

HEXAMETHYLENEDIAMINE

HMD

CAUTIONARY RESPONSE INFORMATION

Common Synonyms 1,6-Diaminohexane 1,6-Hexanediamine HMDA		Solid Colorless Weak ammonia odor
Floats and mixes with water.		
Keep people away. Avoid contact with liquid and vapor. Wear goggles, self-contained breathing apparatus, and rubber overclothing (including gloves). Call fire department. Notify local health and pollution control agencies. Protect water intakes.		
Fire	Combustible. Wear goggles, self-contained breathing apparatus, and rubber overclothing (including gloves). Extinguish with water, foam, dry chemical, or carbon dioxide.	
Exposure	CALL FOR MEDICAL AID. LIQUID OR SOLID POISONOUS IF SWALLOWED OR IF SKIN IS EXPOSED. Will burn 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.	
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: Not listed. 2.2 Formula: $\text{NH}_2(\text{CH}_2)_6\text{NH}_2$ 2.3 IMO/UN Designation: 8.0/1783 2.4 DOT ID No.: 2280 2.5 CAS Registry No.: 124-09-4 2.6 NAERG Guide No.: 153 2.7 Standard Industrial Trade Classification: 51452
3. HEALTH HAZARDS 3.1 Personal Protective Equipment: Protective clothing; eye protection. 3.2 Symptoms Following Exposure: Vapors cause irritation of eyes and respiratory tract. Liquid irritates eyes and skin, may cause dermatitis. 3.3 Treatment of Exposure: SKIN OR EYES: flush immediately with water for 15 min.; call a physician. 3.4 TLV-TWA: 0.5 ppm 3.5 TLV-STEL: Not listed. 3.6 TLV-Ceiling: Not listed. 3.7 Toxicity by Ingestion: Currently not available 3.8 Toxicity by Inhalation: Currently not available. 3.9 Chronic Toxicity: Repeated exposure can cause anemia and damage kidney and liver. 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: Causes smarting of the skin and first-degree burns on short exposure; may cause secondary burns on long exposure. 3.12 Odor Threshold: 0.0041 mg/m ³ 3.13 IDLH Value: Not listed. 3.14 OSHA PEL-TWA: Not listed. 3.15 OSHA PEL-STEL: Not listed. 3.16 OSHA PEL-Ceiling: Not listed. 3.17 EPA AEGL: Not listed	

4. FIRE HAZARDS

- 4.1 **Flash Point:** 160°F O.C.
- 4.2 **Flammable Limits in Air:** 0.7%-6.3%
- 4.3 **Fire Extinguishing Agents:** Currently not available
- 4.4 **Fire Extinguishing Agents Not to Be Used:** Currently not available
- 4.5 **Special Hazards of Combustion Products:** Currently not available
- 4.6 **Behavior in Fire:** Currently not available
- 4.7 **Auto Ignition Temperature:** Currently not available
- 4.8 **Electrical Hazards:** Currently not available
- 4.9 **Burning Rate:** Currently not available
- 4.10 **Adiabatic Flame Temperature:** Currently not available
- 4.11 **Stoichiometric Air to Fuel Ratio:** 57.1 (calc.)
- 4.12 **Flame Temperature:** Currently not available
- 4.13 **Combustion Molar Ratio (Reactant to Product):** 16.0 (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):** Currently not available
- 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: II
 Reduction of amenities: XX

7. SHIPPING INFORMATION

- 7.1 **Grades of Purity:** Anhydrous: 99.8%; 70% solution
- 7.2 **Storage Temperature:** Ambient
- 7.3 **Inert Atmosphere:** Nitrogen
- 7.4 **Venting:** Pressure-vacuum
- 7.5 **IMO Pollution Category:** C
- 7.6 **Ship Type:** 3
- 7.7 **Barge Hull Type:** Currently not available

8. HAZARD CLASSIFICATIONS

- 8.1 **49 CFR Category:** Corrosive material
- 8.2 **49 CFR Class:** 8
- 8.3 **49 CFR Package Group:** III
- 8.4 **Marine Pollutant:** No
- 8.5 **NFPA Hazard Classification:** Not listed
- 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:** Solid (anhydrous)
- 9.2 **Molecular Weight:** 116.21
- 9.3 **Boiling Point at 1 atm:** 478°K = 205°C = 401°F
- 9.4 **Freezing Point:** (anhyd.) 104.9°F = 40.5°C = 313.7°K (70% soln.) 28°F = -2°C = 269°K
- 9.5 **Critical Temperature:** Not pertinent
- 9.6 **Critical Pressure:** Not pertinent
- 9.7 **Specific Gravity:** (anhyd.) 0.799 at 60°C (liquid) (70% soln.) 0.933 at 20°C (liquid)
- 9.8 **Liquid Surface Tension:** (anhyd.) 34.6 dynes/cm = 0.0346 N/m at 60°C
- 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):** Not pertinent
- 9.12 **Latent Heat of Vaporization:** 203 Btu/lb = 113 cal/g = 4.73 X 10⁵ J/kg
- 9.13 **Heat of Combustion:** (est.) -12,200 Btu/lb = -6,790 cal/g = -284 X 10⁵ J/kg
- 9.14 **Heat of Decomposition:** Not pertinent
- 9.15 **Heat of Solution:** (est.) -9 Btu/lb = -5 cal/g = -0.2 X 10⁵ J/kg
- 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:** Currently not available

NOTES

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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
	C U R R E N T L Y N O T A V A I L A B L E		N O T P E R T I N E N T		N O T P E R T I N E N T		N O T P E R T I N E N T

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 I S C I B L E	210	0.367	210	0.00593		N O T
		220	0.468	220	0.00746		P E R T I N E N T
		230	0.594	230	0.00932		
		240	0.748	240	0.01157		
		250	0.936	250	0.01428		
		260	1.164	260	0.01751		
		270	1.438	270	0.02134		
		280	1.768	280	0.02587		
		290	2.161	290	0.03120		
		300	2.627	300	0.03744		
		310	3.178	310	0.04470		
		320	3.825	320	0.05311		
		330	4.583	330	0.06283		
		340	5.466	340	0.07400		
		350	6.491	350	0.08679		
		360	7.677	360	0.10140		
		370	9.041	370	0.11800		
		380	10.610	380	0.13680		
		390	12.400	390	0.15800		
		400	14.440	400	0.18180		