuals with respiratory impairments may be affected by exposure to components in the processing emissions

SECTION 3: COMPOSITION / INFORMATION ON INGREDIENTS

Component Name	CAS #	EU Inventory	Concentration Wt.%
Diethanolamine	111-42-2	203-868-0	85 - 100
Water	7732-18-5	231-791-2	0 - 15

Compositions given are typical values, not specifications.

SECTION 4: FIRST AID MEASURES

General

Take proper precautions to ensure your own health and safety before attempting rescue and providing first aid. For specific information refer to the Emergency Overview in Section 2 of this MSDS.

Skin

Immediately remove excess chemical and contaminated clothing; thoroughly wash contaminated skin with mild soap and water. If irritation persists after washing, seek medical attention. Thoroughly clean contaminated clothing before reuse; discard contaminated leather goods (gloves, shoes, belts, wallets, etc.).

Inhalation

Move the exposed person to fresh air at once. If breathing has stopped, perform artificial respiration. When breathing is difficult, properly trained personnel may assist the affected person by administering oxygen. Keep the affected person



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warm and at rest. Get medical attention immediately.

Eye

Immediately flush eyes thoroughly with plenty of water and continue flushing for at least 15 minutes. Seek immediate medical attention, preferably an ophthalmologist.

Ingestion

If swallowed, give lukewarm water or milk (pint/ 1/2 litre) if victim completely conscious/alert. Never give anything by mouth to an unconscious person. Do not induce vomiting because of corrosive effects. Obtain emergency room treatment immediately.

Note to Physician

Assess airway if inhaled and/or ingested. Do not induce vomiting because of corrosive effects. However, if vomiting occurs spontaneously, maintain open airway. Provide oxygen and/or ventilation assistance, if needed. Skin absorption hazard. If exposed, treat skin and eye burns or irritation conventionally after decontamination.

SECTION 5: FIRE FIGHTING MEASURES

Flammable Properties

Classification

OSHA/NFPA Class IIIB combustible liquid. Not combustible.

Flash Point

> 138 °C (> 280.4 °F) PMCC (Please refer to the product specification sheet for specific data).

Auto-Ignition Temperature

662 °C (1,223.6 °F) (Please refer to the product specification sheet for specific data).

Lower Flammable Limit

No Data Available.

Upper Flammable Limit

No Data Available.

Extinguishing Media

Suitable:

SMALL FIRE: Use dry chemical, CO₂, water spray or regular foam. LARGE FIRE: Use water spray, water fog or regular foam. Do not use straight streams.



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Unsuitable:

No additional information available.

Protection of Firefighters

Protective Equipment/Clothing:

Wear positive pressure self-contained breathing apparatus (SCBA). Structural firefighters protective clothing will only provide limited protection.

Fire Fighting Guidance:

Though not normally combustible, exposure to fire may build enough pressure to rupture closed containers, spreading contents, which are harmful if inhaled, swallowed, or splashed in the eyes or on the skin. Oxides of nitrogen will be evolved. Water may be ineffective, but should be used to keep fire-exposed containers cool. Move containers from fire area if you can do it without risk. For massive fire, use unmanned hose holders or monitor nozzles; if this is impossible, withdraw from area and let fire burn. Always stay away from tanks engulfed in fire. When fighting a fire, notify environmental authorities if liquid runoff enters sewers or public waters.

Hazardous Combustion Products:

Carbon oxides (CO, CO₂)

SECTION 6: ACCIDENTAL RELEASE MEASURES

Release Response

Do not touch or walk through spilled material. Stop leak if you can do it without risk. Soak up small spills with inert solids and shovel into suitable disposal containers. For large spills, dike and pump into properly labeled containers for reclamation or disposal. For small spills, soak up with absorbent material and place in properly labeled containers for disposal. Prevent entry into waterways, sewers, basements or confined areas.

SECTION 7: HANDLING AND STORAGE

Handling

Containers, even those that have been emptied, will retain product residue and vapor and should be handled as if they were full. Do not eat, drink or smoke in areas where this material is used. After handling, always wash hands thoroughly with soap and water. Do not handle near heat, sparks, or flame. Avoid contact with incompatible agents. Use only with adequate ventilation/personal protection. Avoid contact with eyes, skin and clothing. Do not enter storage area unless adequately ventilated. Metal containers involved in the transfer of this material should be grounded and bonded.

Storage

Store containers in a cool, dry, ventilated, fire resistant area away from sources of ignition and incompatible materials.



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Keep container tightly closed and properly labeled.

