

## SAFETY DATA SHEET

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### Section 1, Identification

- Catalog Number: S-500-NMM, S-1L-NMM
- Product Name: N-Methylmorpholine (NMM)
- Alternate Name: 4-Methylmorpholine, Morpholine, N-methyl
- Chemical family: Solvent
- Recommended Use: Peptide Synthesis
- Restrictions on Use:

### Section 2, Hazard(s) Identification



- **Emergency Overview**
  - Flammable liquid and vapor.
  - Harmful if inhaled, absorbed through skin or swallowed.
  - Causes respiratory tract, eye and skin irritation.
  - Corrosive; causes burns
  - Keep away from sources of ignition – no smoking
  - Keep container tightly closed in a cool well-ventilated place Contains material which, causes damage to the following organs: kidneys, liver, respiratory tract, skin, eyes, eye, lens or cornea.
- **Routes of Entry:** Absorbed through skin. Dermal contact. Eye contact. Inhalation. Ingestion
- **Potential Acute Health Effects**
  - Eyes: No known acute effects of this product resulting from eye contact.
  - Skin: Hazardous in case of skin contact (permeator, irritant).
  - Skin inflammation is characterized by itching, scaling, reddening, or, occasionally blistering.
  - Inhalation: Hazardous in case of inhalation (lung irritant).
  - Ingestion: Hazardous in case of ingestion.

### Section 3, Composition/information on Ingredients

Components	CAS#	Chemical Formula	Molecular Weight
N-Methylmorpholine	109-02-4	C <sub>5</sub> H <sub>11</sub> NO	101.2 g/mol

### Section 4, First-Aid Measures

- **Eye Contact**
  - Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Cold water may be used.
  - Do not apply neutralizing agents.
  - Get medical attention immediately.
- **Skin Contact**
  - In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Cover the irritated skin with an emollient.
  - Cold water may be used.
  - Wash clothing before reuse. Thoroughly clean shoes before reuse.
  - Get medical attention immediately.
- **Inhalation**
  - If inhaled, move to fresh air. If not breathing, give artificial respiration.
  - If breathing is difficult, give oxygen.
  - Get medical attention immediately.
- **Ingestion**
  - If swallowed, do not induce vomiting unless directed to do so by medical personnel.
  - Never give anything by mouth to an unconscious person.
  - Loosen tight clothing such as a collar, tie, belt or waistband.
  - Get medical attention immediately.

## Section 5, Fire-Fighting Measures

- **Suitable extinguishing media:**
  - Polyvalent foam
  - BC powder
  - Carbon dioxide
- **Unsuitable extinguishing media:**
  - Solid water jet ineffective as extinguishing medium.
- **Special exposure hazards:**
  - Gas/Vapor spreads at floor level: ignition hazard
  - Gas/Vapor flammable with air within explosion limits
  - On heating: release of highly flammable gases/vapors dimethylamine
  - Emits toxic fumes under fire conditions
  - Forms explosive mixtures in air
- **Instructions:**
  - Cool tanks/drums with water spray/remove them into safety Dilute toxic gases with water spray Take account of toxic firefighting water Use firefighting water moderately and contain it
- **Special protection equipment for firefighters:**
  - Compressed air/oxygen apparatus Gas-tight suit

## Section 6, Accidental Release Measures

- **Small Spill and Leak**
  - Dilute with water and mop up, or absorb with an inert dry material and place in an appropriate waste disposal container.
- **Large Spill and Leak**
  - Keep away from heat.
  - Keep away from sources of ignition.
  - Stop leak if without risk.

- Absorb with DRY earth, sand or other non-combustible material. Do not get water inside container. Do not touch spilled material. Use water spray to reduce vapors. Prevent entry into sewers, basements or confined areas; dike if needed.
- Call for assistance on disposal.
- Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

## Section 7, Handling and Storage

- **Handling:**
  - Use spark/explosion-proof appliances and lighting system
  - Keep away from heat, sparks and flame
  - Handle uncleaned empty containers as full ones
  - Do not discharge the waste into the drain
  - Remove contaminated clothing immediately
  - Avoid breathing vapors and spray mists
- **Storage:** Keep container in a cool, well-ventilated area
- **Materials for packaging:** Glass
- **Materials to not pack in:** Aluminum, iron, copper, synthetic material

## Section 8, Exposure Controls/Personal Protection

- **Recommended engineering controls:**
  - Measure the concentration in the air regularly.
  - Work under local exhaust/ventilation.
  - Keep tightly closed
  - Keep away from heat, sparks, and open flame
  - Store in a cool dry place
- **Personal Protection:**
  - Avoid prolonged or repeated exposure
  - Wash thoroughly after handling
- **Eye protection:** Protective goggles
- **Hand protection:** Gloves
- **Skin protection:**
  - Head/neck protection
  - Corrosion proof clothing
- **Respiratory protection:**
  - Gas mask with filter type A
  - High vapor concentration: compressed air/oxygen apparatus
  - Do not breathe vapor

