



MATERIAL SAFETY DATA SHEET

SECTION 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

MSDS Name: Morpholine
Synonyms: Diethylene imidoxide, Diethylene oximide, 1-Oxa-4-azacyclohexane,
Tetrahydro-1,4-oxazine.
For emergencies call CHEMTREC: 800-424-9300

SECTION 2 - COMPOSITION, INFORMATION ON INGREDIENTS

CAS#: 110-91-8
Chemical Name: Morpholine
EINECS#: 203-815-1
Hazard Symbols: F C
Risk Phrases: 10 20/21/22 34

SECTION 3 - HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

Corrosive. Flammable. Harmful by inhalation, in contact with skin and if swallowed. Causes burns.

POTENTIAL HEALTH EFFECTS

Eye:

May cause severe eye irritation. Causes eye burns. Vapor or mist may cause irritation and severe burns. Contact with liquid is corrosive to the eyes and causes severe burns. May cause chemical conjunctivitis and corneal damage.

Skin:

Contact with liquid is corrosive and causes severe burns and ulceration. Substance is rapidly absorbed through the skin. May cause irritation and dermatitis. May cause cyanosis of the extremities. May cause skin rash (in milder cases), and cold and clammy skin with cyanosis or pale color.

Ingestion:

May cause severe and permanent damage to the digestive tract. Aspiration hazard. May cause gastrointestinal irritation with nausea, vomiting and diarrhea. Causes gastrointestinal tract burns. May cause severe gastrointestinal tract irritation with nausea, vomiting and possible burns. May cause liver and kidney damage. May cause perforation of the digestive tract. Ingestion of large amounts may cause CNS depression. May cause systemic effects.

Inhalation:

Irritation may lead to chemical pneumonitis and pulmonary edema. May cause liver and kidney damage. May cause severe irritation of the upper respiratory tract with pain, burns, and inflammation. Causes chemical burns to the respiratory tract. Aspiration may lead to pulmonary edema. Vapors may cause dizziness or suffocation. May cause systemic effects. May cause burning sensation in the chest.

Chronic:

Chronic inhalation and ingestion may cause effects similar to those of acute inhalation and ingestion.



SECTION 4 - FIRST AID MEASURES

Eyes:

Flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical aid immediately. Do NOT allow victim to rub or keep eyes closed. Extensive irrigation with water is required (at least 30 minutes).

Skin:

Get medical aid immediately. Immediately flush skin with plenty of soap and water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Destroy contaminated shoes.

Ingestion:

Do NOT induce vomiting. If victim is conscious and alert, give 2-4 cupfuls of milk or water. Never give anything by mouth to an unconscious person. Get medical aid immediately. Do NOT induce vomiting. If conscious and alert, rinse mouth and drink 2-4 cupfuls of milk or water.

Inhalation:

Get medical aid immediately. Remove from exposure to fresh air immediately. If breathing is difficult, give oxygen. Do NOT use mouth-to-mouth resuscitation. If breathing has ceased apply artificial respiration using oxygen and a suitable mechanical device such as a bag and a mask.

SECTION 5 - FIRE FIGHTING MEASURES

General Information:

As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Vapors may form an explosive mixture with air. Vapors can travel to a source of ignition and flash back. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. Will burn if involved in a fire.

Use water spray to keep fire-exposed containers cool. Containers may explode in the heat of a fire. Flammable liquid and vapor. Vapors may be heavier than air. They can spread along the ground and collect in low or confined areas.

Extinguishing Media:

For small fires, use dry chemical, carbon dioxide, water spray or alcohol-resistant foam. For large fires, use water spray, fog, or alcohol-resistant foam. Use water spray to cool fire-exposed containers. Water may be ineffective. Do NOT use straight streams of water.

SECTION 6 - ACCIDENTAL RELEASE MEASURES

General Information:

Use proper personal protective equipment as indicated in Section 8.

Spills/Leaks:

Absorb spill with inert material (e.g. vermiculite, sand or earth), then place in suitable container. Clean up spills immediately, observing precautions in the Protective Equipment section. Wear a self contained breathing apparatus and appropriate Personal protection. (See Exposure Controls, Personal Protection section). Remove all sources of ignition. Use a spark-proof tool. Provide ventilation. A vapor suppressing foam may be used to reduce vapors.



SECTION 7 - HANDLING and STORAGE

Handling:

Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Use only in a well-ventilated area. Ground and bond containers when transferring material. Use spark-proof tools and explosion proof equipment. Avoid contact with eyes, skin, and clothing. Empty containers retain product residue, (liquid and/or vapor), and can be dangerous. Keep container tightly closed. Avoid contact with heat, sparks and flame. Do not ingest or inhale. Discard contaminated shoes. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose empty containers to heat, sparks or open flames.

