1. PRODUCT AND COMPANY IDENTIFICATION

Product name : N,N-Dimethylhydrazine
Product Number : D161608
Brand : Aldrich
Supplier : Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO  63103
USA
Telephone : +1 800-325-5832
Fax : +1 800-325-5052
Emergency Phone # (For both supplier and manufacturer) : (314) 776-6555
Preparation Information : Sigma-Aldrich Corporation
Product Safety - Americas Region
1-800-521-8956

2. HAZARDS IDENTIFICATION

Emergency Overview

OSHA Hazards
Flammable liquid, Carcinogen, Target Organ Effect, Highly toxic by inhalation, Toxic by ingestion, Harmful by skin absorption., Corrosive

Target Organs
Liver, Kidney

GHS Classification
Flammable liquids (Category 2)
Acute toxicity, Oral (Category 3)
Acute toxicity, Inhalation (Category 1)
Acute toxicity, Dermal (Category 4)
Skin corrosion (Category 1B)
Serious eye damage (Category 1)
Carcinogenicity (Category 1B)
Acute aquatic toxicity (Category 2)
Chronic aquatic toxicity (Category 2)

GHS Label elements, including precautionary statements

Pictogram

Signal word Danger

Hazard statement(s)

H225 Highly flammable liquid and vapour.
H301 Toxic if swallowed.
H312 Harmful in contact with skin.
H314 Causes severe skin burns and eye damage.
H330 Fatal if inhaled.
H350 May cause cancer.
H411 Toxic to aquatic life with long lasting effects.
Precautionary statement(s)
P201 Obtain special instructions before use.
P210 Keep away from heat/sparks/open flames/hot surfaces. - No smoking.
P260 Do not breathe dust/ fume/ gas/ mist/ vapours/ spray.
P273 Avoid release to the environment.
P280 Wear protective gloves/ protective clothing/ eye protection/ face protection.
P284 Wear respiratory protection.
P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P310 Immediately call a POISON CENTER or doctor/ physician.

HMIS Classification
Health hazard: 3
Chronic Health Hazard: *
Flammability: 3
Physical hazards: 0

NFPA Rating
Health hazard: 3
Fire: 3
Reactivity Hazard: 0

Health hazard: 4
Fire: 3
Reactivity Hazard: 0

Potential Health Effects
Inhalation May be fatal if inhaled. Material is extremely destructive to the tissue of the mucous membranes and upper respiratory tract.
Skin Causes skin burns.
Eyes Causes eye burns.
Ingestion Toxic if swallowed.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Formula : C₂H₈N₂
Molecular Weight : 60.10 g/mol

<table>
<thead>
<tr>
<th>Component</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>N,N-Dimethylhydrazine</td>
<td></td>
</tr>
<tr>
<td>CAS-No.</td>
<td>57-14-7</td>
</tr>
<tr>
<td>EC-No.</td>
<td>200-316-0</td>
</tr>
<tr>
<td>Index-No.</td>
<td>007-012-00-5</td>
</tr>
</tbody>
</table>

4. FIRST AID MEASURES

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance. Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Take off contaminated clothing and shoes immediately. Wash off with soap and plenty of water. Take victim immediately to hospital. Consult a physician.

In case of eye contact
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician. Continue rinsing eyes during transport to hospital.

If swallowed
Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.
5. FIREFIGHTING MEASURES

Conditions of flammability
Flammable in the presence of a source of ignition when the temperature is above the flash point. Keep away from heat/sparks/open flame/hot surface. No smoking.

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

Special protective equipment for firefighters
Wear self contained breathing apparatus for fire fighting if necessary.

Hazardous combustion products
Hazardous decomposition products formed under fire conditions. - Carbon oxides, nitrogen oxides (NOx)

Further information
Use water spray to cool unopened containers.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions
Wear respiratory protection. Avoid breathing vapors, mist or gas. Ensure adequate ventilation. Remove all sources of ignition. Evacuate personnel to safe areas. Beware of vapours accumulating to form explosive concentrations. Vapours can accumulate in low areas.

Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

Methods and materials for containment and cleaning up
Contain spillage, and then collect with an electrically protected vacuum cleaner or by wet-brushing and place in container for disposal according to local regulations (see section 13).

7. HANDLING AND STORAGE

Precautions for safe handling
Avoid contact with skin and eyes. Avoid inhalation of vapour or mist. Use explosion-proof equipment. Keep away from sources of ignition - No smoking. Take measures to prevent the build up of electrostatic charge.

Conditions for safe storage
Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.

Recommended storage temperature: 2 - 8 °C

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Components with workplace control parameters

<table>
<thead>
<tr>
<th>Components</th>
<th>CAS-No.</th>
<th>Value</th>
<th>Control parameters</th>
<th>Basis</th>
</tr>
</thead>
<tbody>
<tr>
<td>N,N-Dimethylhydrazine</td>
<td>57-14-7</td>
<td>TWA</td>
<td>0.5 ppm</td>
<td>USA. OSHA - TABLE Z-1 Limits for Air Contaminants - 1910.1000</td>
</tr>
</tbody>
</table>

Remarks
Skin notation

<table>
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<th>Basis</th>
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<tr>
<td>TWA</td>
<td>USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants</td>
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Skin designation The value in mg/m³ is approximate.

