



Arch Chemicals, Inc.

**MATERIAL
SAFETY DATA**

FOR ANY EMERGENCY, CALL 24HOURS/ 7 DAYS:	1-800-654-6911
FOR ALL TRANSPORTATION ACCIDENTS, CALL CHEMTREC(R):	1-800-424-9300
FOR ALL MSDS QUESTIONS & REQUESTS, CALL:	1-800-511-MSDS

PRODUCT NAME: **MONOMETHYLHYDRAZINE**

1. PRODUCT AND COMPANY IDENTIFICATION

REVISION DATE: 12-01-2003
SUPERCEDES: 12-01-2003

MSDS NO: 00295-0004 - 105296
SYNONYMS: MMH; methyl hydrazine
CHEMICAL FAMILY: Hydrazine
DESCRIPTION / USE: Fuel propellant.
FORMULA: CH₆N₂

Arch Chemicals, Inc. 501 Merritt 7 PO Box 5204 Norwalk, CT 06856-5204

2. COMPOSITION / INFORMATION ON INGREDIENTS

CAS or CHEMICAL NAME	CAS #	% Range
Monomethylhydrazine	60-34-4	90 - 99

3. HAZARDS IDENTIFICATION

OSHA Hazard Classification: lung, liver, kidney, blood and nervous system toxin, possible carcinogen, skin sensitizer, highly toxic by ingestion, dermal contact, and inhalation, corrosive to eyes, skin and mucous membranes, flammable, (causes Methemoglobin formation)

Routes of Entry: Inhalation, skin, eyes, ingestion
Chemical Interactions: No known interactions
Medical Conditions Aggravated: Liver, kidney, blood, respiratory and central nervous system disorders, Skin diseases including eczema and sensitization, cardiovascular disease

Human Threshold Response Data

Odor Threshold:
Monomethyl hydrazine 1.7 ppm
Irritation Threshold: Not established

Hazardous Materials Identification System/National Fire Protection Association Classifications

<u>Hazard Ratings:</u>	<u>Health</u>	<u>Flammability</u>	<u>Reactivity</u>
HMIS	3*	3	2
NFPA	4	3	2

Immediate (Acute) Health Effects

Inhalation Toxicity: Highly toxic. Inhalation of high concentrations may be fatal. This product is rapidly absorbed through the lungs. Immediate and prolonged contact may result in the following: damage to the liver, kidneys and blood with symptoms of vomiting, diarrhea, nausea, dizziness, methemoglobinemia leading to cyanosis (blue coloration to the skin) and convulsions.

Inhalation Irritation: Inhalation of this material may produce severe irritating and/or corrosive effects to the nose, mouth, throat, and respiratory tract. It may cause burns which can result in symptoms which may include coughing, wheezing, choking, shortness of breath, chest pain, and impairment of lung function. Inhalation of high concentrations can also result in permanent lung damage. May cause pulmonary edema (fluid build-up in lungs).

Skin Contact: Dermal exposure can cause severe irritation and/or burns characterized by redness, swelling, and scab formation. Prolonged skin exposure may cause permanent damage. This product is rapidly absorbed through the skin, and may result in the following: damage to the liver, kidneys and blood with symptoms of vomiting, diarrhea, nausea, dizziness, methemoglobinemia leading to cyanosis (blue coloration to the skin) and convulsions.

Skin Absorption: May be highly toxic or fatal if absorbed.

Eye Contact: Severe irritation and/or burns can occur following exposure. Direct contact may cause impairment of vision and corneal damage. Rinsing of the eye should take place immediately.

Ingestion Irritation: Irritation and/or burns can occur to the entire gastrointestinal tract, including the stomach and intestines, characterized by nausea, vomiting, diarrhea, abdominal pain, bleeding, and/or tissue ulceration or perforation.

Ingestion Toxicity: Significant exposure to this material can lead to serious health effects and/or death.

Acute Target Organ Toxicity: Respiratory Tract, Liver, Kidneys, Central nervous system, Blood

Prolonged (Chronic) Health Effects

Carcinogenicity: This chemical is considered to be a suspect human carcinogen based on animal data.

