MATERIAL SAFETY DATA SHEET

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Version 1.2

Section 1 - Product and Company Information

Product Name	1,1-DIMETHYLHYDRAZINE, 98%
Product Number	D161608
Brand	ALDRICH
Company	Sigma-Aldrich
Street Address	3050 Spruce Street
City, State, Zip, Country	SAINT LOUIS MO 63103 US
Technical Phone:	314 771 5765
Emergency Phone:	414 273 3850 Ext. 5996
Fax:	800 325 5052

Section 2 - Composition/Information on Ingredient

Substance Name	CAS #	SARA 313
1,1-DIMETHYLHYDRAZINE	57-14-7	Yes

Formula	C2H8N2
Synonyms	Dimazin * Dimazine * 1,1-Dimethylhydrazin (German) * Dimethylhydrazine * asymmetric-Dimethylhydrazine * N,N-Dimethylhydrazine * as-Dimethyl hydrazine * uns-Dimethylhydrazine * 1,1-Dimethylhydrazine (ACGIH:OSHA) * Niesymetryczna dwu metylohydrazyna (Polish) * RCRA waste number U098 * Unsymmetrical dimethylhydrazine
RTECS Number:	MV2450000

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Flammable (USA) Highly Flammable (EU). Highly Toxic (USA) Toxic (EU).

May cause cancer. Very toxic by inhalation, in contact with skin and if swallowed. Causes burns.

Readily absorbed through skin.

For additional information on toxicity, please refer to Section 11.

Section 4 - First Aid Measures

INHALATION EXPOSURE

If inhaled, remove to fresh air. If not breathing give artificial respiration. If breathing is difficult, give oxygen.

EYE EXPOSURE

Assure adequate flushing of the eyes by separating the eyelids with fingers.

Section 5 - Fire Fighting Measures

EXPLOSION HAZARDS
Vapor may travel considerable distance to source of ignition and flash back.

CONDITIONS OF FLAMMABILITY
Under fire conditions, material may decompose to form flammable and/or explosive mixtures in air. Catches fire if exposed to air.

FLASH POINT
14 °F -10 °C Method: closed cup

EXPLOSION LIMITS
Lower: 2 % Upper: 95 %

AUTOIGNITION TEMP
248 °C

FLAMMABILITY
N/A

EXTINGUISHING MEDIA
Suitable: Carbon dioxide, dry chemical powder, or appropriate foam.

FIREFIGHTING
Protective Equipment: Wear self-contained breathing apparatus and protective clothing to prevent contact with skin and eyes.
Specific Hazard(s): Flammable liquid. Vapor may travel considerable distance to source of ignition and flash back.

EXPOSURE HAZARD(S)
Material: Corrosive.

Section 6 - Accidental Release Measures

PROCEDURE TO BE FOLLOWED IN CASE OF LEAK OR SPILL
Evacuate area. Shut off all sources of ignition.

PROCEDURE(S) OF PERSONAL PRECAUTION(S)
Wear self-contained breathing apparatus, rubber boots, and heavy rubber gloves.

METHODS FOR CLEANING UP
Absorb on sand or vermiculite and place in closed containers for disposal.

Section 7 - Handling and Storage

HANDLING
User Exposure: Do not breathe vapor. Do not get in eyes, on skin, on clothing. Avoid prolonged or repeated exposure.

STORAGE
Suitable: Keep tightly closed. Keep away from heat, sparks, and open flame. Store in a cool dry place.
Store at 2-8°C

Section 8 - Exposure Controls / PPE

ENGINEERING CONTROLS
Use only in a chemical fume hood. Safety shower and eye bath.

PERSONAL PROTECTIVE EQUIPMENT

Other: Wear appropriate government approved respirator, chemical-resistant gloves, safety goggles, other protective clothing.

GENERAL HYGIENE MEASURES

Wash thoroughly after handling. Discard contaminated clothing and shoes.

EXPOSURE LIMITS, RTECS

Country	Source	Type	Value
USA	ACGIH	TWA	0.01 PPM
Remarks: Skin			
USA	MSHA Standard-air	TWA	0.5 PPM (1 MG/M3) (SKIN)
USA	OSHA.	PEL	8H TWA 0.5 PPM (1 MG/M3) (SKIN
New Zealand OEL			
Remarks: check ACGIH TLV			
USA	NIOSH	Ceiling co	0.06 PPM/120M