Storage:

Keep away from heat, sparks, and flame. Keep away from sources of ignition. Keep container closed when not in use. Store in a cool, dry, well-ventilated area away from incompatible substances. Flammables-area.

SECTION 8 - EXPOSURE CONTROLS, PERSONAL PROTECTION

Engineering Controls:

Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use adequate general or local explosion-proof ventilation to keep airborne levels to acceptable levels.

PERSONAL PROTECTIVE EQUIPMENT

Eyes:

Wear safety glasses and chemical goggles if splashing is possible.

Skin:

Wear appropriate protective gloves to prevent skin exposure.

Clothing:

Wear appropriate protective clothing to minimize contact with skin.

Respirators:

A respiratory protection program that meets OSHA's 29 CFR :1910.134 and ANSI Z88.2 requirements or European Standard EN 149 must be followed whenever workplace conditions warrant a respirator's use. Wear a NIOSH/MSHA or European Standard EN 149 approved full-facepiece airline respirator in the positive pressure mode with emergency escape provisions.

SECTION 9 - PHYSICAL AND CHEMICAL PROPERTIES

Physical State:	Liquid
Appearance:	clear, colorless
Odor:	characteristic odor - amine-like
pH:	>7.0 (basic).
Vapor Pressure:	6.6 mm Hg @ 20
Vapor Density:	3.0 (air=1)
Evaporation Rate:	Not available.
Viscosity:	2.23 cP 20 C
Boiling Point:	262°F
Freezing/Melting Point:	23°F
Autoignition Temperature:	555°F (290.56°C)
Flash Point:	98°F (36.67°C)
Explosion Limits, lower:	1.4
Explosion Limits, upper:	11.2



Decomposition Temperature: 489°F
Solubility: >500 mg/l (20 C)
Specific Gravity/Density: 1.0 (water=1)
Molecular Formula: C₄H₉NO
Molecular Weight: 87.0691

SECTION 10 - STABILITY AND REACTIVITY

Chemical Stability:

Stable at room temperature in closed containers under normal storage and handling conditions.

Conditions to Avoid:

Incompatible materials, ignition sources, metals, excess heat.

Incompatibilities with Other Materials:

Acids, organic anhydrides, isocyanates, vinyl acetate, acrylates, substituted allyls, alkylene oxides, epichlorohydrin, ketones, aldehydes, alcohols, glycols, phenols, cresol, caprolactam solution, strong oxidizing agents.

Hazardous Decomposition Products:

Nitrogen oxides, carbon monoxide, carbon dioxide, ammonia and/or derivatives.

Hazardous Polymerization:

Has not been reported.

SECTION 11 - TOXICOLOGICAL INFORMATION

RTECS#:

CAS# 110-91-8: QD6475000

LD50/LC50:

CAS# 110-91-8: Draize test, rabbit, eye: 2 mg Severe; Draize test, rabbit, skin: 995 mg/24H Severe; Inhalation, mouse: LC50 = 1320 mg/m³/2H; Inhalation, rat: LC50 = 8000 ppm/8H; Oral, mouse: LD50 = 525 mg/kg; Oral, rat: LD50 = 1450 mg/kg; Skin, rabbit: LD50 = 500 uL/kg.

Carcinogenicity:

Morpholine -

ACGIH: A4 - Not Classifiable as a Human Carcinogen

IARC: Group 3 carcinogen

Epidemiology:

No information available.

Teratogenicity:

No information available.

Reproductive Effects:

No information available.

Neurotoxicity:

No information available.

Mutagenicity:

Morphological transformation (mouse Lymphocyte) = 1 uL/L Mutation in mammalian somatic cells = 1 gm/L Sister chromatid exchange(Hamster Ovary) = 160 mg/L.

Other Studies:

Standard Draize test (skin, rabbit) = 995 mg/24H; Severe Open irritation test (skin, rabbit) = 500 mg; Moderate.



SECTION 12 - ECOLOGICAL INFORMATION

Ecotoxicity:

Fish: Bluegill/Sunfish: LC50 = 350.0 mg/L; 96 Hr.; Static conditions, 18-22°C Water flea
Daphnia: LC50 = 100.0-119.0 mg/L; 24 Hr.; Unspecified algae: EC50 = 28.0 mg/L; 96 Hr.;
Unspecified bacteria: Phytobacterium phosphoreum: EC50 = 57.0 mg/L; 30 minutes; Microtox
test

SECTION 13 - DISPOSAL CONSIDERATIONS

Dispose of in a manner consistent with federal, state, and local regulations.