## Section 9, Physical and Chemical Properties

- |                                      |                           |
|--------------------------------------|---------------------------|
| ● <b>Physical Appearance:</b>        | Colorless Liquid          |
| ● <b>Odor:</b>                       | Strong Odor               |
| ● <b>Boiling Point:</b>              | 115 °C to 116 °C at 750MM |
| ● <b>Melting Point:</b>              | -66 °C                    |
| ● <b>Specific Gravity:</b>           | 0.9                       |
| ● <b>Vapor Pressure (mmHg/70 F):</b> | 18                        |
| ● <b>Vapor Density (Air = 1):</b>    | >1                        |
| ● <b>Explosion limits in air:</b>    |                           |
| ● <b>Lower:</b>                      | 3%                        |

- **Flashpoint:** 13 °C
- **Water Solubility:** Soluble

### Section 10, Stability and Reactivity

- **Stability:** Hygroscopic
- **Thermal (heat) decomposition:** May produce carbon monoxide, carbon dioxide, and nitrogen oxides
- **Conditions/materials to avoid:** Heat sources, ignition sources, combustible materials, oxidizing agents, carbon dioxide, acid chlorides, acid anhydrides, acids
- **Keep away from:** aluminum, iron, copper, synthetic material

### Section 11, Toxicological Information

- **Acute toxicity:**
  - LD 50 oral rat: 1960 mg/kg
  - LD50 dermal rabbit: 1350 mg/kg
  - LC inhalation mouse: 25200 mg/m<sup>3</sup>/2H
  - Skin rabbit: 460mg open mild
  - Eye rabbit: 920µg severe
  - Eye rabbit: 20 mg/24H mild
- **Routes of exposure:** Ingestion, inhalation, eyes and skin substance is absorbed through the skin
- **Acute effects:**
  - Harmful if swallowed, inhaled or absorbed through skin
  - Material is extremely destructive to tissue of the mucous membranes and upper respiratory tract, eyes and skin
- **Symptoms:** Alcohol intolerance
- **Inhalation:** Inhalation may result in spasm, inflammation and edema of the larynx and bronchi, chemical pneumonitis and pulmonary edema
- **Symptoms:** Dry/sore throat Coughing, nausea, headache, shortness of breath, wheezing, laryngitis
- **Exposure to high concentrations:**
  - Dizziness
  - Headache
  - Vomiting
  - Corrosion of the upper respiratory tract
  - Respiratory difficulties
  - Risk of lung oedema
- **After ingestion**
  - Risk of aspiration pneumonia
  - Burns to the gastric/intestinal mucosa
  - Symptoms similar to those listed under inhalation
- **After skin contact**
  - Blisters
  - Caustic burns/corrosion of the skin
  - Destruction of tissue
  - Symptoms similar to those listed under inhalation
- **After eye contact**
  - Corrosion of the eye tissue
  - Visual disturbances
- **Continuous/repeated exposure/contact:**

- Gastrointestinal complaints
- Enlargement/affection of the liver
- Affection of the renal tissue
- Cardiac and blood circulation effects
- Promotes the clotting of blood

**Section 12, Ecological Information\***

**Section 13, Disposal Considerations\***

- **EPA waste number:** N/A
- **Treatment:** Material does not have an EPA Waste Number and is not a listed waste, however consultation with a permitted waste disposal site (TSD) should be accomplished. Always contact a permitted waste disposal (TSD) to assure compliance with all current local, state, and Federal Regulations.

**Section 14, Transport Information\***

- **Proper shipping name:** N-Methylmorpholine, UN 2535
- **Transport by road/rail (ADR/RID):** Class 3
- **Danger code:** 338
- **Danger labels on tanks:** 3+8
- **Danger labels on packages:** 3+8
- **Packing identification:** I
- **Maritime transport (IMDG code):** class 3.2
- **EMS:** 3-02
- **MFAG:** 760 4.3
- **Marine pollutant:** -
- **Air freight (ICAO):** Class 3

**Section 15, Regulatory Information\***

- **Flammable:** Corrosive
- **Contains:** morpholine, N-methyl
- **R 20/21/22:** Harmful by inhalation, in contact with skin and if swallowed
- **R1:** Flammable
- **R34:** Causes burns
- **S36/37/39:** Wear suitable protective clothing, gloves and eye/face protection
- **S16:** Keep away from sources of ignition - No smoking
- **S26:** In case of contact with eyes, rinse immediately with plenty of water and seek medical advice
- **S27:** Take off immediately all contaminated clothing

**Section 16, Other Information**

The information accumulated herein is believed to be accurate but is not warranted to be whether origination with the company or not. Recipients are advised to confirm in advance of need that the information is current, applicable, and suitable to their circumstances. This MSDS has been prepared by Gyros Protein Technologies.

\*Note: Since other Agencies regulate this information, OSHA will not be enforcing Sections 12 through 15(29 CFR 1910.1200(g)(2)).