SECTION 8: EXPOSURE CONTROLS AND PERSONAL PROTECTION

Engineering Controls

Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. Emergency shower and eyewash facility should be in close proximity (ANSI Z358.1)

Personal Protection

Inhalation

A respiratory protection program that meets OSHA's 29 CFR 1910.134 or ANSI Z88.2 requirements must be followed whenever workplace conditions warrant respirator use. Use an approved respirator, either air-supplied or air purifying (consult your company safety professional, or Equistar Industrial Hygiene group for guidance). The type of respiratory protection will depend upon whether the maximum exposure concentration is known.

Skin

Wear chemical resistant gloves such as: Butyl rubber. Neoprene. Nitrile. PVC or Viton(TM). Appropriate protective clothing should be worn to prevent skin contact.

Eye

Eye protection such as chemical splash goggles and/or face shield must be worn when possibility exists for eye contact due to splashing or spraying liquid, airborne particles, or vapor.

Additional Remarks

Selection of appropriate personal protective equipment should be based on an evaluation of the performance characteristics of the protective equipment relative to the task(s) to be performed, conditions present, duration of use, and the hazards and/or potential hazards that may be encountered during use. Emergency eye wash fountains and safety showers should be available in the immediate vicinity of any potential exposure. Use good personal hygiene practices. Wash hands thoroughly after use. Promptly remove soiled clothing/wash thoroughly before reuse.

Occupational Exposure Limits:

<u>Component Name</u>	<u>Source</u>	<u>Type</u>	<u>Value</u>	<u>Notation</u>
Diethanolamine	US (ACGIH)	TWA	2 mg/m ³	Skin

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES



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Appearance: Liquid.

Odor: Ammonia-like.

Odor Threshold: No value available.

pH: 11

Boiling Point/Boiling Range: 100 - 268 °C (212 - 514.4 °F)
(Please refer to the product specification sheet for specific data).

Freezing Point/Melting Point: 28 °C (82.4 °F) Water is added to Low Freeze Grades to depress freezing point.

Flash Point: > 138 °C (> 280.4 °F) PMCC (Please refer to the product specification sheet for specific data).

Auto-ignition: 662 °C (1,223.6 °F) (Please refer to the product specification sheet for specific data).

Flammability: OSHA/NFPA Class IIIB combustible liquid. Not combustible.

Lower Flammable Limit: No Data Available.

Upper Flammable Limit: No Data Available.

Explosive Properties: No Data Available.

Oxidizing Properties: No Data Available.

Vapor Pressure: < 0.01 mm Hg @ 20 °C (68 °F)

Evaporation Rate: No Data Available.

Relative Density: 1.08 @ 20 °C (68 °F) (Water = 1)

Relative Vapor Density: 3.65 (Air = 1.0)

Viscosity: 580 mPa.s @ 25 °C (77 °F)

Solubility (Water): Miscible

Partition Coefficient (Kow): Log Pow: -1.43 Estimated

Additional Physical and Chemical Properties: No additional information available.

SECTION 10: STABILITY AND REACTIVITY

Chemical Stability

The product is stable.

Conditions to Avoid

Avoid contact with strong oxidizers, excessive heat, sparks or open flame.



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Substances to Avoid

Oxidizers, Acids, Alkalis

Decomposition Products

Carbon Monoxide and Carbon dioxide. Ammonia and oxides of nitrogen.

Hazardous Polymerization

Will not occur.

Reactions with Air and Water

Does not react with air, water or other common materials.

SECTION 11: TOXICOLOGICAL INFORMATION

PRODUCT INFORMATION

Product Summary

This product is of low to moderate acute toxicity. May be harmful if swallowed. Ingestion may cause discomfort and irritation of the gastrointestinal tract and damage to the liver and kidney. Inhalation of vapors may cause respiratory irritation and distress, cardiac effects, and mortality. Severely irritating and corrosive to the eye and a moderate skin irritant. Does not induce skin sensitization. It also produces a rat-specific microcytic anemia that does not involve the bone marrow. Diethanolamine has not been tested for reproductive toxicity but at high exposure concentrations it produced minimal to moderate testicular, sperm and prostate gland effects in male rats. Diethanolamine is not selectively toxic to the developing fetus and does not induce frank malformations. Embryo/fetotoxicity (manifested primarily as delays in ossification) is observed at maternally toxic doses. Diethanolamine is negative in standard genotoxicity assays (both in vitro and in vivo). In 2-year studies in rats and mice, diethanolamine failed to produce tumors in rats following dermal application but was carcinogenic in mice, producing liver and kidney tumors. In workers occupationally exposed to diethanolamine, there is some indication of an increased risk for certain cancers, most notably of the esophagus, stomach, and larynx. These tumors are seen primarily in workers exposed to metalworking fluids. The complex nature of these fluids, and the lack of specific exposure information for diethanolamine, makes interpretation of these studies difficult. Evidence from mechanistic studies suggests that the hepatocarcinogenic effect of diethanolamine in mice is due to an enhanced sensitivity to choline deficiency and is not predictive of the human response.

