

IN CASE OF TRANSPORTATION EMERGENCY CONTACT:

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1. IDENTIFICATION

MONOETHANOLAMINE

SYNONYMS: MEA, ETHANOLAMINE SOLUTIONS

CHEMICAL FAMILY: ALKANOLAMINE

2. HAZARDS IDENTIFICATION

Potential Acute Health Effects: Corrosive. Causes eye and skin burns.

Potential Chronic Health Effects: Swallowing of this material may result in severe ulceration, inflammation, and possible perforation of the upper alimentary tract.

Hazards of product

Colorless Liquid

Ammoniacal

CAUSES EYE AND SKIN BURNS.

HARMFUL IF INHALED OR ABSORBED THROUGH SKIN. HARMFUL IF SWALLOWED.

EVACUATE AREA.

KEEP UPWIND OF SPILL.

ASPIRATION MAY CAUSE LUNG DAMAGE.

REPEATED EXPOSURE MAY CAUSE LIVER AND KIDNEY DAMAGE.

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. Prolonged overexposure may cause injury to the respiratory tract.

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.

Skin Contact Causes local discomfort or pain, severe excess redness and swelling, tissue destruction, fissures, ulceration, and possibly bleeding into the injured area.

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

Swallowing Aspiration into the lungs may occur during ingestion or vomiting, resulting in lung injury. 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.

Chronic, Prolonged or Repeated Overexposure

Effects of Repeated Overexposure Repeated overexposure may cause damage to kidneys and liver.

Other Effects of Overexposure None currently known.

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. COMPOSITION

CHEMICAL NAME	CAS Number	%WT	TLV	PEL
Monoethanolamine	141-43-5	100	3	6 ppm

4. FIRST AID MEASURES

Skin: Causes severe irritation with pain and chemical burns, blister formation and possible tissue damage.

Eyes: Causes irritation experienced as pain with redness, tearing and tissue damage.

Inhalation: Heated mist or vapors causes respiratory tract irritation and mucous discharge. High vapor concentrations may be irritating to respiratory system. Breathing of vapor may cause headaches, irritation of throat and may cause central nervous system depression.

Ingestion: Causes irritation or burns of the digestive tract accompanied by stomach and chest pain, nausea, vomiting and diarrhea. Aspiration may occur during vomiting.

FIRST AID PROCEDURES:

Eyes: Immediately flush with large amounts of cool running water for at least 15 minutes. Hold eyelids apart while flushing to rinse entire surface of eye and lids. DO NOT remove contact lenses, if worn. Obtain medical attention without delay, preferably from an ophthalmologist.

Skin: Remove contaminated clothing. Use safety shower. Wash skin with soap and water. Get immediate medical attention. Wash clothing before reuse. Discard contaminated leather articles such as shoes and belt.

Inhalation: For excessive inhalation remove to fresh air. Seek professional medical advice.

Ingestion: DO NOT induce vomiting. Drink 2 glasses of water or milk. Get immediate medical attention.

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 irritant nature of the material, the stomach should be evacuated carefully in cases of poisoning by swallowing.

5. FIRE FIGHTING MEASURES

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

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.

FIRE FIGHTING PROCEDURES

Do not direct a solid stream of water or foam into burning molten material; this may cause spattering and spread the fire.

SPECIAL PROTECTIVE EQUIPMENT FOR FIREFIGHTERS

Use self-contained breathing apparatus, eye protection, and protective clothing.

UNUSUAL FIRE AND EXPLOSION HAZARDS

During fire, oxides of nitrogen may be evolved.

HAZARDOUS COMBUSTION PRODUCTS

Burning can produce the following products: Oxides of carbon and nitrogen. Carbon monoxide is highly toxic if inhaled; carbon dioxide in sufficient concentrations can act as an asphyxiant. 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. Collect in suitable and properly labeled containers.

Personal Precautions: Evacuate area. Handling for additional precautionary measures. Keep upwind of spill. Ventilate area of leak or spill. Only trained and properly protected personnel must be involved in clean-up operations.

Environmental Precautions: Prevent from entering into soil, ditches, sewers, waterways and/ or groundwater.

Small Spill: Stop source of spill. Absorb on inert media and collect into suitable container.