Reproductive and Developmental Toxicity: Industrial exposures kept at or below the occupational exposure standard are not expected to pose a reproductive or developmental toxicity hazard. High dose levels of this chemical produced maternal toxicity, and embryoletality and fetal malformations.

Inhalation: Prolonged or repeated exposure may cause continuous bronchitis. Prolonged or repeated exposure may cause kidney, liver and blood damage.

Eye Contact: Prolonged contact may result in permanent damage.

Skin Contact: Prolonged or repeated exposure will cause more severe irritation and possibly permanent skin damage. Repeated or prolonged skin contact may cause some individuals to develop skin rash and other skin complications due to allergic skin sensitization. Prolonged or repeated exposure may cause kidney, liver and blood damage.

Skin Absorption: Prolonged or repeated exposure may be fatal.

Ingestion: Chronic ingestion of this product may cause severe irritation and possible corrosive effects.

Chronic Target Organ Toxicity: Lungs, Liver, Kidneys, Central nervous system, Blood, This chemical is considered to be a suspect human carcinogen based on animal data.

Supplemental Health Hazard Information: No additional health information available.

4. FIRST AID MEASURES

Inhalation: IF INHALED: Remove individual to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Call a physician.

Skin Contact: IF ON SKIN: Immediately flush skin with plenty of water for 15 minutes. If clothing comes in contact with the product, the clothing should be removed immediately and should be laundered before re-use. Call a physician.

Eyes: IF IN EYES: Immediately flush eyes with plenty of water for at least 15 minutes while holding eyelids apart. Call a physician immediately.

Ingestion: IF SWALLOWED: Call a physician immediately. DO NOT induce vomiting unless directed to do so by a physician. Never give anything by mouth to an unconscious person.

Notes to Physician: Treat for methemoglobinemia. Pyridoxine (Vitamin B6) has been used successfully to treat the neurological symptoms of hydrazine exposure (See Section 16 for references).

5. FIRE FIGHTING MEASURES

Flammability Summary (OSHA): Flammable. Contact with incompatible materials will result in immediate ignition or explosion. Product is not pyrophoric.

Flammable Properties

Flash Point: 21 Deg. C. / 70 Deg. F. (Test Method: Open Cup)

Autoignition Temperature: 194 Deg. C. / 382 Deg. F.

Upper Flammable/Explosive Limit, % in air: 98%

Lower Flammable/Explosive Limit, % in air: 2.5%

Fire/Explosion Hazards: Flammable Liquid. Can release vapors that form explosive mixtures at temperatures at or above the flash point. Water is the preferred extinguishing media as it will dilute the material resulting in a non-flammable mixture.

Extinguishing Media: Carbon dioxide, Dry chemical, Water spray, Dilute the spilled material to about 10% with water.

Fire Fighting Instructions: Use water to cool containers exposed to fire. See Section 6 for protective equipment for fire fighting.

Hazardous Combustion Products: carbon monoxide, Oxides of nitrogen

6. ACCIDENTAL RELEASE MEASURES

Personal Protection for Emergency Situations:	Response to this material requires the use of a full encapsulated suit and self-contained breathing apparatus (SCBA).
<u>Spill Mitigation Procedures</u>	
Air Release:	Vapors may be suppressed by the use of water fog.
Water Release:	Divert water flow around spill if possible and safe to do so. Notify all downstream users of possible contamination. This material is lighter than water.
Land Release:	Create a dike or trench to contain materials. Dilute the spilled material to about 10% with water. Neutralize the diluted material by slowly adding a 5-8% calcium hypochlorite solution until all the diluted material has been reacted. DO NOT ADD DRY CALCIUM HYPOCHLORITE TO THE SPILL AS A VIOLENT REACTION MAY RESULT. Remove in a liquid form, containerize and label properly. Do not place spill materials back in their original containers.
Additional Spill Information:	Remove all sources of ignition. If this material is released into a work area, evacuate the area immediately. Hazardous concentrations in air may be found in local spill area and immediately downwind. Utilize emergency response personal protection equipment prior to the start of any response. Stop source of spill as soon as possible and notify appropriate personnel. This material may be neutralized for disposal; you are requested to contact Arch Chemicals at 1- 800-654-6911 before beginning any such procedure. Containerize and label properly and remove to a secure location for proper disposal. Decontaminate all clothing and the spill area using a detergent and flush with large amounts of water.

