

MORPHOLINE

MPL

CAUTIONARY RESPONSE INFORMATION

Common Synonyms Diethyleneimide oxide Diethylene imidoxide Diethylene oximide Tetrahydro-2h-1, 4-oxazine Tetrahydro-p-oxazine		Oily liquid	Colorless	Fishy, ammonia odor
Floats and mixes with water. Irritating vapor is produced.				
Avoid contact with liquid and vapor. Call fire department. Notify local health and pollution control agencies.				
Fire	FLAMMABLE Flashback along vapor trail may occur. Vapor may explode if ignited in an enclosed area. Extinguish with water, dry chemical, or carbon dioxide. Cool exposed containers with water.			
Exposure	CALL FOR MEDICAL AID. VAPOR Irritating to eyes, nose and throat. If inhaled, will cause nausea, headache, or difficult breathing. Move to fresh air. If breathing has stopped, give artificial respiration. If breathing is difficult, give oxygen. LIQUID Irritating to skin and eyes. Remove contaminated clothing and shoes. Flush affected areas with plenty of water. IF IN EYES, hold eyelids open and flush with plenty of water. IF SWALLOWED and victim is CONSCIOUS, have victim drink water or milk and have victim induce vomiting. IF SWALLOWED and victim is UNCONSCIOUS OR HAVING CONVULSIONS, do nothing except keep victim warm.			
Water Pollution	Effect of low concentrations on aquatic life is unknown. May be dangerous if it enters water intakes. Notify local health and wildlife officials. Notify operators of nearby water intakes.			

1. CORRECTIVE RESPONSE ACTIONS Dilute and disperse Stop discharge	2. CHEMICAL DESIGNATIONS 2.1 CG Compatibility Group: 7; Aliphatic amine 2.2 Formula: OCH ₂ CH ₂ NHCH ₂ CH ₂ 2.3 IMO/UN Designation: 3.3/2054 2.4 DOT ID No.: 2054 2.5 CAS Registry No.: 110-91-8 2.6 NAERG Guide No.: 132 2.7 Standard Industrial Trade Classification: 51579
3. HEALTH HAZARDS 3.1 Personal Protective Equipment: Organic vapor canister or self-contained breathing apparatus; rubber boots and gloves; goggles or face shield. 3.2 Symptoms Following Exposure: Liquid causes skin and eye burns. Breathing vapors or absorption through skin may cause nausea and headache. 3.3 Treatment of Exposure: INHALATION: if ill effects occur, move patient to fresh air, keep him quiet and warm, and call a physician; if breathing stops, start artificial respiration. INGESTION: force milk or water, then immediately induce vomiting; treat symptomatically; no known antidote. SKIN OR EYES: immediately flush with plenty of water for at least 15 min.; for eyes get medical attention promptly. 3.4 TLV-TWA: 20 ppm 3.5 TLV-STEL: Not listed. 3.6 TLV-Ceiling: Not listed. 3.7 Toxicity by Ingestion: Grade 2; LD ₅₀ = 0.5 to 5 g/kg (guinea pig, rat) 3.8 Toxicity by Inhalation: Currently not available. 3.9 Chronic Toxicity: Currently not available 3.10 Vapor (Gas) Irritant Characteristics: Vapors cause a slight smarting of the eyes or respiratory system if present in high concentrations. The effect is temporary. 3.11 Liquid or Solid Characteristics: Minimum hazard. If spilled on clothing and allowed to remain, may cause smarting and reddening of the skin. 3.12 Odor Threshold: 0.01 ppm 3.13 IDLH Value: 1,400 ppm 3.14 OSHA PEL-TWA: 20 ppm 3.15 OSHA PEL-STEL: Not listed. 3.16 OSHA PEL-Ceiling: Not listed. 3.17 EPA AEG1: Not listed	

4. FIRE HAZARDS

- 4.1 Flash Point: 100°F O.C.
- 4.2 Flammable Limits in Air: 1.8%-10.8%
- 4.3 Fire Extinguishing Agents: Water fog, alcohol foam, dry chemical, or carbon dioxide
- 4.4 Fire Extinguishing Agents Not to Be Used: Not pertinent
- 4.5 Special Hazards of Combustion Products: Irritating vapors are generated when heated.
- 4.6 Behavior in Fire: Vapor is heavier than air and may travel some distance to source of ignition and flash back.
- 4.7 Auto Ignition Temperature: 590°F
- 4.8 Electrical Hazards: Not pertinent
- 4.9 Burning Rate: 1.9 mm/min
- 4.10 Adiabatic Flame Temperature: Currently not available
- 4.11 Stoichiometric Air to Fuel Ratio: 32.1 (calc.)
- 4.12 Flame Temperature: Currently not available
- 4.13 Combustion Molar Ratio (Reactant to Product): 9.5 (calc.)
- 4.14 Minimum Oxygen Concentration for Combustion (MOCC): Not listed

5. CHEMICAL REACTIVITY

- 5.1 Reactivity with Water: No reaction
- 5.2 Reactivity with Common Materials: No reaction
- 5.3 Stability During Transport: Stable
- 5.4 Neutralizing Agents for Acids and Caustics: Flush with water
- 5.5 Polymerization: Not pertinent
- 5.6 Inhibitor of Polymerization: Not pertinent

6. WATER POLLUTION

- 6.1 Aquatic Toxicity: Currently not available
- 6.2 Waterfowl Toxicity: Currently not available
- 6.3 Biological Oxygen Demand (BOD): (theor.) 0.9%, 5 days; 5.1%, 20 days
- 6.4 Food Chain Concentration Potential: None
- 6.5 GESAMP Hazard Profile: Bioaccumulation: 0
Damage to living resources: 2
Human Oral hazard: 1
Human Contact hazard: 1
Reduction of amenities: 0