Large Spill: Ventilate the area. Dike area to contain spill. Salvage as much useable liquid as possible into a suitable container. Absorb residual on inert media and collect into suitable container. Prevent entry into sewers and waterways.

Personal Protection in Case of Large Spill: Full Suit. Boots. Gloves. A self-contained breathing apparatus should be used to avoid inhalation of the product.

7. HANDLING AND STORAGE

General Handling

Do not get in eyes, on skin, on clothing. Avoid breathing vapor.

Do not swallow.

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.

Ventilation

Provide general and/or local exhaust ventilation to control airborne levels below the exposure guidelines.

STORAGE

STABILITY - Monoethanolamine and iron form a complex molecule, trisethanolamino-iron. This material can spontaneously decompose at temperatures between 130° and 160°C, and has been suspected of causing a fire in a nearly empty storage tank containing a 'heel' of MEA in contact with carbon steel steam coils. If steam coil heating is used, low pressure steam in stainless steel coils is preferred. Since this same mechanism may occur in drums, take care when thawing drummed MEA with heating coils and maintain temperature below 130°C.

8. EXPOSURE CONTROLS AND PERSONAL PROTECTION

COMPONENT

EXPOSURE LIMITS

Monoethanolamine

3 ppm TWA8 ACGIH

6 ppm STEL ACGIH

3 ppm TWA8 OSHA
6 mg/m3 TWA8 OSHA

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.

PERSONAL PROTECTION

Respiratory Protection: Atmospheric levels should be maintained below the exposure guideline.

When airborne exposure guidelines and/or comfort levels may be exceeded, use an approved air-purifying respirator.

For emergency response or for situations where the atmospheric level is unknown, use an approved positive-pressure self-contained breathing apparatus or positive-pressure airline with auxiliary self-contained air supply.

Ventilation:

Provide general and/or local exhaust ventilation to control airborne levels below the exposure guidelines.

Eye Protection:

Monogoggles.

PROTECTIVE GLOVES:

Polyvinyl chloride coated rubber

OTHER PROTECTIVE EQUIPMENT:

Eye bath, safety shower and chemical apron

9. PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL STATE:	LIQUID
APPEARANCE:	COLORLESS
ODOR:	AMMONIACAL
FLASH POINT - CLOSED CUP	96° C 205° F Pensky-Martens Closed Cup ASTM D93
FLASH POINT - OPEN CUP	104° C 220° F Cleveland Open Cup ASTM D 92
AUTO IGNITION TEMPERATURE:	No test data available
VAPOR PRESSURE:	0.2 mmHg 20° C
BOILING POINT (760 mmHg):	170° C 339° F
VAPOR DENSITY (air = 1):	2.1
SPECIFIC GRAVITY (H2O = 1):	1.017 20°C / 20° C
FREEZING:	11° C 51° F
MELTING POINT:	N/A
SOLUBILITY IN WATER (by weight):	100% 20° C
PH:	NO TEST DATA AVAILABLE
MOLECULAR WEIGHT:	61/g/mol
OCTANOL/WATER PARTITION COEFFICIENT - MEASURED:	-1.31

EVAPORATION RATE (Butyl Acetate = 1)0.02

PERCENT VOLATILES: 100 WT%

10. STABILITY AND REACTIVITY

Stability: Stable under normal use and storage conditions.

Conditions to Avoid: This material reacts violently with acids. Temperatures above 250 degrees C. May undergo self-sustaining thermal decomposition

Incompatibility: Strong oxidizing agents. Strong bases. Strong acids. Aldehydes. Ketones. Acrylates. Organic anhydrides. Organic halides. Formates. Lactones. Oxalates.

Hazardous Decomposition Products: Oxides of Carbon and Nitrogen plus irritating levels of aldehydes and ketones.

Hazardous Polymerization: Will not occur.

11. TOXICOLOGICAL INFORMATION

The following information is applicable to monoethanolamine.

ACUTE TOXICITY

Peroral

Rat; male; LD50 = 1.19 (0.79 - 1.80) ml/kg; slope = 3.84

Time to Death: 0 to 12 days.

Peroral

Rat; female; LD50 = 1.07 (0.72 - 1.59) ml/kg; slope = 4.96

Time to Death: 0 to 12 days.