EXPOSURE LIMITS

Country	Source	Type	Value
Poland		NDS	0.1 mg/m3
Poland		NDSCh	-
Poland		NDSP	

Section 9 - Physical/Chemical Properties

Appearance	Color: Faintly yellow-green Form: Clear liquid	
Property	**Value**	**At Temperature or Pressure**
Molecular Weight	60.1 AMU	
pH	N/A	
BP/BP Range	60 - 62 °C	
MP/MP Range	N/A	
Freezing Point	N/A	
Vapor Pressure	103 mmHg	20 °C
Vapor Density	1.94 g/l	
Saturated Vapor Conc.	N/A	
SG/Density	0.79 g/cm3	
Bulk Density	N/A	
Odor Threshold	N/A	
Volatile%	N/A	
VOC Content	N/A	
Water Content	N/A	
Solvent Content	N/A	
Evaporation Rate	N/A	
Viscosity	N/A	
Surface Tension	N/A	
Partition Coefficient	N/A	
Decomposition Temp.	N/A	
Flash Point	14 °F -10 °C	Method: closed cup
Explosion Limits	Lower: 2 % Upper: 95 %	
Flammability	N/A	
Autoignition Temp	248 °C	
Refractive Index	1.408	
Optical Rotation	N/A	
Miscellaneous Data	N/A	
Solubility	N/A	

N/A = not available

Section 10 - Stability and Reactivity

STABILITY
Materials to Avoid: Oxidizing agents Copper, Copper alloys, Brass Iron and iron salts.

HAZARDOUS DECOMPOSITION PRODUCTS
Hazardous Decomposition Products: Carbon monoxide, Carbon dioxide.

Section 11 - Toxicological Information

ROUTE OF EXPOSURE
Multiple Routes: May be fatal if inhaled, swallowed, or absorbed through skin.

TARGET ORGAN(S) OR SYSTEM(S)
Damage to the liver. Damage to the kidneys.

SIGNS AND SYMPTOMS OF EXPOSURE
Warning: unsymmetrical dimethylhydrazine can cause convulsions resulting in death, pulmonary edema, CNS stimulation, and hemolytic anemia. Material is extremely destructive to tissue of the mucous membranes and upper respiratory tract, eyes, and skin. Inhalation may result in spasm, inflammation and edema of the larynxand bronchi, chemical pneumonitis, and pulmonary edema. Symptoms of exposure may include burning sensation, coughing, wheezing, laryngitis, shortness of breath, headache, nausea, and vomiting. Exposure can cause: Damage to the liver. Damage to the kidneys. Blood effects. Gastrointestinal disturbances.

TOXICITY DATA

Oral
Rat
122 mg/kg
LD50

Inhalation
Rat
252 ppm
LC50
Remarks: Sense Organs and Special Senses (Nose, Eye, Ear, and Taste):Eye:Other. Behavioral:Convulsions or effect on seizure threshold. Lungs, Thorax, or Respiration:Dyspnea.

Skin
Rat
770 mg/kg
LD50
Remarks: Brain and Coverings:Recordings from specific areas of CNS. Behavioral:Convulsions or effect on seizure threshold. Blood:Changes in bone marrow not included above.

Intraperitoneal
Rat
102 MG/KG
LD50
Remarks: Behavioral:Convulsions or effect on seizure threshold.

Intravenous
Rat
119 MG/KG
LD50

Oral
Mouse
155 mg/kg
LD50
Remarks: Brain and Coverings:Recordings from specific areas of CNS. Behavioral:Convulsions or effect on seizure threshold. Kidney, Ureter, Bladder:Changes in tubules (including acute renal failure, acute tubular necrosis).

Inhalation
Mouse
172 ppm
LC50
Remarks: Sense Organs and Special Senses (Nose, Eye, Ear, and Taste):Eye:Other. Behavioral:Convulsions or effect on seizure threshold. Lungs, Thorax, or Respiration:Dyspnea.

Intraperitoneal
Mouse
113 MG/KG
LD50
Remarks: Sense Organs and Special Senses (Nose, Eye, Ear, and Taste):Eye:Miosis (pupilliary constriction). Behavioral:Convulsions or effect on seizure threshold. Skin and Appendages: Other: Hair.

Intravenous
Mouse
250 MG/KG
LD50

Inhalation
Dog
3,580 ppm
LC50
Remarks: Gastrointestinal:Hypermotility, diarrhea. Behavioral:Tremor. Behavioral:Convulsions or effect on seizure threshold.

Intraperitoneal
Dog
60 MG/KG
LD50
Remarks: Behavioral:Convulsions or effect on seizure threshold. Gastrointestinal:Nausea or vomiting. Lungs, Thorax, or Respiration:Other changes.

Intravenous
Dog
60 MG/KG
LD50

Intraperitoneal
Monkey
60 MG/KG
LD50
Remarks: Behavioral:Convulsions or effect on seizure threshold.

