SECTION 1: Identification

1.1. Identification
Product form : Substance
Substance name : Morpholine
Chemical name : morpholine
CAS-No. : 110-91-8
Product code : LC17440
Formula : C4H9NO
Synonyms : Tetrahydro-2H-1,4-oxazine / 1-Oxa-4-azacyclohexane

1.2. Recommended use and restrictions on use
Use of the substance/mixture : For laboratory and manufacturing use only.
Recommended use : Laboratory chemicals
Restrictions on use : Not for food, drug or household use

1.3. Supplier
LabChem Inc
Jackson's Pointe Commerce Park Building 1000, 1010 Jackson's Pointe Court
Zelienople, PA 16063 - USA
T 412-826-5230 - F 724-473-0647
info@labchem.com - www.labchem.com

1.4. Emergency telephone number
Emergency number : CHEMTREC: 1-800-424-9300 or 011- 703-527-3887

SECTION 2: Hazard(s) identification

2.1. Classification of the substance or mixture
GHS-US classification
<table>
<thead>
<tr>
<th>Category</th>
<th>Hazard (GHS-US)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flammable liquids Category 3</td>
<td>H226</td>
<td>Flammable liquid and vapor</td>
</tr>
<tr>
<td>Acute toxicity (oral) Category 4</td>
<td>H302</td>
<td>Harmful if swallowed</td>
</tr>
<tr>
<td>Acute toxicity (dermal) Category 3</td>
<td>H311</td>
<td>Toxic in contact with skin</td>
</tr>
<tr>
<td>Skin corrosion/irritation Category 1A</td>
<td>H314</td>
<td>Causes severe skin burns and eye damage</td>
</tr>
<tr>
<td>Serious eye damage/eye irritation Category 1</td>
<td>H318</td>
<td>Causes serious eye damage</td>
</tr>
<tr>
<td>Hazardous to the aquatic environment - Acute Hazard Category 3</td>
<td>H402</td>
<td>Harmful to aquatic life</td>
</tr>
</tbody>
</table>

Full text of H statements : see section 16

2.2. GHS Label elements, including precautionary statements
GHS-US labeling
Hazard pictograms (GHS-US) :

Signal word (GHS-US) : Danger
Hazard statements (GHS-US) :
- H226 - Flammable liquid and vapor
- H302 - Harmful if swallowed
- H311 - Toxic in contact with skin
- H314 - Causes severe skin burns and eye damage
- H402 - Harmful to aquatic life

Precautionary statements (GHS-US) :
- P210 - Keep away from heat, sparks, open flames, hot surfaces. - No smoking
- P233 - Keep container tightly closed
- P240 - Ground/bond container and receiving equipment
P241 - Use explosion-proof electrical, ventilating, lighting equipment
P242 - Use only non-sparking tools
P243 - Take precautionary measures against static discharge
P260 - Do not breathe mist, vapors, spray
P264 - Wash exposed skin thoroughly after handling
P270 - Do not eat, drink or smoke when using this product
P273 - Avoid release to the environment
P280 - Wear protective gloves, protective clothing, eye protection, face protection
P301+P330+P331 - IF SWALLOWED: rinse mouth. Do NOT induce vomiting
P303+P361+P353 - IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower
P305+P351+P338 - If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
P310 - Immediately call a poison center or doctor/physician
P363 - Wash contaminated clothing before reuse
P370+P378 - In case of fire: Use alcohol resistant foam, carbon dioxide (CO2), sand to extinguish
P403+P235 - Store in a well-ventilated place. Keep cool
P405 - Store locked up
P501 - Dispose of contents/container to comply with local, state and federal regulations

2.3. Other hazards which do not result in classification

Other hazards not contributing to the classification : None under normal conditions.