7. HANDLING AND STORAGE

Handling:	Avoid contact with material, avoid breathing vapors, use only in a well ventilated area, use bonding and grounding when transferring quantities of material. Do not get in eyes, on skin or clothing. Follow all MSDS/label precautions even after container is emptied because they may retain product residues.
Storage:	Store in a cool dry ventilated location, away from sources of ignition or other incompatible conditions and chemicals. Keep container(s) closed. Keep under a nitrogen blanket.
Shelf Life Limitations:	5 Years if not opened and exposed to the atmosphere. Material older than five years should be retested before use.
Incompatible Materials for Storage:	strong oxidizing agents, peroxides, acid anhydrides, metal oxides, organic materials with high surface area such as rags, cotton waste, sawdust, etc.
Do Not Store At temperatures Above:	51 Deg. C. 124 Deg. F.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Ventilation:	Local exhaust ventilation or other engineering controls are imperative when handling or using this product to keep employee exposure to airborne contaminants below the exposure limit. Use explosion-proof local exhaust ventilation to maintain levels to below the exposure limits.
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Protective Equipment for Routine Use of Product

Respiratory Protection:	Wear a NIOSH approved respirator if any exposure occurs.
Respirator Type(s):	NIOSH approved full-face positive pressure supplied-air respirator

Skin: Wear impervious gloves, boots and apron. An eye wash and safety shower should be provided in the immediate work area. A full impervious suit is recommended if exposure is possible to a large portion of the body.

Eyes: Use chemical goggles and a faceshield.

Protective Clothing Type: Butyl rubber

Exposure Limit Data

CHEMICAL NAME	CAS #	OSHA PEL / STEL	ACGIH LIMITS	AIHA WEEL
Methyl hydrazine	60-34-4	0.2 ppm Ceiling; 0.35 mg/m3 Ceiling prevent or reduce skin absorption	skin - potential for cutaneous absorption 0.01 ppm TWA	Not Established

CHEMICAL NAME: Methyl hydrazine (not including carcinogenic effects)
 NIOSH Immediately Dangerous to Life or Health: Ca [20 ppm]

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State: liquid
 Color: colorless
 Odor: amine
 Molecular Weight: 46.08
 pH: (@ 25 Deg. C) 11 - 11.5 (5% solution in neutral, distilled water)
 Octanol/Water Coeff: No data
 Solubility in Water: Completely miscible
 Bulk Density: 0.874 g/cc
 Specific Gravity: 0.87
 Vapor Density: 1.59 (air =1)
 Vapor Pressure: (@ 25 Deg. C) 49.6 mmHg
 Evaporation Rate: No data
 Boiling Point: 87.5 Deg. C.
 189.5 Deg. F.
 Freezing Point: -52.4 Deg. C.
 -62.3 Deg. F.
 Volatiles, % by vol.: 100 %
 VOC Content % w/w / lbs/gal: 97.00 / 7.03
 HAP Content % w/w / lbs/gal: 97.00 / 7.03

10. STABILITY AND REACTIVITY

Stability and Reactivity Summary: May become unstable at elevated temperatures and/or pressure. Direct exposure to ultraviolet radiation causes slow decomposition. Not sensitive to mechanical shock.

Hazardous Polymerization: Will not occur

Conditions to Avoid: Product is sensitive to electrostatic discharge and is an electrostatic generator., Contact with metal oxide surfaces may lead to flaming decomposition., Avoid mixing product with chemicals listed below as immediate ignition or explosion may occur., Ultraviolet light, Temperatures above the flash point in combination with sparks, open flames, or other sources of ignition. Avoid contact with organic materials.