Gastrointestinal:Nausea or vomiting.

Skin
Rabbit
1060 mg/kg
LD50

Inhalation
Guinea pig
100 mg/m3
LC50

Skin
Guinea pig
1329 mg/kg
LD50
Remarks: Behavioral:Convulsions or effect on seizure threshold.

Inhalation
Hamster
392 ppm
LC50
Remarks: Behavioral:Convulsions or effect on seizure threshold.

Subcutaneous
Hamster
325 MG/KG
LD50

CHRONIC EXPOSURE - CARCINOGEN
Result: Carcinogen.

Species: Rat
Route of Application: Oral
Dose: 150 MG/KG
Exposure Time: 7W
Frequency: I
Result: Tumorigenic:Equivocal tumorigenic agent by RTECS criteria. Sense Organs and Special Senses (Nose, Eye, Ear, and Taste):Ear:Tumors. Gastrointestinal:Colon tumors.

Species: Rat
Route of Application: Subcutaneous
Dose: 21 MG/KG
Result: Tumorigenic:Equivocal tumorigenic agent by RTECS criteria. Gastrointestinal:Tumors. Gastrointestinal:Colon tumors.

Species: Mouse
Route of Application: Oral
Dose: 5880 MG/KG
Exposure Time: 42W
Frequency: C
Result: Tumorigenic:Carcinogenic by RTECS criteria. Vascular:Tumors. Lungs, Thorax, or Respiration:Tumors.

Species: Mouse
Route of Application: Intraperitoneal
Dose: 144 MG/KG
Exposure Time: 8W
Frequency: I
Result: Tumorigenic:Equivocal tumorigenic agent by RTECS criteria. Lungs, Thorax, or Respiration:Tumors.

Species: Mouse
Route of Application: Subcutaneous
Dose: 420 MG/KG
Exposure Time: 21W
Frequency: I
Result: Tumorigenic:Neoplastic by RTECS criteria.
Gastrointestinal:Colon tumors.

Species: Hamster
Route of Application: Oral
Dose: 228 GM/KG
Exposure Time: 48W
Frequency: C
Result: Tumorigenic:Carcinogenic by RTECS criteria.
Vascular:Tumors. Gastrointestinal:Colon tumors.

Species: Hamster
Route of Application: Subcutaneous
Dose: 2686 MG/KG
Exposure Time: 72W
Frequency: I
Result: Tumorigenic:Carcinogenic by RTECS criteria. Peripheral
Nerve and Sensation:Peripheral nerve tumors.

Species: Mouse
Route of Application: Oral
Dose: 288 MG/KG
Exposure Time: 8W
Frequency: I
Result: Tumorigenic:Equivocal tumorigenic agent by RTECS
criteria. Lungs, Thorax, or Respiration:Tumors.

Species: Rat
Route of Application: Subcutaneous
Dose: 400 MG/KG
Exposure Time: 20W
Frequency: I
Result: Tumorigenic:Equivocal tumorigenic agent by RTECS
criteria. Gastrointestinal:Tumors. Gastrointestinal:Colon tumors.

Species: Rat
Route of Application: Oral
Dose: 300 MG/KG
Exposure Time: 14W
Frequency: I
Result: Tumorigenic:Equivocal tumorigenic agent by RTECS
criteria. Sense Organs and Special Senses (Nose, Eye, Ear, and
Taste):Ear:Tumors. Gastrointestinal:Colon tumors.

Species: Mouse
Route of Application: Subcutaneous
Dose: 200 MG/KG
Exposure Time: 25W
Frequency: I
Result: Tumorigenic:Equivocal tumorigenic agent by RTECS
criteria. Gastrointestinal:Tumors.

IARC CARCINOGEN LIST

Rating: Group 2B

NTP CARCINOGEN LIST

Rating: Anticipated to be a carcinogen.

CHRONIC EXPOSURE - MUTAGEN

Species: Human
Dose: 50 MG/L
Cell Type: Other cell types
Mutation test: Morphological transformation.

Species: Human
Dose: 167 UMOL/L
Cell Type: fibroblast
Mutation test: Morphological transformation.

Species: Human
Dose: 300 UMOL/L
Cell Type: fibroblast
Mutation test: DNA damage

Species: Rat
Route: Oral
Dose: 200 UMOL/KG
Mutation test: Morphological transformation.

