SAFETY DATA SHEET

MORPHOLINE

CAS No.: 110-91-8

This Safety Data Sheet is issued by Suraj Chemicals as the distributor/supplier of record, based on manufacturer and published GHS / regulatory reference data for this substance. Users should also consult the specific manufacturer's SDS where available.

1. IDENTIFICATION

GHS Product identifier

MORPHOLINE
Synonyms: Tetrahydro-1,4-oxazine; Diethylene oximide; 1-Oxa-4-azacyclohexane
CAS: 110-91-8

Other means of identification

Not relevant

Recommended use of the chemical and restrictions on use

Relevant uses: Corrosion inhibitor (boiler water/steam treatment), rubber vulcanization accelerator intermediate, solvent, chemical intermediate for optical brighteners and surfactants. For industrial user only.

Uses advised against: All uses not specified in this section or in section 7.3.

Supplier's details

SURAJ CHEMICALS
No 92, Govindappa Naicken Street, Shiva Complex, Chennai – 600001, Tamil Nadu, India
Tel: +91 - 7092722822, +91 - 9840284032 / +91 - 44 - 25393652, 42130281
Email: sales@surajchemicals.com | Website: www.surajchemicals.com
GST No: 33ACEPV8190L1ZZ

Emergency phone number

Emergency Contact No: +91 - 7092722822, +91 - 9840284032

2. HAZARDS IDENTIFICATION

Classification of the substance or mixture

GHS:
Classification of this product has been carried out in accordance with the Globally Harmonized System of Classification and Labelling of Chemicals (GHS).

Flam. Liq. 3	Flammable liquid, Category 3, H226
Acute Tox. 4	Acute oral toxicity, Category 4, H302
Acute Tox. 4	Acute dermal toxicity, Category 4, H312
Acute Tox. 4	Acute inhalation toxicity, Category 4, H332
Skin Corr. 1B	Skin corrosion, Category 1B, H314
Eye Dam. 1	Serious eye damage, Category 1, H318

GHS label elements, including precautionary statements

GHS: Danger

Hazard statements

Flam. Liq. 3: H226 – Flammable liquid and vapour.
Acute Tox. 4: H302 – Harmful if swallowed.
Acute Tox. 4: H312 – Harmful in contact with skin.
Acute Tox. 4: H332 – Harmful if inhaled.
Skin Corr. 1B: H314 – Causes severe skin burns and eye damage.
Eye Dam. 1: H318 – Causes serious eye damage.

Precautionary statements

P210: Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
P260: Do not breathe vapours.
P264: Wash hands thoroughly after handling.
P271: Use only outdoors or in a well-ventilated area.
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.
P304+P340: IF INHALED: Remove person to fresh air and keep comfortable for breathing.
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/doctor.
P370+P378: In case of fire, use foam, dry chemical, CO_2 or water spray to extinguish.
P501: Dispose of the contents/containers in accordance with regulations on hazardous waste.

Other hazards which do not result in classification

Strongly alkaline liquid; corrosive vapours may be evolved on heating. Does not meet the PBT/vPvB criteria.

3. COMPOSITION / INFORMATION ON INGREDIENTS

Substances

Chemical description: Morpholine (technical grade)

In accordance with Annex 4.3.3 of the GHS, the product contains:

Identification	Chemical Name / Classification	Concentration
CAS: 110-91-8	Morpholine — Flam. Liq. 3: H226; Acute Tox. 4: H302, H312, H332; Skin Corr. 1B: H314; Eye Dam. 1: H318 – Danger	≥ 99%

To obtain more information on the hazards of the substances, consult sections 11, 12 and 16.

Mixtures	Non-applicable

4. FIRST AID MEASURES

Description of necessary first-aid measures

Request medical assistance immediately, showing the SDS of this product.

By inhalation

Remove the person affected from the area of exposure immediately, provide fresh air and keep at rest. Vapours are corrosive to the respiratory tract. Seek immediate medical attention.