Chemical Incompatibility: strong oxidizing agents, metal oxides such as those of iron, copper, lead, manganese, and molybdenum, nitrogen tetroxide, fluorine, halogen fluorides, fuming nitric acid

Packaging Incompatibility: Package only in 304 or 347 stainless steel containing less than 1% molybdenum.

Hazardous Decomposition Products: carbon monoxide, oxides of nitrogen

Decomposition Temperature: 88 Deg. C. 190 Deg. F.

Product May Be Unstable At Temperatures Above: 88 Deg. C. 190 Deg. F.

11. TOXICOLOGICAL INFORMATION

Component Animal Toxicology

Oral LD50 value:
 Monomethylhydrazine Oral LD50: Rat 32 mg/kg

Dermal LD50 value:
 Monomethylhydrazine Dermal LD50 Rabbit 93 mg/kg

Inhalation LC50 value:
 Monomethylhydrazine Inhalation LC50 (4h) Rat 74 ppm
 Inhalation LC50 (1h) Rat 148 ppm

Product Animal Toxicity: See component data.

Skin Irritation: This material is expected to be corrosive.

Eye Irritation: This material is expected to cause irreversible effects to the cornea with impairment of vision or corrosion to the eyes.

Skin Sensitization: May cause allergic skin sensitization in some individuals.

Reproductive and Developmental Toxicity: High dose levels of this chemical produced maternal toxicity, and embryoletality, and fetal malformations. Industrial exposures kept at or below occupational exposures standards should not pose a reproductive or developmental toxicity hazard.

Component Data:

Monomethyl hydrazine High dose levels of this chemical produced maternal toxicity, and embryoletality, and fetal malformations.

Mutagenicity: Tests revealed both positive and negative results. Believed to be a mutagenic hazard.

Carcinogenicity: This chemical is considered to be a suspect human carcinogen based on animal data.

Component Data:

Monomethyl hydrazine This chemical is considered to be a suspect human carcinogen based on animal data.

12. ECOLOGICAL INFORMATION

Overview: Moderate ecological hazard. Toxic to fish and other aquatic organisms.

Ecological Toxicity Values:

Monomethyl hydrazine Scud, 48 hr. LC50: 1.2 mg/l (static).
 Channel Catfish (*Ictalurus punctatus rafinesque*), 96 hr. LC50: 3.54 mg/l (static).
 Golden Shiner, 96 hr. LC50: 2.27 mg/l (static).

13. DISPOSAL CONSIDERATIONS

CARE MUST BE TAKEN TO PREVENT ENVIRONMENTAL CONTAMINATION FROM THE USE OF THIS MATERIAL. THE USER OF THIS MATERIAL HAS THE RESPONSIBILITY TO DISPOSE OF UNUSED MATERIAL, RESIDUES AND CONTAINERS IN COMPLIANCE WITH ALL RELEVANT LOCAL, STATE AND FEDERAL LAWS AND REGULATIONS REGARDING TREATMENT, STORAGE AND DISPOSAL FOR HAZARDOUS AND NONHAZARDOUS WASTES.

Waste Disposal Summary: Spent or discarded material is a hazardous waste.
Potential US EPA Waste Codes: D001, P068
Disposal Methods: Dispose of by incineration following Federal, State, Local, or Provincial regulations.

Components subject to land ban restrictions: No components subject to land ban restrictions.

14. TRANSPORT INFORMATION

THIS MATERIAL IS REGULATED AS A DOT HAZARDOUS MATERIAL.

DOT Description (49 CFR 172.101):

Land (U.S. DOT): RQ,
RQ, Methylhydrazine, 6.1, UN 1244, PG I, Toxic Inhalation Hazard - Hazard Zone A.

Air (IATA/ICAO): FORBIDDEN.