COMPONENT INFORMATION

Diethanolamine 111-42-2

Acute Toxicity - Lethal Doses



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LCLo (vapor) Rat > 200 PPM 6 HOURS
LD50 (Oral) Rat 780 MG/KG BWT
LD50 (Skin) Rabbit 8100 MG/KG BWT

Acute Toxicity - Effects

Inhalation

This substance is of low to moderate acute toxicity by the inhalation route of exposure. Exposure to vapor may cause irritation of the eyes, nose, or throat. At high concentrations, respiratory distress, cardiac effects, congested lungs, liver, and spleen, enlarged kidneys, thymic hemorrhage and death.

Ingestion

This substance is of low to moderate acute toxicity when administered orally. Ingestion may cause discomfort and irritation of the gastrointestinal tract, respiratory difficulty, and damage to the liver and kidneys.

Skin Contact

The substance is poorly absorbed through skin. Considered to be of low toxicity by the dermal route of exposure.

Irritation

Skin

Skin irritant. Repeated and/or prolonged contact with skin may cause inflammation, hyperkeratosis, acanthosis and ulceration.

Eye

Corrosive to eyes. Severe eye irritant. Vapor may be irritating to the eyes.

Sensitization

Does not induce skin sensitization. Not expected to cause respiratory tract sensitization.

Target Organ Effects

Skin. Eye. Respiratory system. Lung. Liver. Kidneys.

Repeated Dose Toxicity

This substance is moderately to severely toxic following repeated exposures by a variety of routes. At relatively high dosages, a number of other tissues are affected by treatment with diethanolamine, but the significance of these effects is confounded by stress and the loss of body weight. Toxic effects reported in experimental animals receiving subchronic oral exposures include anemia (≥ 200 mg/kg bwt), liver weight, enzyme and structural changes (≥ 100 mg/kg bwt),



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kidney weight increases, tubular necrosis and mineralization (> 178 mg/kg bwt), minimal to mild demyelination of the brain and spinal cord (> 200 mg/kg bwt), and immune function decreases (≥ 50 mg/kg bwt). Subchronic exposure to the aerosol caused liver and kidney effects, anemia and upper respiratory irritation (≥ 0.08 mg/L). Diethanolamine causes a rat-specific microcytic anemia not involving the bone marrow. Dermal subchronic exposure produced death (500 mg/kg bwt), acanthosis and ulceration to the skin (≥ 32 mg/kg bwt), liver weight and structural changes (320 mg/kg bwt), kidney tubular necrosis (≥ 32 mg/kg bwt), heart degeneration (1250 mg/kg bwt), salivary gland structural changes (1250 mg/kg bwt) and minimal brain demyelination (≥ 250 mg/kg bwt). Chronic dermal exposure produced structural changes to the liver (≥ 8 mg/kg bwt), hyperkeratosis of the skin with the presence of exudates (≥ 8 mg/kg bwt), nephropathy (≥ 8 mg/kg bwt), decrease body weight (≥ 32 mg/kg bwt) and salivary gland structural changes (80 mg/kg bwt). In humans, repeated exposure to high oral doses (≥ 250 mg/kg bwt) resulted in lower blood lipids (including cholesterol) and increase clotting times.

Reproductive Effects

May cause toxicity to male reproduction. Testicular effects have been found after repeated exposure of male rats to diethanolamine (> 200 mg/kg bwt/day) in drinking water. Effects were reported as minimal to moderate and consisted of testicular degeneration and reduced sperm motility and sperm counts in the epididymis. Minimal diffuse testicular atrophy and minimal atrophy of the prostate were present at an aerosol inhalation exposure concentration of 0.4 mg/L. No effects on female reproductive organs have been reported in a variety of sub-acute, sub-chronic, and chronic toxicity studies.