By skin contact

Remove contaminated clothing immediately, rinse skin thoroughly with plenty of water for at least 15 minutes. Causes severe burns – seek immediate medical attention.

By eye contact

Rinse eyes immediately and thoroughly with lukewarm water for at least 15 minutes, holding eyelids open. Remove contact lenses if present and easy to do. Seek IMMEDIATE medical attention – risk of serious eye damage.

By ingestion/aspiration

Do NOT induce vomiting (risk of further burns/aspiration). Rinse the mouth with water – do not give anything by mouth if the person is unconscious. Seek IMMEDIATE medical attention, showing the SDS of the product.

Most important symptoms/effects, acute and delayed	Acute and delayed effects are indicated in sections 2 and 11.
Indication of immediate medical attention and special treatment needed, if necessary	Treat as a corrosive/chemical burn injury; specialist medical evaluation for eye and skin burns is required without delay.

5. FIRE-FIGHTING MEASURES

Suitable extinguishing media	**Suitable:** Foam (alcohol-resistant), dry chemical powder, carbon dioxide, water spray/fog for cooling containers **Unsuitable:** Do not use a solid water jet as it may scatter and spread the fire
Specific hazards arising from the chemical	Flammable liquid and vapour. Vapours may form explosive mixtures with air and travel to an ignition source. Combustion produces toxic nitrogen oxide fumes and corrosive/irritating gases.
Special protective actions for fire-fighters	Evacuate all non-essential personnel. Intervention only by capable personnel who are trained and aware of the hazards of the product. In all cases wear self-contained breathing apparatus. When intervention in close proximity, wear full protective chemical-resistant suit. After intervention, proceed to clean the equipment (take a shower, remove clothing carefully, clean and check). **Additional provisions** Cool fire-exposed containers with water spray from a safe distance. Approach from upwind. Use self-contained breathing apparatus and full protective (acid-resistant) clothing.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures	**For non-emergency personnel** Eliminate ignition sources. Ventilate the area. Contain the spill (bunding/absorbent), provided there is no additional risk – product is corrosive. Use appropriate PPE (see section 8). **For emergency responders** Wear protective equipment. Keep unprotected persons away. See section 8.
Environmental precautions	Avoid release to drains, watercourses or soil. Neutralise cautiously if trained to do so. Notify the relevant authority in case of significant environmental release.
Methods and materials for containment and cleaning up	Absorb with inert non-combustible absorbent material (sand, vermiculite) and place in a labelled, closed, corrosion-resistant container for disposal.
Reference to other sections	See sections 8 and 13.

7. HANDLING AND STORAGE

Precautions for safe handling

A. General precautions for safe use

Keep away from heat, sparks, open flame and other ignition sources. Avoid contact with skin and eyes and avoid inhalation of vapours – use in well-ventilated areas with local exhaust ventilation. Ground and bond containers during transfer to prevent static discharge.

B. Technical recommendations for the prevention of fires and explosions

Store and handle away from oxidizing agents, acids and ignition sources. Use bonding/grounding for all transfer operations. Keep containers tightly closed when not in use.

C. Technical recommendations on general occupational hygiene

Do not eat or drink during the process; wash hands afterwards with suitable cleaning products.

D. Technical recommendations to prevent environmental risks

Provide tight electrical equipment well protected against corrosion. Avoid atmospheric emissions. Warn people about the dangers of the product. Follow the protective measures given in the exposure controls/personal protection section. In industrial installations, apply the rules for the prevention of major accidents (consult an expert).

Conditions for safe storage, including any incompatibilities

A. Specific storage requirements

Minimum Temp.	5°C
Maximum Temp.	30°C (cool, well-ventilated, away from direct sunlight)
Maximum time	12 Months in original sealed packaging

B. General conditions for storage

Store in a cool, dry, well-ventilated area in corrosion-resistant, tightly closed containers, away from heat, ignition sources, acids and oxidizing agents, in accordance with local flammable/corrosive liquid storage regulations. For additional information see subsection 10.5.