Water (IMO): Methylhydrazine, 6.1, UN 1244, PG I, Toxic Inhalation Hazard - Hazard Zone A, 3.2 (Flash Point 21 Deg. C), 8.
Flash Point: (C) 21

Hazard Label/Placard: (Primary) TOXIC, INHALATION HAZARD
(Subsidiary) FLAMMABLE LIQUID, CORROSIVE

Reportable Quantity (49 CFR 172.101, Appendix):

Methyl hydrazine 10 lb RQ; 4.54 kg RQ; (also listed as Hydrazine, methyl-)

Special Comments: Exemptions for 4BW and 110A500W type containers exist for this material. Air shipments may be possible using specialized containers.

Emergency Response Guide Number: 131

15. REGULATORY INFORMATION

UNITED STATES:

Toxic Substances Control Act (TSCA): This substance is listed on the TSCA Inventory of Existing Chemical Substances.

Pesticide acceptance indication: US EPA Registration Number: Not applicable

Superfund Amendments and Reauthorization Act (SARA) Title III:

Hazard Categories Sections 311/312 (40 CFR 370.2):

Health: Acute and Chronic
Physical: Fire

Emergency Planning & Community Right to Know (40 CFR 355, App. A):

Extremely Hazardous Substance Section 302 - Threshold Planning Quantity:

Methyl hydrazine 500 lb TPQ

Reportable Quantity (40 CFR 302.4):

Methyl hydrazine

10 lb final RQ; 4.54 kg final RQ

Supplier Notification Requirements (40 CFR 372.45), 313 Reportable Components

Methyl hydrazine 1.0 percent de minimis concentration

Clean Air Act Socmi:	Methyl hydrazine
Clean Air Act Organic HAP 40 CFR Section 61.01(b)	Methyl hydrazine
Clean Air Act VOC Section 111	Hydrazine, methyl-
Clean Air Act Toxic ARP Section 112r	Methyl hydrazine (Hydrazine, methyl-)
Clean Air Act Haz. Air Pollutants Section 112	Methyl hydrazine,

State Right-to-Know Regulations Status of Ingredients

Pennsylvania:	Hydrazine, methyl-
New Jersey:	Methyl hydrazine
Massachusetts:	Methyl hydrazine

CALIFORNIA SAFE DRINKING WATER AND TOXIC ENFORCEMENT ACT OF 1986 - Proposition 65: "WARNING: This product contains a chemical(s) known to the State of California to cause cancer and/or birth defects or other reproductive harm."

CAS or CHEMICAL NAME	CAS #	
Methylhydrazine	60-34-4	carcinogen; initial date 7/1/92

Canada:	
Product Classification:	D1
Ingredient Disclosure List:	Methyl hydrazine

16. OTHER INFORMATION

MSDS REVISION

STATUS:

Section(s) Revised: 3, 4, 8, 11

MAJOR REFERENCES: Available upon request.

THIS MATERIAL SAFETY DATA SHEET (MSDS) HAS BEEN PREPARED IN COMPLIANCE WITH THE FEDERAL OSHA HAZARD COMMUNICATION STANDARD, 29 CFR 1910.1200. THE INFORMATION IN THIS MSDS SHOULD BE PROVIDED TO ALL WHO WILL USE, HANDLE, STORE, TRANSPORT, OR OTHERWISE BE EXPOSED TO THIS PRODUCT. THIS INFORMATION HAS BEEN PREPARED FOR THE GUIDANCE OF PLANT ENGINEERING, OPERATIONS AND MANAGEMENT AND FOR PERSONS WORKING WITH OR HANDLING THIS PRODUCT. ARCH CHEMICALS BELIEVES THIS INFORMATION TO BE RELIABLE AND UP TO DATE AS OF THE DATE OF PUBLICATION BUT, MAKES NO WARRANTY THAT IT IS. ADDITIONALLY, IF THIS MSDS IS MORE THAN THREE YEARS OLD, YOU SHOULD CONTACT ARCH CHEMICALS MSDS CONTROL AT THE PHONE NUMBER ON THE FRONT PAGE TO MAKE CERTAIN THAT THIS DOCUMENT IS CURRENT.