2.4. Unknown acute toxicity (GHS US)

Not applicable

SECTION 3: Composition/Information on ingredients

3.1. Substances

Substance type : Mono-constituent

<table>
<thead>
<tr>
<th>Name</th>
<th>Product identifier</th>
<th>%</th>
<th>GHS-US classification</th>
</tr>
</thead>
</table>
| Morpholine (Main constituent) | (CAS-No.) 110-91-8 | 100 | Flam. Liq. 3, H226  
Acute Tox. 4 (Oral), H302  
Acute Tox. 3 (Dermal), H311  
Skin Corr. 1A, H314  
Eye Dam. 1, H318  
Aquatic Acute 3, H402 |

Full text of hazard classes and H-statements : see section 16

3.2. Mixtures

Not applicable

SECTION 4: First-aid measures

4.1. Description of first aid measures

First-aid measures general : Never give anything by mouth to an unconscious person. If you feel unwell, seek medical advice (show the label where possible).

First-aid measures after inhalation : Remove victim to fresh air and keep at rest in a position comfortable for breathing. Immediately call a poison center or doctor/physician.

First-aid measures after skin contact : Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower. Immediately call a poison center or doctor/physician. Wash contaminated clothing before reuse.

First-aid measures after eye contact : Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a poison center or doctor/physician.

First-aid measures after ingestion : Rinse mouth. Do NOT induce vomiting. Immediately call a poison center or doctor/physician.

4.2. Most important symptoms and effects (acute and delayed)

Symptoms/effects : Causes severe skin burns and eye damage.
Symptoms/effects after skin contact : Repeated exposure to this material can result in absorption through skin causing significant health hazard. Toxic in contact with skin.
Symptoms/effects after eye contact : Causes serious eye damage.
Symptoms/effects after ingestion : Swallowing a small quantity of this material will result in serious health hazard.

4.3. Immediate medical attention and special treatment, if necessary

Obtain medical assistance.
SECTION 5: Fire-fighting measures

5.1. Suitable (and unsuitable) extinguishing media


Unsuitable extinguishing media: Do not use a heavy water stream.

5.2. Specific hazards arising from the chemical

Fire hazard: Flammable liquid and vapor.
Explosion hazard: May form flammable/explosive vapor-air mixture.
Reactivity: Thermal decomposition generates: Corrosive vapors.

5.3. Special protective equipment and precautions for fire-fighters

Firefighting instructions: Use water spray or fog for cooling exposed containers. Exercise caution when fighting any chemical fire. Prevent fire-fighting water from entering environment.

Protection during firefighting: Do not enter fire area without proper protective equipment, including respiratory protection.

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

General measures: Remove ignition sources. Use special care to avoid static electric charges. No naked lights. No smoking.

6.1.1. For non-emergency personnel

Emergency procedures: Evacuate unnecessary personnel.

6.1.2. For emergency responders

Protective equipment: Equip cleanup crew with proper protection.
Emergency procedures: Ventilate area.

6.2. Environmental precautions

Prevent entry to sewers and public waters. Notify authorities if liquid enters sewers or public waters. Avoid release to the environment.

6.3. Methods and material for containment and cleaning up

Methods for cleaning up: Soak up spills with inert solids, such as clay or diatomaceous earth as soon as possible. Collect spillage. Store away from other materials.

6.4. Reference to other sections

See Heading 8. Exposure controls and personal protection.

SECTION 7: Handling and storage

7.1. Precautions for safe handling

Additional hazards when processed: Handle empty containers with care because residual vapors are flammable.
Precautions for safe handling: Wash hands and other exposed areas with mild soap and water before eating, drinking or smoking and when leaving work. Provide good ventilation in process area to prevent formation of vapor. No naked lights. No smoking. Take precautionary measures against static discharge. Use only non-sparking tools. Do not breathe mist, vapors, spray. Avoid contact during pregnancy/while nursing.

Hygiene measures: Do not eat, drink or smoke when using this product. Wash exposed skin thoroughly after handling.

7.2. Conditions for safe storage, including any incompatibilities

Technical measures: Proper grounding procedures to avoid static electricity should be followed. Ground/bond container and receiving equipment. Use explosion-proof electrical/ventilating/lighting/… equipment. Comply with applicable regulations.
Storage conditions: Keep only in the original container in a cool, well ventilated place away from: Heat sources, Ignition sources, incompatible materials. Keep container tightly closed.
Incompatible products: Strong oxidizers.
Incompatible materials: Sources of ignition. Direct sunlight. Heat sources.