Specific end use(s)	Except for the instructions already specified, it is not necessary to provide any special recommendation regarding the uses of this product.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Control parameters

Substances whose occupational exposure limits have to be assessed in the workplace, per the Factories Act, 1948 (Act No. 63 of 1948), as amended by the Factories (Amendment) Act, 1987 (Act 20 of 1987):

Identification	Occupational Exposure Limit Type	Value
Morpholine CAS: 110-91-8	ACGIH TLV – TWA (8 hrs, skin notation)	20 ppm

Appropriate engineering controls

It is recommended to use localized extraction in the work area as a collective protection measure to avoid exceeding occupational exposure limits, in addition to individual protective equipment (PPE) as needed. Consult the manufacturer's information leaflet for storage, use, cleaning and maintenance of PPE.

B. Respiratory protection

Organic vapour/acid gas combination cartridge respirator; supplied-air respirator for high vapour concentrations or confined spaces.

C. Specific protection for the hands

Chemical-resistant gloves (e.g. butyl rubber, neoprene). Replace at any sign of damage.

D. Eye and face protection

Chemical splash goggles and face shield – risk of serious eye damage.

E. Bodily protection

Chemical-resistant apron/coveralls and flame-retardant/antistatic clothing where flammable atmospheres may be present.

F. Additional emergency measures

Emergency shower (ANSI Z358-1, ISO 3864-1:2011, ISO 3864-4:2011) and eyewash stations (DIN 12 899, ISO 3864-1:2011, ISO 3864-4:2011) should be available.

Environmental exposure controls

Avoid environmental spillage of both the product and its container. See subsection 7.1.D.

9. PHYSICAL AND CHEMICAL PROPERTIES

Information on basic physical and chemical properties

Appearance	
Physical state at 20°C	Liquid
Appearance	Clear, mobile liquid
Color	Colorless to pale yellow
Odor	Ammonia/amine-like, fishy
Odour threshold	Available on request
Volatility	
Boiling point at atmospheric pressure	128°C
Vapour pressure at 20°C	~6 mmHg (0.8 kPa)
Evaporation rate (n-BuAc = 1)	~1.0 (approx.)
Product Description	
Density / Relative density at 20°C	1.00 g/cm³
Dynamic / Kinematic viscosity at 20°C	~2.3 mPa·s
Concentration	≥ 99%
pH (aqueous solution)	~11–12 (strongly alkaline)
Vapour density (air = 1)	~3.0
Partition coefficient n-octanol/water (log Pow)	-0.86
Solubility in water at 20°C	Miscible in all proportions
Decomposition temperature	Not established
Melting point/freezing point	-5°C
Flammability	
Flash Point	35°C (closed cup)
Flammability (solid, gas)	Non-applicable (liquid); flammable
Autoignition temperature	255°C
Lower / Upper flammability limit	1.8% / 10.8% (vol. in air, approx.)
Particle Characteristics	
Median equivalent diameter	Non-applicable (liquid)

Other information

Explosive properties	Not classified as explosive; vapour/air mixtures are flammable within the flammability limits
Oxidising properties	Not an oxidizer
Corrosive to metals	May attack copper, aluminium and their alloys
Heat of combustion	Available on request
Surface tension at 20°C	Available on request
Refraction index	~1.454

10. STABILITY AND REACTIVITY

Reactivity

Strongly basic amine; reacts vigorously and exothermically with strong acids. Corrosive to copper, aluminium and their alloys, and to zinc and galvanised surfaces.

Chemical stability

Chemically stable under the indicated conditions of storage, handling and use.

Possibility of hazardous reactions

Contact with strong oxidizing agents or strong acids can cause a vigorous, exothermic reaction. Vapours can form explosive mixtures with air. Under recommended conditions no other hazardous reactions are expected.