Peroral

Combined effects for males and females:

Major Signs: sluggishness, lacrimation, piloerection, kyphosis, unsteady gait, emaciation, pallor, red or brown discharge on perianal, periocular, and perigenital fur.

Gross Pathology: lungs, kidneys, stomachs, and intestines discolored; liver and stomach adhesions; stomachs gas- or liquid-filled.

Percutaneous

Rabbit; male; LD50 = 2.46 (1.76 - 3.39) ml/kg; slope = 5.60; 24 h occluded.

Time to Death: 1 to 13 days.

Percutaneous

Rabbit; female; LD50 = 2.83 (1.61 - 4.98) ml/kg; slope = 3.89; 24 h occluded.

Time to Death: 1 to 13 days.

Percutaneous

Combined effects for males and females:

Major Signs: sluggishness, audible breathing in one, abdominal distention, prostration in one, emaciation.

Irritation: erythema, edema, ecchymosis, necrosis, ulceration, desquamation, alopecia on one.

Gross Pathology: numerous organs discolored, hemorrhaged intestines, stomachs and intestines liquid- or gas-filled.

Inhalation

Substantially saturated vapor studies, 6 hour exposure static generation method Rat; male and female

Mortality: 0/5

Gross Pathology: Nothing remarkable.

IRRITATION

Skin: Rabbit; 4-hour occluded contact; 0.5 ml

Results: severe erythema, edema and necrosis with subsequent ulceration and scabbing, severe irritation persisted through 14 days.

Skin: Rabbit; 4 h occluded

Results: corrosive

Eye: Rabbit; 0.005 ml

Results: severe corneal injury with vascularization and corneal deformation, severe iritis, severe conjunctival irritation with necrosis and hemorrhages, healed by 21 days.

REPEATED EXPOSURE

In an inhalation study with rats, guinea pigs, and dogs presented in the literature, doses varied up to 102 ppm over durations ranging from 3.5-13 wks for rats, 3.5 wks for guinea pigs, and 4-13 wks for dogs. Major signs at high exposures included mortality, severe stress, breathing difficulties, and behavior changes. Histopathological changes were observed in lungs and nasal mucosa in guinea pigs and in livers and kidneys in guinea pigs and dogs. All exposure levels showed skin histopathology.

In an inhalation study with rats at doses up to 160 ppm for up to 6 months presented in literature, major signs included decreased body weights, altered hematological parameters, altered urine chemistries, and altered hippuric acid synthesis. The study concluded that the liver and kidney are the target organs.

In a 4-week dietary study with rats at doses of up to 2670 mg/kg/day, the major signs at 1280 mg/kg/day were deaths, kidney and liver histopathology. Altered liver and kidney weights were observed at 640 mg/kg/day.

SENSITIZATION (ANIMAL AND HUMAN STUDIES)

A repeated insult patch test was carried out on human volunteers. No skin reaction was observed.

DEVELOPMENTAL TOXICITY

In a developmental study with rats reported in literature, doses of up to 450 mg/kg were administered by gavage. Significant reductions in food consumption and body weight were observed in the 450 mg/kg group. The NOEL was 120 mg/kg/day for maternal toxicity and greater than 450 mg/kg/day for embryofetal toxicity and teratogenicity. No increases in malformation rate or growth retardation were observed in fetuses or pups, indicating that MEA was not embryotoxic or teratogenic in the rat following gavage exposure. In a cutaneous study with rats, doses of up to 225 mg/kg were administered. Severe skin irritation or lesions and a significant decrease in body weight gain were observed at 225 mg/kg/day. The NOEL was 75 mg/kg/day for maternal toxicity and greater than 225 mg/kg/day for embryofetal toxicity and teratogenicity. A study with rabbits had similar results. The NOEL was 25 mg/kg/day for maternal toxicity and greater than 75 mg/kg/day for embryofetal toxicity and teratogenicity.

GENETIC TOXICOLOGY

In Vitro

This material was not genotoxic in various mutagenicity and clastogenicity tests.

In Vivo

This material was not genotoxic in various mutagenicity and clastogenicity tests.