SECTION 14 - TRANSPORT INFORMATION

Regulated Material. Please refer to applicable shipping regulations.

SECTION 15 - REGULATORY INFORMATION

US FEDERAL

TSCA

CAS# 110-91-8 is listed on the TSCA inventory.

Clean Air Act:

This material does not contain any Class 2 Ozone depletors.

Clean Water Act:

None of the chemicals in this product are listed as Hazardous Substances under the CWA.

None of the chemicals in this product are listed as Priority Pollutants under the CWA.

None of the chemicals in this product are listed as Toxic Pollutants under the CWA.

OSHA:

None of the chemicals in this product are considered highly hazardous by OSHA.

STATE

Morpholine can be found on the following state right to know lists: California, New Jersey, Florida, Pennsylvania, Minnesota, Massachusetts.

California No Significant Risk Level:

None of the chemicals in this product are listed.

European/International Regulations

European Labeling in Accordance with EC Directives

Hazard Symbols: F C

Risk Phrases:

R 10 Flammable.

R 20/21/22 Harmful by inhalation, in contact with skin and if swallowed.

R 34 Causes burns.

Safety Phrases:

S 9 Keep container in a well-ventilated place.

S 16 Keep away from sources of ignition - No smoking.

S 23C Do not breathe vapour.

S 33 Take precautionary measures against static discharges.

S 36 Wear suitable protective clothing.

S 45 In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).

WGK (Water Danger/Protection)

CAS# 110-91-8: 2

United Kingdom Occupational Exposure Limits

AllChem Industries Industrial Chemicals Group, Inc.

6010 NW First Place • Gainesville, FL 32607

TEL: (352) 378-9696 FAX: (352) 333-7438



CAS# 110-91-8: OES-United Kingdom, TWA 20 ppm TWA; 72 mg/m³ TWA
CAS# 110-91-8: OES-United Kingdom, STEL 30 ppm STEL; 109 mg/m³ STEL Canada
CAS# 110-91-8 is listed on Canada's DSL List.
CAS# 110-91-8 is listed on Canada's Ingredient Disclosure List.

Exposure Limits

CAS# 110-91-8: OEL-AUSTRALIA:TWA 20 ppm (70 mg/m³);STEL 30 ppm (105 mg/m³);Skin
OEL-BELGIUM:TWA 20 ppm (71 mg/m³);STEL 30 ppm (10 mg/m³);Skin
OEL-DENMARK:TWA 20 ppm (70 mg/m³);Skin
OEL-FINLAND:TWA 20 ppm (70 mg/m³);STEL 30 ppm (10 mg/m³);Skin
OEL-FRANCE:TWA 20 ppm (70 mg/m³);STEL 30 ppm (105 mg/m³)
OEL-GERMANY:TWA 20 ppm (70 mg/m³);Skin
OEL-HUNGARY:STEL 10 mg/m³;Skin
OEL-THE NETHERLANDS:TWA 20 ppm (70 mg/m³);Skin
OEL-THE PHILIPPINES:TWA 20 ppm (70 mg/m³);Skin
OEL-RUSSIA:TWA 0.5 mg/m³;STEL 1.5 mg/m³;Skin JAN9
OEL-SWEDEN:TWA 20 ppm (70 mg/m³);STEL 30 ppm (110 mg/m³);Skin
OEL-SWITZERLAND:TWA 20 ppm (70 mg/m³);STEL 40 ppm;Skin
OEL-UNITED KINGDOM:TWA 20 ppm (70 mg/m³);STEL 30 ppm;Skin
OEL IN BULGARIA, COLOMBIA, JORDAN, KOREA check ACGIH TLV
OEL IN NEW ZEALAND, SINGAPORE, VIETNAM check ACGI TLV

SECTION 16 - ADDITIONAL INFORMATION

ALWAYS COMPLY WITH ALL APPLICABLE INTERNATIONAL, FEDERAL, STATE AND LOCAL REGULATIONS REGARDING THE TRANSPORTATION, STORAGE, USE AND DISPOSAL OF THIS CHEMICAL.

Due to the changing nature of regulatory requirements, the information in this document should NOT be considered all-inclusive or authoritative. Users should make their own investigations to determine the suitability of the information for their particular purposes. International, Federal, State and Local regulations should be consulted to determine compliance with all required reporting requirements.

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