7. SHIPPING INFORMATION

- 7.1 Grades of Purity: Several grades available, most above 99%.
- 7.2 Storage Temperature: Ambient
- 7.3 Inert Atmosphere: No requirement
- 7.4 Venting: Open
- 7.5 IMO Pollution Category: D
- 7.6 Ship Type: 3
- 7.7 Barge Hull Type: 3

8. HAZARD CLASSIFICATIONS

- 8.1 49 CFR Category: Flammable liquid
- 8.2 49 CFR Class: 3
- 8.3 49 CFR Package Group: III
- 8.4 Marine Pollutant: No
- 8.5 NFPA Hazard Classification:

Category	Classification
Health Hazard (Blue).....	2
Flammability (Red).....	3
Instability (Yellow).....	0
- 8.6 EPA Reportable Quantity: Not listed.
- 8.7 EPA Pollution Category: Not listed.
- 8.8 RCRA Waste Number: Not listed
- 8.9 EPA FWPCA List: Not listed

9. PHYSICAL & CHEMICAL PROPERTIES

- 9.1 Physical State at 15° C and 1 atm: Liquid
- 9.2 Molecular Weight: 87.12
- 9.3 Boiling Point at 1 atm: 262.8°F = 128.2°C = 401.4°K
- 9.4 Freezing Point: 23.4°F = -4.8°C = 268.4°K
- 9.5 Critical Temperature: 653.0°F = 345°C = 618.2°K
- 9.6 Critical Pressure: 794 psia = 54 atm = 5.47 MN/m²
- 9.7 Specific Gravity: 1.00 at 20°C (liquid)
- 9.8 Liquid Surface Tension: Not pertinent
- 9.9 Liquid Water Interfacial Tension: Not pertinent
- 9.10 Vapor (Gas) Specific Gravity: Not pertinent
- 9.11 Ratio of Specific Heats of Vapor (Gas): (est.) 1.091
- 9.12 Latent Heat of Vaporization: 182.9 Btu/lb = 101.6 cal/g = 4.254 X 10⁵ J/kg
- 9.13 Heat of Combustion: Currently not available
- 9.14 Heat of Decomposition: Not pertinent
- 9.15 Heat of Solution: Currently not available
- 9.16 Heat of Polymerization: Not pertinent
- 9.17 Heat of Fusion: Currently not available
- 9.18 Limiting Value: Currently not available
- 9.19 Reid Vapor Pressure: 0.55 psia

NOTES

MORPHOLINE

MPL

9.20 SATURATED LIQUID DENSITY		9.21 LIQUID HEAT CAPACITY		9.22 LIQUID THERMAL CONDUCTIVITY		9.23 LIQUID VISCOSITY	
Temperature (degrees F)	Pounds per cubic foot	Temperature (degrees F)	British thermal unit per pound-F	Temperature (degrees F)	British thermal unit inch per hour-square foot-F	Temperature (degrees F)	Centipoise
35	63.740	70	0.476		N		N
40	63.550	75	0.477		O		O
45	63.360	80	0.479		T		T
50	63.170	85	0.480				
55	62.980	90	0.481		P		P
60	62.790	95	0.482		E		E
65	62.600	100	0.484		R		R
70	62.410	105	0.485		T		T
75	62.220	110	0.486		I		I
80	62.030	115	0.488		N		N
85	61.840	120	0.489		E		E
90	61.650	125	0.490		N		N
95	61.450	130	0.492		T		T
100	61.260	135	0.493				
105	61.070	140	0.494				
110	60.880	145	0.496				
115	60.690	150	0.497				
120	60.500	155	0.498				
		160	0.499				
		165	0.501				
		170	0.502				
		175	0.503				
		180	0.505				
		185	0.506				
		190	0.507				
		195	0.509				

9.24 SOLUBILITY IN WATER		9.25 SATURATED VAPOR PRESSURE		9.26 SATURATED VAPOR DENSITY		9.27 IDEAL GAS HEAT CAPACITY	
Temperature (degrees F)	Pounds per 100 pounds of water	Temperature (degrees F)	Pounds per square inch	Temperature (degrees F)	Pounds per cubic foot	Temperature (degrees F)	British thermal unit per pound-F
	M	-30	0.002	-30	0.00003	50	0.274
	I	-20	0.003	-20	0.00005	52	0.274
	S	-10	0.005	-10	0.00009	54	0.274
	C	0	0.008	0	0.00014	56	0.274
	I	10	0.013	10	0.00023	58	0.274
	B	20	0.021	20	0.00036	60	0.274
	L	30	0.033	30	0.00054	62	0.274
	E	40	0.049	40	0.00080	64	0.274
		50	0.073	50	0.00117	66	0.274
		60	0.106	60	0.00166	68	0.274
		70	0.152	70	0.00232	70	0.274
		80	0.213	80	0.00320	72	0.274
		90	0.294	90	0.00434	74	0.274
		100	0.401	100	0.00581	76	0.274
		110	0.538	110	0.00767	78	0.274
		120	0.714	120	0.00999	80	0.274
		130	0.936	130	0.01288	82	0.274
		140	1.213	140	0.01641	84	0.274
		150	1.556	150	0.02071		
		160	1.976	160	0.02588		
		170	2.487	170	0.03205		
		180	3.102	180	0.03936		
		190	3.838	190	0.04795		
		200	4.712	200	0.05797		
		210	5.742	210	0.06959		
		220	6.949	220	0.08297		