PHARMACOKINETICS AND METABOLISM

In Vivo

As reported in the literature, the fate of ethanolamine-1, 2-C14 in the intact rat, tissue slices, and homogenates resulted in 54% of the dose in the liver, spleen, kidneys, heart, brain, and diaphragm and 11.5% as CO₂, 8 hr after intraperitoneal administration. The liver was the most active tissue followed by the heart and brain. MEA is incorporated into the liver phosphatidylethanolamines via phosphorylethanolamine and CDP-ethanolamine (cytidine-5'-diphosphoethanolamine).

SIGNIFICANT DATA WITH POSSIBLE RELEVANCE TO HUMANS

Inhalation studies of monoethanolamine (MEA) in laboratory animals produced effects which suggest possible injury to the nervous system. A laboratory study suggests that rats given high doses of MEA by gavage produced increased embryofetal death, growth retardation and some malformations (hydronephrosis/hydroureter). Due to the high doses used and other technical deficiencies, the validity of this study is somewhat questionable. There is evidence that no embryofetotoxicity or teratogenicity was produced in rats or rabbits when MEA was administered by skin contact, a more relevant route of potential human exposure.

12. ECOLOGICAL INFORMATION

ENVIRONMENTAL FATE

The following information is applicable to monoethanolamine

BOD (% OXYGEN CONSUMPTION)

DAY 5	DAY 10	DAY 15	DAY 20	DAY 28/30
60%	75%			100%

BOD (% OXYGEN CONSUMPTION)

DAY 5	DAY 10	DAY 15	DAY 20	DAY 28/30
52%	73%			90%

Toxicity to Micro-organisms
Bacterial Inhibition; IC50
Result value: 700 mg/L

Toxicity to Micro-organisms
Bacterial Inhibition; IC50
Result value: > 2000 mg/L

Toxicity to Aquatic Invertebrates
Daphnia; 48 h; LC50
Result value: 33 mg/L

Toxicity to Aquatic Invertebrates
Daphnia; 48 h; LC50
Result value: 93 mg/L

Toxicity to Fish
Fathead Minnow; 96 h; LC50
Result value: 125 mg/L

Toxicity to Fish
Fathead Minnow; 96 h; LC50
Result value: 206 mg/L

THODCARB

Theoretical Oxygen Demand (THOD) - calculated:: 1.31 mg/mg

THODNITR

Theoretical Oxygen Demand (THOD) - calculated:: 0.79 mg/mg

Chemical Oxygen Demand (COD) - measured: 1.54 mg/mg Octanol/Water Partition Coefficient - Measured: -1.31

13. DISPOSAL CONSIDERATIONS

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. CISCO 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 3 (Composition/ Information on Ingredients). FOR UNUSED & UNCONTAMINATED PRODUCT, the preferred options include sending to a licensed, permitted: incinerator or other thermal destruction device.

14. TRANSPORT INFORMATION

PROPER SHIPPING INFORMATION:

UN 2491, ETHANOLAMINE, 8, PG III

U.S. D.O.T.

NON-BULK

Proper Shipping Name : ETHANOLAMINE Hazard Class : 8.

ID Number : UN2491

Packing Group : PG III

BULK
Proper Shipping Name : ETHANOLAMINE Hazard Class : 8.
ID Number : UN2491
Packing Group : PG III

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

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 : No
Immediate (Acute) Health Hazard : Yes
Reactive Hazard : No
Sudden Release of Pressure Hazard : No

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.

TOXIC SUBSTANCES CONTROL ACT (TSCA)

All components of this product are on the TSCA Inventory or are exempt from TSCA Inventory requirements.

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.

Component Monoethanolamine CAS #141-43-5 Amount < 100.0000%

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)

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.

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

VOC: Vapor pressure 0.2 mmHg @ 20° C
1014 g/l VOC
1016 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

HAZARD RATING SYSTEM NFPA ratings for this product are: H-3 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.

FOR INDUSTRY USE ONLY

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

TS Trade secret

VOL/VOL Volume/Volume

W Water Reactive

W/W Weight/Weight

The information contained on this Material Safety Data Sheet is considered accurate as of the date of publication. It is not necessarily all inclusive nor fully adequate in every circumstance. The suggestions should not be confused with, nor followed in violation of applicable laws, regulations, rules or insurance requirements. No warranty, express or implied, of merchantability, fitness, accuracy of data, or the results to be obtained from the use thereof is made. The vendor assumes no responsibility for injury or damages resulting from the inappropriate use of this product.

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