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

<table>
<thead>
<tr>
<th>Morpholine (110-91-8)</th>
<th>ACGIH</th>
<th>ACGIH TWA (mg/m³)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>71 mg/m³</td>
</tr>
</tbody>
</table>

01/09/2018 EN (English US)
**Morpholine**

Safety Data Sheet

according to Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules and Regulations

<table>
<thead>
<tr>
<th>Morpholine (110-91-8)</th>
<th>ACGIH</th>
<th>ACGIH TWA (ppm)</th>
<th>20 ppm</th>
</tr>
</thead>
<tbody>
<tr>
<td>OSHA</td>
<td>OSHA PEL (TWA) (mg/m³)</td>
<td>70 mg/m³</td>
<td></td>
</tr>
<tr>
<td>OSHA</td>
<td>OSHA PEL (TWA) (ppm)</td>
<td>20 ppm</td>
<td></td>
</tr>
<tr>
<td>IDLH</td>
<td>US IDLH (ppm)</td>
<td>1400 ppm</td>
<td></td>
</tr>
<tr>
<td>NIOSH</td>
<td>NIOSH REL (TWA) (mg/m³)</td>
<td>70 mg/m³</td>
<td></td>
</tr>
<tr>
<td>NIOSH</td>
<td>NIOSH REL (TWA) (ppm)</td>
<td>20 ppm</td>
<td></td>
</tr>
<tr>
<td>NIOSH</td>
<td>NIOSH REL (STEL) (mg/m³)</td>
<td>105 mg/m³</td>
<td></td>
</tr>
<tr>
<td>NIOSH</td>
<td>NIOSH REL (STEL) (ppm)</td>
<td>30 ppm</td>
<td></td>
</tr>
</tbody>
</table>

8.2. Appropriate engineering controls

Appropriate engineering controls: Emergency eye wash fountains should be available in the immediate vicinity of any potential exposure.

8.3. Individual protection measures/Personal protective equipment

**Personal protective equipment:**

Gloves. Safety glasses. Protective clothing.

**Hand protection:**

Wear protective gloves

**Eye protection:**

Chemical goggles or face shield

**Skin and body protection:**

Wear suitable protective clothing

**Respiratory protection:**

Respiratory protection not required in normal conditions

**Other information:**

Do not eat, drink or smoke during use.

**SECTION 9: Physical and chemical properties**

9.1. Information on basic physical and chemical properties

<table>
<thead>
<tr>
<th>Physical property</th>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical state</td>
<td></td>
<td>Liquid</td>
</tr>
<tr>
<td>Color</td>
<td></td>
<td>Colorless</td>
</tr>
<tr>
<td>Odor</td>
<td></td>
<td>strong</td>
</tr>
<tr>
<td>Odor threshold</td>
<td></td>
<td>No data available</td>
</tr>
<tr>
<td>pH</td>
<td></td>
<td>No data available</td>
</tr>
<tr>
<td>Melting point</td>
<td></td>
<td>-5 °C</td>
</tr>
<tr>
<td>Freezing point</td>
<td></td>
<td>No data available</td>
</tr>
<tr>
<td>Boiling point</td>
<td></td>
<td>128 °C</td>
</tr>
<tr>
<td>Flash point</td>
<td></td>
<td>32 °C</td>
</tr>
<tr>
<td>Relative evaporation rate (butyl acetate=1)</td>
<td></td>
<td>No data available</td>
</tr>
<tr>
<td>Flammability (solid, gas)</td>
<td></td>
<td>Flammable liquid and vapor.</td>
</tr>
<tr>
<td>Vapor pressure</td>
<td></td>
<td>11 mbar</td>
</tr>
<tr>
<td>Relative vapor density at 20 °C</td>
<td></td>
<td>3 air = 1</td>
</tr>
</tbody>
</table>

01/09/2018  EN (English US)  4/8
Morpholine
Safety Data Sheet

Relative density : No data available
Specific gravity / density : 0.99 g/cm³
Molecular mass : 87.12 g/mol
Log Pow : -2.55
Auto-ignition temperature : 255 °C
Decomposition temperature : No data available
Viscosity, kinematic : No data available
Viscosity, dynamic : 2.23 cP
Explosion limits : 2 - 11.2 vol %
Explosive properties : No data available
Oxidizing properties : No data available

