

METHYLHYDRAZINE

MHZ

CAUTIONARY RESPONSE INFORMATION

Common Synonyms		Liquid	Colorless	Ammonia-like odor
MMH Monomethylhydrazine		Mixes with water. Poisonous, flammable vapor is produced.		
<p>Evacuate. KEEP PEOPLE AWAY. AVOID CONTACT WITH LIQUID AND VAPOR. Wear goggles and self-contained breathing apparatus. Shut off ignition sources. Call fire department. Stay upwind. Use water spray to "knock down" vapor. Notify local health and pollution control agencies.</p>				
Fire	<p>FLAMMABLE. Containers may explode in fire. Flashback along vapor trail may occur. Vapor may explode if ignited in an enclosed area. May explode if exposed to heat or flames. Extinguish with dry chemicals, alcohol foam, or carbon dioxide. Water may be ineffective on fire. Cool exposed containers with water.</p>			
Exposure	<p>Call for medical aid.</p> <p>VAPOR POISONOUS IF INHALED OR IF SKIN IS EXPOSED. Irritating to eyes, nose and throat. Move victim to fresh air. If breathing has stopped, give artificial respiration. If breathing is difficult, give oxygen.</p> <p>LIQUID POISONOUS IF SWALLOWED OR IF SKIN IS EXPOSED. Will burn 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. DO NOT INDUCE VOMITING.</p>			
Water Pollution	<p>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.</p>			

1. CORRECTIVE RESPONSE ACTIONS

Dilute and disperse
 Stop discharge

2. CHEMICAL DESIGNATIONS

- 2.1 CG Compatibility Group: Not listed.
- 2.2 Formula: CH₃NHNH₂
- 2.3 IMO/UN Designation: 3.2/1244
- 2.4 DOT ID No.: 1244
- 2.5 CAS Registry No.: 60-34-4
- 2.6 NAERG Guide No.: 131
- 2.7 Standard Industrial Trade Classification: 51486

3. HEALTH HAZARDS

- 3.1 **Personal Protective Equipment:** Organic canister mask or self-contained breathing apparatus; goggles or face shield; rubber gloves; protective clothing
- 3.2 **Symptoms Following Exposure:** Tremors and convulsions follow absorption by any route. Inhalation causes local irritation of respiratory tract, respiratory distress, and systemic effects. Contact of liquid with eyes or skin causes irritation and burns. Ingestion causes irritation of mouth and stomach.
- 3.3 **Treatment of Exposure:** Get medical attention at once following all exposures to this compound.
 INHALATION: move victim to fresh air and keep him quiet; give artificial respiration if breathing stops. EYES: flush for at least 15 min. with large quantities of water. SKIN: immediately wash with large quantities of water and treat as for alkali burn. INGESTION: give egg whites or other emollient, followed by a 5% salt solution or other mild emetic. Keep patient as quiet as possible. To control convulsions, short-acting barbituates may be administered parenterally by a physician with due regard for depression of respiration.
- 3.4 TLV-TWA: 0.01 ppm
- 3.5 TLV-STEL: Not listed.
- 3.6 TLV-Ceiling: Not listed.
- 3.7 **Toxicity by Ingestion:** Grade 4; oral LD₅₀ = 33 mg/kg (rat)
- 3.8 **Toxicity by Inhalation:** Currently not available.
- 3.9 **Chronic Toxicity:** Hemolytic anemia may result from large doses by any route.
- 3.10 **Vapor (Gas) Irritant Characteristics:** Vapors are moderately irritating such that personnel will not usually tolerate moderate or high concentrations.
- 3.11 **Liquid or Solid Characteristics:** Severe skin irritant. Causes second-and third-degree burns on short contact and is very injurious to the eyes.
- 3.12 **Odor Threshold:** 1-3 ppm
- 3.13 IDLH Value: 20 ppm
- 3.14 OSHA PEL-TWA: Not listed.
- 3.15 OSHA PEL-STEL: Not listed.
- 3.16 OSHA PEL-Ceiling: 0.2 ppm
- 3.17 EPA AEGL: Not listed

4. FIRE HAZARDS

- 4.1 **Flash Point:** 62°F O.C.
- 4.2 **Flammable Limits in Air:** 2.5%-98%
- 4.3 **Fire Extinguishing Agents:** Water or dry chemical
- 4.4 **Fire Extinguishing Agents Not to Be Used:** Not pertinent
- 4.5 **Special Hazards of Combustion Products:** Irritating nitrogen oxides are produced.
- 4.6 **Behavior in Fire:** May explode
- 4.7 **Auto Ignition Temperature:** 382°F
- 4.8 **Electrical Hazards:** Currently not available
- 4.9 **Burning Rate:** 2.0 mm/min.
- 4.10 **Adiabatic Flame Temperature:** Currently not available
- 4.11 **Stoichiometric Air to Fuel Ratio:** 20.2 (calc.)
- 4.12 **Flame Temperature:** Currently not available
- 4.13 **Combustion Molar Ratio (Reactant to Product):** 5.5 (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:** Reacts slowly with air, but heat may cause ignition of rags, rust, or other combustibles.
- 5.3 **Stability During Transport:** Stable if not in contact with iron, copper, or their alloys.
- 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: -
 Human Oral hazard: 3
 Human Contact hazard: II
 Reduction of amenities: X