Conditions to avoid

Shock/Friction	Contact with Air	Increase in Temperature	Sunlight	Humidity
Not applicable	Vapour/air mixtures flammable	Avoid heat/ignition sources	Not applicable	Not applicable (miscible with water)

Incompatible materials

Strong Acids	Strong Oxidizing Agents	Copper / Aluminium / Zinc
Avoid contact – violent exothermic reaction	Avoid contact	Avoid prolonged contact – corrosive to these metals

Hazardous decomposition products

Toxic nitrogen oxide fumes and carbon monoxide on combustion/thermal decomposition.

11. TOXICOLOGICAL INFORMATION

Information on toxicological effects

In case of exposure that is repetitive, prolonged, or at concentrations higher than the recommended occupational exposure limits, adverse health effects may result depending on the means of exposure:

A. Ingestion (acute effect)

Harmful if swallowed. Corrosive – causes severe burns to the mouth, throat and gastrointestinal tract; may cause nausea, vomiting and abdominal pain.

B. Inhalation (acute effect)

Harmful if inhaled. Vapours are corrosive/irritating to the respiratory tract and can cause coughing, breathing difficulty and, at high concentrations, pulmonary oedema.

C. Contact with skin and eyes (acute effect)

Causes severe skin burns and serious eye damage on contact.

D. CMR effects (carcinogenicity, mutagenicity, reproductive toxicity)

Classification criteria for carcinogenicity, mutagenicity and reproductive toxicity are not met based on available data. IARC: Not classified.

E. Sensitizing effects

Classification criteria for respiratory or skin sensitisation are not met based on available data.

F. Specific target organ toxicity (STOT) – single exposure

May cause respiratory tract irritation at concentrations near the corrosive threshold; primary acute hazard is corrosivity (see section 2).

G. Specific target organ toxicity (STOT) – repeated exposure

Classification criteria are not met based on available data.

H. Aspiration hazard

Classification criteria are not met based on available data.

Product-specific toxicological information

Identification	Acute Toxicity	Genus
Morpholine (technical grade) CAS: 110-91-8	LD50 oral: 1050 mg/kg	Rat
	LD50 dermal: 500 mg/kg	Rabbit
	LC50 inhalation: 2000 ppm (1h)	Rat

12. ECOLOGICAL INFORMATION

Not classified as hazardous to the aquatic environment under standard GHS criteria, but is strongly alkaline and can cause local pH-related harm.

Toxicity

Identification	Acute Toxicity	Species	Genus
Morpholine CAS: 110-91-8	LC50: 240 mg/L (96h)	Pimephales promelas	Fish
	EC50: 610 mg/L (48h)	Daphnia magna	Crustacean

Persistence and degradability

Readily biodegradable under standard OECD test conditions.

Bioaccumulative potential

Low bioaccumulation potential (log Pow -0.86).

Mobility in soil

Koc	Henry	Dry Soil	Moist Soil
~10 (low)	Low	No	Miscible, disperses readily

Results of PBT and vPvB assessment

This substance does not meet the PBT/vPvB criteria of Annex XIII.

Other adverse effects

Not described

13. DISPOSAL CONSIDERATIONS

Disposal methods

Neutralise cautiously under controlled conditions or incinerate in a licensed hazardous waste incinerator with acid-gas/NOx emission control, in accordance with local regulations. For packaging: do not rinse into drains; manage as hazardous waste.

Refer to national and local regulations on waste management, including the Hazardous and Other Wastes (Management and Transboundary Movement) Rules.