Species: Rat
Dose: 30 UMOL/L
Cell Type: liver
Mutation test: DNA damage

Species: Rat
Route: Intraperitoneal
Dose: 60 MG/KG
Mutation test: Unscheduled DNA synthesis

Species: Mouse
Route: Intraperitoneal
Dose: 28 MG/KG
Exposure Time: 24H
Mutation test: Micronucleus test

Species: Mouse
Dose: 100 UMOL/L
Cell Type: liver
Mutation test: DNA repair

Species: Mouse
Route: Intraperitoneal
Dose: 3500 UMOL/KG
Mutation test: DNA damage

Species: Mouse
Route: Oral
Dose: 50 MG/KG
Mutation test: DNA damage

Species: Mouse
Route: Oral
Dose: 200 MG/KG
Mutation test: DNA inhibition

Species: Mouse
Dose: 1100 UMOL/L
Cell Type: Ascites tumor
Mutation test: DNA inhibition

Species: Mouse
Dose: 900 UMOL/L
Cell Type: Ascites tumor
Mutation test: Other mutation test systems

Species: Mouse
Route: Intraperitoneal
Dose: 10 MG/KG
Mutation test: Sister chromatid exchange

Species: Mouse
Dose: 5 MMOL/L
Exposure Time: 24H
Cell Type: lymphocyte
Mutation test: Mutation in mammalian somatic cells.

Species: Mouse
Dose: 125 MG/KG
Cell Type: S. typhimurium
Mutation test: Host-mediated assay

Species: Mouse
Route: Intraperitoneal
Dose: 2300 MG/KG
Exposure Time: 5D
Mutation test: sperm

Species: Hamster
Dose: 5 MMOL/L
Cell Type: lung
Mutation test: Mutation in mammalian somatic cells.

CHRONIC EXPOSURE - REPRODUCTIVE HAZARD

Species: Rat
Dose: 600 MG/KG
Route of Application: Intraperitoneal
Exposure Time: (6-15D PREG)
Result: Effects on Fertility: Post-implantation mortality (e.g., dead and/or resorbed implants per total number of implants). Effects on Embryo or Fetus: Fetotoxicity (except death, e.g., stunted fetus).

Section 12 - Ecological Information

No data available.

Section 13 - Disposal Considerations

APPROPRIATE METHOD OF DISPOSAL OF SUBSTANCE OR PREPARATION
Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. Observe all federal, state, and local environmental regulations.

Section 14 - Transport Information

IATA
Proper Shipping Name: Dimethylhydrazine, unsymmetrical
IATA UN Number: 1163
Hazard Class: 6.1
Packing Group: I
Not Allowed - Aircraft: Not permitted for air transport.

Section 15 - Regulatory Information

EU DIRECTIVES CLASSIFICATION
Symbol of Danger: F T N
Indication of Danger: Highly Flammable. Toxic. Dangerous for the environment.
R: 45 11 23/25 34 51/53
Risk Statements: May cause cancer. Highly flammable. Also toxic by inhalation and if swallowed. Causes burns. Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.
S: 53 45 61
Safety Statements: Restricted to professional users. Attention - Avoid exposure - obtain special instructions before use. In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible). Avoid release to the environment. Refer to special instructions/safety data sheets.

US CLASSIFICATION AND LABEL TEXT
Indication of Danger: Flammable (USA) Highly Flammable (EU). Highly Toxic (USA) Toxic (EU).
Risk Statements: May cause cancer. Very toxic by inhalation, in contact with skin and if swallowed. Causes burns.
Safety Statements: Avoid exposure - obtain special instructions before use. Keep away from sources of ignition - no smoking. In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. Take off immediately all contaminated clothing. Wear suitable protective clothing, gloves, and eye/face protection. In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).
US Statements: Readily absorbed through skin.

UNITED STATES REGULATORY INFORMATION
SARA LISTED: Yes
DEMINIMIS: 0.1 %
NOTES: This product is subject to SARA section 313 reporting requirements.
TSCA INVENTORY ITEM: Yes

UNITED STATES - STATE REGULATORY INFORMATION

CALIFORNIA PROP - 65
California Prop - 65: California Proposition 65: This product is or contains chemical(s) known to the state of California to cause cancer. California Proposition 65: This product is or contains chemical(s) known to the state of California to cause cancer.

CANADA REGULATORY INFORMATION
WHMIS Classification: This product has been classified in accordance with the hazard criteria of the CPR, and the MSDS contains all the information required by the CPR.

DSL: No
NDSL: Yes

Section 16 - Other Information

DISCLAIMER

For R&D use only. Not for drug, household or other uses.

WARRANTY

The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Inc., shall not be held liable for any damage resulting from handling or from contact with the above product. See reverse side of invoice or packing slip for additional terms and conditions of sale.