9.2. Other information
No additional information available

SECTION 10: Stability and reactivity

10.1. Reactivity
Thermal decomposition generates : Corrosive vapors.

10.2. Chemical stability
Flammable liquid and vapor. May form flammable/explosive vapor-air mixture.

10.3. Possibility of hazardous reactions
Not established.

10.4. Conditions to avoid

10.5. Incompatible materials
Strong oxidizers.

10.6. Hazardous decomposition products

SECTION 11: Toxicological information

11.1. Information on toxicological effects
Likely routes of exposure : Inhalation; Skin and eye contact
Acute toxicity : Oral: Harmful if swallowed. Dermal: Toxic in contact with skin.

<table>
<thead>
<tr>
<th>Morpholine (110-91-8)</th>
</tr>
</thead>
<tbody>
<tr>
<td>LD50 oral rat</td>
</tr>
<tr>
<td>LD50 dermal rabbit</td>
</tr>
<tr>
<td>ATE US (oral)</td>
</tr>
<tr>
<td>ATE US (dermal)</td>
</tr>
</tbody>
</table>

Skin corrosion/irritation : Causes severe skin burns and eye damage.
Serious eye damage/irritation : Causes serious eye damage.
Respiratory or skin sensitization : Not classified
Germ cell mutagenicity : Not classified
Carcinogenicity : Not classified
Reproductive toxicity : Not classified
Specific target organ toxicity – single exposure : Not classified
Specific target organ toxicity – repeated exposure : Not classified
Aspiration hazard : Not classified
Potential Adverse human health effects and symptoms: Based on available data, the classification criteria are not met. Harmful if swallowed. Toxic in contact with skin.

Symptoms/effects after skin contact: Repeated exposure to this material can result in absorption through skin causing significant health hazard. Toxic in contact with skin.

Symptoms/effects after eye contact: Causes serious eye damage.

Symptoms/effects after ingestion: Swallowing a small quantity of this material will result in serious health hazard.

### SECTION 12: Ecological information

#### 12.1. Toxicity

Ecology - water: Harmful to aquatic life.

**Morpholine (110-91-8)**

<table>
<thead>
<tr>
<th>Endpoint</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>LC50 fish 1</td>
<td>350 mg/l</td>
</tr>
<tr>
<td>EC50 Daphnia 1</td>
<td>100 mg/l</td>
</tr>
<tr>
<td>EC50 other aquatic organisms 1</td>
<td>28 mg/l 96 hr. Algae</td>
</tr>
<tr>
<td>LC50 fish 2</td>
<td>375 - 460 mg/l</td>
</tr>
</tbody>
</table>

#### 12.2. Persistence and degradability

**Morpholine (110-91-8)**

Persistence and degradability: Readily biodegradable in water. Not established.

#### 12.3. Bioaccumulative potential

**Morpholine (110-91-8)**

Log Pow: -2.55

Bioaccumulative potential: Not established.

#### 12.4. Mobility in soil

No additional information available.

#### 12.5. Other adverse effects

Other information: Avoid release to the environment.

### SECTION 13: Disposal considerations

#### 13.1. Disposal methods

Waste disposal recommendations: Dispose in a safe manner in accordance with local/national regulations. Dispose of contents/container to comply with local, state and federal regulations.

Additional information: Handle empty containers with care because residual vapors are flammable.

Ecology - waste materials: Hazardous waste due to toxicity. Avoid release to the environment.