Developmental Effects

May cause developmental toxicity at doses that cause maternal toxicity. In experimental animals, this substance was not selectively toxic to the developing fetus. Embryo/fetotoxicity but no teratogenic effects was evident at dose levels at which maternal toxicity is observed. Fetal effects described generally as skeletal variations were observed in rats after exposures to aerosols above 0.05 mg/L; after oral administration at dose levels above 50 mg/kg bwt; or following dermal administration at doses above 380 mg/kg bwt. Maternal toxicity including increased mortality, increased absolute and relative liver weights, reduced body weights and body weight gains, altered blood clinical chemistries and hematology, and vaginal bleeding was evident in rats after exposures to aerosols above 0.05 mg/L; after oral administration above 50 mg/kg bwt; or following dermal administration at doses below 150 mg/kg bwt. In the rabbit, prenatal developmental toxicity was not present at the highest dose administered (350 mg/kg bwt). In a limited screening level developmental toxicity study in mice, diethanolamine was judged to be a developmental toxicant.

Genetic Toxicity

This substance was negative for genotoxicity in bacterial, yeast, and mammalian cell mutation assays, in an in vitro chromosome aberration assay and in an in vivo micronucleus test. Mixed results were obtained in the Syrian hamster embryo cell transformation test, with a negative finding in one study with an 8-day treatment, but positive findings at similar concentrations after a 7-day treatment or after a 24-hour treatment at much higher concentrations. Coadministration of choline in this latter study abolished the effect.

Carcinogenicity

There is limited evidence for the carcinogenicity of this substance in experimental animals. In a chronic dermal study



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conducted in mice, there were increased rates of liver tumors at all administered dose levels up to 160 mg/kg bwt. Renal tubule adenomas in male mice were marginally increased. A chronic dermal study conducted in rats found no treatment related increase in the incidence of tumors in either males (dosed up to 64 mg/kg bwt) or females (dosed up to 32 mg/kg bwt). Mechanistic information suggests that the occurrence of hepatocellular tumors in mice are due to an enhanced sensitivity to choline deficiency and are not predictive of a similar susceptibility in humans. Available epidemiology studies have looked at cancer mortality or incidence among workers using metalworking fluids containing diethanolamine as an additive, either with or without sodium nitrite. Small excesses in cancers of various tissues were reported, in particular the stomach, esophagus, and larynx. In most of these studies, associations found were primarily with the use of soluble oils or synthetic fluids. The lack of specific information concerning worker exposures to diethanolamine, and the complex nature of the mixtures present in metalworking fluids (including exposures to other known or suspect carcinogens), make the interpretation of results from these studies difficult. The International Agency for Research on Cancer (IARC) has evaluated this material as an IARC Group 3 not classifiable as to carcinogenicity in humans, based on limited data in animals and inadequate data in humans.

Water 7732-18-5

Acute Toxicity - Lethal Doses

LD50 (Oral) Rat > 90 ML/KG

Repeated Dose Toxicity

No known chronic health effects.

Carcinogenicity

Not listed by IARC, NTP, OSHA or EPA.

SECTION 12: ECOLOGICAL INFORMATION

PRODUCT INFORMATION

Ecotoxicity

See component summary.

Environmental Fate and Pathway

See component summary.



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COMPONENT INFORMATION

• *Diethanolamine 111-42-2*

Ecotoxicity

Acute toxicity to fish

LC50 / 96 HOURS *Pimephales promelas* 1,370 mg/l

Summary: Acute toxicity to fish is very low.

Acute toxicity to aquatic invertebrates

EC50 / 48 HOURS *Daphnia magna*. > 100 mg/l

Summary: Low acute toxicity to aquatic invertebrates.

Toxicity to aquatic plants

EC50 / 72 HOURS *Scenedesmus subspicatus* 7.8 - 75 mg/l

EC50 / 96 HOURS *Pseudokirchneriella subcapita* (formerly *Selenastrum capricornutum*) 2.1 - 3.6 mg/l

Summary: This material is toxic to algae or higher aquatic plants.

Toxicity to microorganisms

TGK / 16 HOURS *Pseudomonas putida* 16 mg/l

EC42 / 20 d Activated sludge 5,000 mg/l

Summary: Respiration inhibition.

Summary: Low toxicity to bacteria.

Chronic toxicity to fish

Summary: No measured data available. Not expected to exhibit chronic toxicity to fish.

Chronic toxicity to aquatic invertebrates

NOEC / 21 d *Daphnia magna*. 0.78 mg/l(reproduction test)

Summary: May show chronic toxicity to aquatic invertebrates.