7. SHIPPING INFORMATION

- 7.1 **Grades of Purity:** Propellant grade, 99+%; Laboratory grade, 98+%
- 7.2 **Storage Temperature:** Ambient
- 7.3 **Inert Atmosphere:** Padded with nitrogen
- 7.4 **Venting:** Safety relief
- 7.5 **IMO Pollution Category:** Currently not available
- 7.6 **Ship Type:** Currently not available
- 7.7 **Barge Hull Type:** Currently not available

8. HAZARD CLASSIFICATIONS

- 8.1 **49 CFR Category:** Poison
- 8.2 **49 CFR Class:** 6.1
- 8.3 **49 CFR Package Group:** I
- 8.4 **Marine Pollutant:** No
- 8.5 **NFPA Hazard Classification:**

Category	Classification
Health Hazard (Blue).....	3
Flammability (Red).....	3
Instability (Yellow).....	1
- 8.6 **EPA Reportable Quantity:** 10 pounds
- 8.7 **EPA Pollution Category:** A
- 8.8 **RCRA Waste Number:** P068
- 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:** 46.1
- 9.3 **Boiling Point at 1 atm:** 189.5°F = 87.5°C = 360.7°K
- 9.4 **Freezing Point:** -62.3°F = -52.4°C = 220.8°K
- 9.5 **Critical Temperature:** 593.6°F = 312°C = 585.2°K
- 9.6 **Critical Pressure:** 1,195 psia = 81.3 atm = 8.25 MN/m²
- 9.7 **Specific Gravity:** 0.878 at 20°C (liquid)
- 9.8 **Liquid Surface Tension:** 34.3 dynes/cm = 0.0343 N/m at 20°C
- 9.9 **Liquid Water Interfacial Tension:** Not pertinent
- 9.10 **Vapor (Gas) Specific Gravity:** 1.59
- 9.11 **Ratio of Specific Heats of Vapor (Gas):** 1.1326
- 9.12 **Latent Heat of Vaporization:** 376 Btu/lb = 209 cal/g = 8.75 X 10⁵ J/kg
- 9.13 **Heat of Combustion:** -12,178 Btu/lb = -6,766 cal/g = -283.1 X 10⁵ J/kg
- 9.14 **Heat of Decomposition:** Not pertinent
- 9.15 **Heat of Solution:** Not pertinent
- 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
35	55.950	0	0.689	0	1.811	0	2.031
40	55.780	5	0.689	5	1.805	5	1.891
45	55.600	10	0.690	10	1.799	10	1.764
50	55.430	15	0.691	15	1.794	15	1.648
55	55.260	20	0.692	20	1.788	20	1.541
60	55.080	25	0.693	25	1.782	25	1.443
65	54.910	30	0.694	30	1.776	30	1.354
70	54.740	35	0.694	35	1.770	35	1.271
75	54.560	40	0.695	40	1.764	40	1.195
80	54.390	45	0.696	45	1.759	45	1.125
85	54.220	50	0.697	50	1.753	50	1.060
90	54.040	55	0.698	55	1.747	55	1.001
95	53.870	60	0.699	60	1.741	60	0.945
100	53.700	65	0.699	65	1.735	65	0.894
		70	0.700	70	1.729	70	0.846
		75	0.701	75	1.724	75	0.802
		80	0.702	80	1.718	80	0.761
		85	0.703	85	1.712	85	0.722
		90	0.704	90	1.706	90	0.686
		95	0.704	95	1.700	95	0.653
		100	0.705	100	1.695	100	0.622
				105	1.689		
				110	1.683		
				115	1.677		
				120	1.671		
				125	1.665		

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	55	0.483	55	0.00403	0	0.340
	I	60	0.566	60	0.00467	20	0.348
	S	65	0.661	65	0.00541	40	0.356
	C	70	0.769	70	0.00624	60	0.365
	I	75	0.893	75	0.00717	80	0.373
	B	80	1.034	80	0.00823	100	0.381
	L	85	1.194	85	0.00942	120	0.390
	E	90	1.376	90	0.01075	140	0.398
		95	1.581	95	0.01224	160	0.406
		100	1.812	100	0.01390	180	0.414
		105	2.071	105	0.01575	200	0.423
		110	2.362	110	0.01781	220	0.431
		115	2.688	115	0.02009	240	0.439
		120	3.052	120	0.02261	260	0.448
		125	3.458	125	0.02540	280	0.456
		130	3.910	130	0.02848	300	0.464
		135	4.411	135	0.03186	320	0.473
		140	4.967	140	0.03557	340	0.481
		145	5.582	145	0.03964	360	0.489
		150	6.261	150	0.04410	380	0.498
		155	7.009	155	0.04897	400	0.506
		160	7.833	160	0.05428	420	0.514
		165	8.737	165	0.06007	440	0.523
		170	9.730	170	0.06636		
		175	10.820	175	0.07319		
		180	12.000	180	0.08060		