### SECTION 14: Transport information

**Department of Transportation (DOT)**

In accordance with DOT

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>UN-No. (DOT)</td>
<td>UN2054</td>
</tr>
<tr>
<td>Proper Shipping Name (DOT)</td>
<td>Morpholine</td>
</tr>
<tr>
<td>Transport hazard class(es) (DOT)</td>
<td>8 - Class 8 - Corrosive material 49 CFR 173.136</td>
</tr>
<tr>
<td>Packing group (DOT)</td>
<td>I - Great Danger</td>
</tr>
<tr>
<td>Hazard labels (DOT)</td>
<td>8 - Corrosive 3 - Flammable liquid</td>
</tr>
</tbody>
</table>

**DOT Packaging Non Bulk (49 CFR 173.xxx)**: 201

**DOT Packaging Bulk (49 CFR 173.xxx)**: 243
DOT Special Provisions (49 CFR 172.102) : A6 - For combination packaging, if plastic inner packaging are used, they must be packed in tightly closed metal receptacles before packing in outer packaging.
TP2 - a. The maximum degree of filling must not exceed the degree of filling determined by the following: (image) Where: tr is the maximum mean bulk temperature during transport, tf is the temperature in degrees celsius of the liquid during filling, and a is the mean coefficient of cubical expansion of the liquid between the mean temperature of the liquid during filling (tf) and the maximum mean bulk temperature during transportation (tr) both in degrees celsius. b. For liquids transported under ambient conditions may be calculated using the formula: (image) Where: d15 and d50 are the densities (in units of mass per unit volume) of the liquid at 15 C (59 F) and 50 C (122 F), respectively.

DOT Packaging Exceptions (49 CFR 173.xxx) : None
DOT Quantity Limitations Passenger aircraft/rail (49 CFR 173.27) : 0.5 L
DOT Quantity Limitations Cargo aircraft only (49 CFR 175.75) : 2.5 L
DOT Vessel Stowage Location : A - The material may be stowed “on deck” or “under deck” on a cargo vessel and on a passenger vessel.
Other information : No supplementary information available.

SECTION 15: Regulatory information

15.1. US Federal regulations
Morpholine (110-91-8)
Listed on the United States TSCA (Toxic Substances Control Act) inventory
SARA Section 311/312 Hazard Classes
Immediate (acute) health hazard
Fire hazard

All components of this product are listed, or excluded from listing, on the United States Environmental Protection Agency Toxic Substances Control Act (TSCA) inventory

15.2. International regulations
CANADA
Morpholine (110-91-8)
Listed on the Canadian DSL (Domestic Substances List)

EU-Regulations
No additional information available

National regulations
Morpholine (110-91-8)
Listed on the Canadian IDL (Ingredient Disclosure List)

15.3. US State regulations
California Proposition 65 - This product does not contain any substances known to the state of California to cause cancer, developmental and/or reproductive harm

SECTION 16: Other information
Revision date : 01/09/2018
Other information : None.
Full text of H-phrases: see section 16:

<table>
<thead>
<tr>
<th>H-Phrase</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>H226</td>
<td>Flammable liquid and vapor</td>
</tr>
<tr>
<td>H302</td>
<td>Harmful if swallowed</td>
</tr>
<tr>
<td>H311</td>
<td>Toxic in contact with skin</td>
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<tr>
<td>H314</td>
<td>Causes severe skin burns and eye damage</td>
</tr>
<tr>
<td>H318</td>
<td>Causes serious eye damage</td>
</tr>
<tr>
<td>H402</td>
<td>Harmful to aquatic life</td>
</tr>
</tbody>
</table>

NFPA health hazard : 3 - Materials that, under emergency conditions, can cause serious or permanent injury.

NFPA fire hazard : 3 - Liquids and solids (including finely divided suspended solids) that can be ignited under almost all ambient temperature conditions.

NFPA reactivity : 1 - Materials that in themselves are normally stable but can become unstable at elevated temperatures and pressures.

Hazard Rating

Health : 3 Serious Hazard - Major injury likely unless prompt action is taken and medical treatment is given.

Flammability : 3 Serious Hazard - Materials capable of ignition under almost all normal temperature conditions. Includes flammable liquids with flash points below 73 F and boiling points above 100 F. as well as liquids with flash points between 73 F and 100 F. (Classes IB & IC)

Physical : 1 Slight Hazard - Materials that are normally stable but can become unstable (self-react) at high temperatures and pressures. Materials may react non-violently with water or undergo hazardous polymerization in the absence of inhibitors.

Personal protection : H
H - Splash goggles, Gloves, Synthetic apron, Vapor respirator

SDS US LabChem

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