14. TRANSPORT INFORMATION

Transport of dangerous goods by land (ADR 2023 / RID 2023)

14.1 UN number	UN2054
14.2 UN proper shipping name	MORPHOLINE
14.3 Transport hazard class(es)	8 (Subsidiary risk: 3)
14.4 Packing group	II
14.5 Environmental hazard	No
14.6 Special precautions for user	Physico-chemical properties: see section 9
14.7 Transport in bulk (Annex II MARPOL 73/78, IBC Code)	Not relevant

Transport of dangerous goods by sea (IMDG 41-22)

14.1 UN number	UN2054
14.2 UN proper shipping name	MORPHOLINE
14.3 Transport hazard class(es)	8 (Subsidiary risk: 3)
14.4 Packing group	II
14.5 Marine pollutant	No
14.6 Special precautions for user	EmS Codes: F-E, S-C | Limited quantities: 1 L | Segregation group: SG1 – Segregation from acids
14.7 Transport in bulk (Annex II MARPOL 73/78, IBC Code)	Not relevant

Transport of dangerous goods by air (IATA/ICAO 2024)

14.1 UN number	UN2054
14.2 UN proper shipping name	MORPHOLINE
14.3 Transport hazard class(es)	8 (Subsidiary risk: 3)
14.4 Packing group	II
14.5 Environmental hazard	No
14.6 Special precautions for user	Physico-chemical properties: see section 9
14.7 Transport in bulk (Annex II MARPOL 73/78, IBC Code)	Not relevant

15. REGULATORY INFORMATION

Safety, health and environmental regulations specific for the product in question

It is recommended to use the information included in this safety data sheet as data used in a risk evaluation of local circumstances, in order to establish the necessary risk prevention measures for the manipulation, use, storage and disposal of this product.

Other legislation

Manufacture, Storage and Import of Hazardous Chemicals Rules 1989
The Factories Act, 1948 (Act No. 63 of 1948), as amended by the Factories (Amendment) Act, 1987 (Act 20 of 1987)
The Chemical Accidents (Emergency Planning, Preparedness, and Response) Rules, 1996
Public Liability Insurance Act, 1991

16. OTHER INFORMATION

Legislation related to safety data sheets

This safety data sheet has been designed in accordance with Annex 4 – Guidance on the preparation of Safety Data Sheets of the Globally Harmonized System of Classification and Labelling of Chemicals (GHS).

Texts of the legislative phrases mentioned in sections 2 and 3

H226: Flammable liquid and vapour.
H302: Harmful if swallowed.
H312: Harmful in contact with skin.
H332: Harmful if inhaled.
H314: Causes severe skin burns and eye damage.
H318: Causes serious eye damage.

The phrases indicated do not refer to the product itself; they are present merely for informative purposes and refer to the individual components which appear in section 3.

Advice related to training

Minimal training is recommended to prevent industrial risks for staff using this product, in order to facilitate their comprehension and interpretation of this safety data sheet, as well as the label on the product.

Principal bibliographical sources

The United Nations Economic Commission for Europe (UNECE); European Chemicals Agency (ECHA) classification and labelling inventory; ACGIH Threshold Limit Values.

Abbreviations and acronyms

ADR: European agreement concerning the international carriage of dangerous goods by road | IMDG: International maritime dangerous goods code | IATA: International Air Transport Association | ICAO: International Civil Aviation Organisation | COD: Chemical Oxygen Demand | BOD5: 5-day biochemical oxygen demand | BCF: Bioconcentration factor | LD50: Lethal Dose 50 | LC50: Lethal Concentration 50 | EC50: Effective Concentration 50 | Log-POW: Octanol-water partition coefficient | Koc: Partition coefficient of organic carbon | IARC: International Agency for Research on Cancer

Disclaimer: The information contained in this safety data sheet is based on sources, technical knowledge and current legislation, without being able to guarantee its accuracy. This information cannot be considered a guarantee of the properties of the product; it is simply a description of the security requirements. The occupational methodology and conditions for users of this product are not within Suraj Chemicals' awareness or control, and it is ultimately the responsibility of the user to take the necessary measures to obtain the legal requirements concerning the manipulation, storage, use and disposal of chemical products. The information on this safety data sheet only refers to this product, which should not be used for needs other than those specified.

(This document is computer generated and therefore does not require any signature.)