

**Monomethyl Hydrazine (MMH)**

Monomethyl hydrazine (CH_3NHNH_2) is a clear, colorless hygroscopic liquid. It has an odor typical of ammonia or organic amines. Monomethyl hydrazine is miscible with water, hydrazine, hydrazine derivatives, amines and lower weight monohydric alcohols. It is soluble in hydrocarbons.

Monomethyl hydrazine is a mildly alkaline base and a very strong reducing agent. Its high chemical reactivity, easily controlled functionality and strong hydrogen bonding are its most useful properties.

Specifications for monomethyl hydrazine are given in Table 1. In addition, monomethyl hydrazine meets all requirements for the latest revision of Military Specification MIL-PRF-27404. Physical properties of monomethyl hydrazine are shown in Table 2.

Table 1 Specifications

Component	% by Weight
Monomethyl Hydrazine, min Water, max	98.0 2.0

**Table 2
Physical Properties**

Density @ 25°C (g/ml)	0.874
(lb/gal)	7.265
Viscosity @ 20°C (cp)	0.855
Boiling Point @ 760 mm Hg (°C)	87.5
(°F)	189.5
Freezing Point (°C)	-52.4
(°F)	-62.3
Flash Point, TCC (°C)	19
(°F)	67
Flammable Limits in Air (% by vol)	2.5-98

Applications

The major use for monomethyl hydrazine is in the aerospace industry. It is used as a propellant and for spacecraft orbital control thrusters. Monomethyl hydrazine may also be used in organic syntheses where both an N-N bond and a methyl group are desirable.

Many patents have been issued covering applications of monomethyl hydrazine in pharmaceuticals, petroleum refining, explosives, metal treating, photography, fibers, coatings and resins.

Handling, Storage and Safety

The experience accumulated by the chemical and aerospace industries indicates that with rigid adherence to proper precautions, monomethyl hydrazine can be handled safely. Because monomethyl hydrazine vapors have such a very wide range of explosive limits and because monomethyl hydrazine liquid is extremely reactive with many materials, the safety precautions outlined are necessary to avoid fire or explosions. In addition, prolonged exposure to monomethyl hydrazine vapor, contact with skin, or ingestion may produce harmful or fatal effects.

Storage: Monomethyl hydrazine may be stored in the DOT approved container in which it is shipped (see *Shipping Information*). Store away from heat, sparks, open flame and oxidants. Store only in well ventilated areas. Do not contaminate.

Since monomethyl hydrazine is stable, it can be stored without loss of purity. Keep the container securely closed. Drums should be vented carefully when opening.

If you wish information on bulk storage, Arch Chemicals Technical Service is available to assist you. Contact the Arch Chemicals Sales Office.

Safety Precautions: Monomethyl hydrazine is insensitive to shock or friction. But both monomethyl hydrazine and its vapor can be flammable or explosive in the presence of heat, flame, sparks, contaminants and oxidizers (including air.)

All containers and handling equipment for monomethyl hydrazine should be electrically grounded. And because of the rapid rate of oxidation, which may lead to fire or explosion, an inert atmosphere is necessary over monomethyl hydrazine at all times. Nitrogen, which is inert and readily available, has been adopted as the padding material for monomethyl hydrazine storage and transfer. The lower explosive limit for monomethyl hydrazine vapor in air is 2.5%. This value increases significantly when a nitrogen atmosphere is used.

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Performance Chemicals Hydrazine

Avoid contact between monomethyl hydrazine and strong oxidizers such as hydrogen peroxide, nitrogen tetroxide, fluorine, halogen fluorides and fuming nitric acid. Such contact will result in immediate ignition.

Avoid contact with metal oxides such as those of iron, copper, lead, manganese and molybdenum. Contact with such metallic oxide surfaces may lead to flaming decomposition. Avoid contact with organic materials having large surface areas, or porous surfaces. Absorption of monomethyl hydrazine by rags, cotton waste, sawdust or similar organic materials will eventually result in spontaneous ignition.

For additional details on handling and use of monomethyl hydrazine, contact (800) 654-6018 for assistance. Or visit our web site www.hydrazine.com

Shipping Information

Monomethyl hydrazine is available in 30 gallon drums (215 lbs net) packed with a capseal in an approved overpack. These drums meet DOT Specification 1A1/X and are constructed of 304 stainless steel containing less than 0.5% molybdenum. Monomethyl hydrazine can be supplied in customer-provided pressure cylinders.

Please refer to the Material Safety Data Sheet (MSDS) for complete information on Storage and Handling, Toxicological Properties, Personal Protection, First Aid, Spill and Leak Procedures, and Waste Disposal. To order an MSDS, call the Arch Chemicals sales office listed below or the MSDS Control Group at (800) 511-MSDS. Before using or handling this product, the MSDS should be thoroughly reviewed.

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