Other Adverse Effects

Xenopus laevis, 48-hr larval LC50 = 1174 mg/l. Low toxicity to terrestrial species.

Environmental Fate and Pathway

Mobility

Transport between environmental compartments: Volatilization from water or soil surfaces is expected to be limited.

Partitioning mainly to water. High mobility in soil.

Persistence and Degradability



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Biodegradation: Readily biodegradable (96% degraded in 10 days). Expected to be hydrolytically stable, but rapidly degraded following atmospheric release.

Bioaccumulation: This material is not expected to bioaccumulate. QSAR calculations based on chemical structure predict a BCF value of 3.16.

- **Water 7732-18-5**

Ecotoxicity

Not applicable.

Environmental Fate and Pathway

Not applicable.

SECTION 13: DISPOSAL CONSIDERATIONS

Dispose of all waste and contaminated equipment in accordance with all applicable federal, state and local health and environmental regulations. Recovery and reuse, rather than disposal, should be the ultimate goal of handling efforts. The materials resulting from clean-up operations may be hazardous wastes and therefore, subject to specific regulations.

SECTION 14: TRANSPORT INFORMATION

Special Requirements

If you reformulate or further process this material, you should consider re-evaluation of the regulatory status of the components listed in the composition section of this sheet, based on final composition of your product.

Proper Shipping Name Environmentally hazardous substance, liquid, n.o.s. (DIETHANOLAMINE)

RQ DIETHANOLAMINE

ID No. UN3082

Hazard Class 9

PG III

This information is not intended to convey all specific regulatory or operational requirements/information relating to this product. It is the responsibility of the transporting organization to follow all applicable laws, regulations and rules relating to the transportation of the material.

SECTION 15: REGULATORY INFORMATION

Regulatory Status:



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<u>Country</u>	<u>Inventory</u>
Australia	AICS
Canada	DSL
China	IECS
European Union	EINECS
Japan	ENCS
Korea	ECL
Philippines	PICCS
United States	TSCA

If identified components of this product are listed under the TSCA 12(b) Export Notification rule, they will be listed below.

SARA 302/304

This material contains a component(s) with known CAS numbers classified as hazardous substances subject to the reporting of CERCLA (40 CFR 302) and/or to the release reporting requirements of SARA (Section 302) based on reportable quantities (RQs).

<u>Component</u>	<u>RQ</u>
Diethanolamine / CAS# 111-42-2.	100 lbs

SARA 311/312

Based upon available information, this material is classified as the following health and/or physical hazards according to Section 311 & 312:

Immediate (Acute) Health Hazard.
Delayed (Chronic) Health Hazard.

SARA 313

This material contains the following chemicals with known CAS numbers subject to the reporting requirements of SARA Title III, Section 313 and 40 CFR 372:

<u>Component</u>	<u>Reporting Threshold</u>
Diethanolamine / CAS# 111-42-2	1.0%

State Reporting

This material is not known to contain any chemicals currently listed as carcinogens or reproductive toxins under **California** Proposition 65 at levels which would be subject to the proposition.



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Environmentally Hazardous Substances listed by the State of **Pennsylvania** must be identified when present in materials at levels greater than the state specified criterion. The criterion is $\geq 1\%$. Components with CAS numbers in this material at a level which could require reporting under the statute are:

Diethanolamine / CAS# 111-42-2.

Massachusetts Substances List (MSL) - Hazardous substances on the MSL must be identified when present in materials at levels greater than state specified criterion. The criterion is: $\geq 1\%$. Components with CAS numbers present in this material at a level which could require reporting under the statute are:

Diethanolamine / CAS# 111-42-2.

New Jersey Community Right-to-Know Survey, Table A: NJ Environmental Hazardous Substances [EHS] List (N.J. Admin. Code Title 7 Section 1G-2.1):

Diethanolamine / CAS# 111-42-2.

SECTION 16: OTHER INFORMATION

Date Created: 1/29/2008

Date Last Updated: 1/29/2008

DISCLAIMER OF RESPONSIBILITY

The information on this MSDS was obtained from sources which we believe are reliable. However, the information is provided without any warranty, expressed or implied, regarding its correctness. Some information presented and conclusions drawn herein are from sources other than direct test data on the substance itself. The conditions or methods of handling, storage, use and disposal of the product are beyond our control and may be beyond our knowledge. For this and other reasons, we do not assume responsibility and expressly disclaim liability for loss, damage, or expense arising out of or in any way connected with handling, storage, use, or disposal of this product. If the product is used as a component in another product, this MSDS information may not be applicable.

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