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<tr>
<td>TWA</td>
<td>USA. ACGIH Threshold Limit Values (TLV)</td>
</tr>
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</table>

Upper Respiratory Tract irritation Nasal cancer Confirmed animal carcinogen with unknown
relevance to humans Danger of cutaneous absorption

<table>
<thead>
<tr>
<th></th>
<th>0.06 ppm</th>
<th>0.15 mg/m3</th>
</tr>
</thead>
<tbody>
<tr>
<td>USA. NIOSH Recommended Exposure Limits</td>
<td></td>
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</table>

Potential Occupational Carcinogen See Appendix A 2 hour ceiling value

**Personal protective equipment**

**Respiratory protection**
Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type AXBEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

**Hand protection**
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove’s outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Immersion protection
Material: butyl-rubber
Minimum layer thickness: 0.3 mm
Break through time: > 480 min
Material tested: Butoject® (Aldrich Z677647, Size M)

Splash protection
Material: Nitrile rubber
Minimum layer thickness: 0.4 mm
Break through time: > 30 min
Material tested: Camatril® (Aldrich Z677442, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 873000, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an Industrial Hygienist familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

**Eye protection**
Tightly fitting safety goggles. Faceshield (8-inch minimum). Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

**Skin and body protection**
Complete suit protecting against chemicals, Flame retardant antistatic protective clothing, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

**Hygiene measures**
Avoid contact with skin, eyes and clothing. Wash hands before breaks and immediately after handling the product.

**9. PHYSICAL AND CHEMICAL PROPERTIES**

**Appearance**
Form clear, liquid
Colour light yellow

**Safety data**
pH no data available
Melting point/freezing point no data available
Boiling point 60 - 62 °C (140 - 144 °F)
Flash point -10 °C (14 °F) - closed cup
Ignition temperature 248 °C (478 °F)
Autoignition temperature no data available
Lower explosion limit 2 % (V)
Upper explosion limit 95 % (V)
Vapour pressure 137 hPa (103 mmHg) at 20 °C (68 °F)
Density 0.79 g/mL at 20 °C (68 °F)
Water solubility no data available
Partition coefficient: n-octanol/water no data available
Relative vapour density 2.41
Odour no data available
Odour Threshold no data available
Evaporation rate no data available

10. STABILITY AND REACTIVITY

Chemical stability
Stable under recommended storage conditions.

Possibility of hazardous reactions
Vapours may form explosive mixture with air.

Conditions to avoid
Heat, flames and sparks. Extremes of temperature and direct sunlight.

Materials to avoid
Copper, Brass, Iron and iron salts.

Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Carbon oxides, nitrogen oxides (NOx)
Other decomposition products - no data available

11. TOXICOLOGICAL INFORMATION

Acute toxicity
Oral LD50
LD50 Oral - rat - 122 mg/kg

Inhalation LC50
LC50 Inhalation - guinea pig - 4 h - 100 mg/m3

Dermal LD50
LD50 Dermal - rabbit - 1,060 mg/kg

Other information on acute toxicity
no data available

Skin corrosion/irritation
no data available

Serious eye damage/eye irritation
no data available

Respiratory or skin sensitization
no data available

Germ cell mutagenicity
Genotoxicity in vitro - mouse - Ascites tumor
DNA inhibition
Genotoxicity in vitro - mouse - S. typhimurium
Host-mediated assay
Genotoxicity in vitro - mouse - lymphocyte
Mutation in mammalian somatic cells.
Genotoxicity in vitro - Human - fibroblast
Morphological transformation.
Genotoxicity in vitro - Human - fibroblast
DNA damage
Genotoxicity in vivo - mouse - Intraperitoneal
Sister chromatid exchange
Genotoxicity in vivo - mouse - Intraperitoneal
sperm
Genotoxicity in vivo - mouse - Intraperitoneal
DNA damage
Genotoxicity in vivo - rat - Oral
Morphological transformation.
Genotoxicity in vivo - mouse - Oral
DNA inhibition
Genotoxicity in vivo - rat - Intraperitoneal
Unscheduled DNA synthesis
Genotoxicity in vivo - mouse - Intraperitoneal
Micronucleus test

Carcinogenicity
Carcinogenicity - rat - Subcutaneous
Tumorigenic: Equivocal tumorigenic agent by RTECS criteria. Gastrointestinal: Tumors.
Carcinogenicity - mouse - Oral
Tumorigenic: Equivocal tumorigenic agent by RTECS criteria. Lungs, Thorax, or Respiration: Tumors.
Carcinogenicity - mouse - Subcutaneous
Carcinogenicity - Hamster - Oral
Carcinogenicity - Hamster - Subcutaneous
Carcinogenicity - rat - Oral

Possible human carcinogen

IARC: 2B - Group 2B: Possibly carcinogenic to humans (N,N-Dimethylhydrazine)
NTP: Reasonably anticipated to be a human carcinogen (N,N-Dimethylhydrazine)
OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity
Reproductive toxicity - rat - Intraperitoneal
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).
Teratogenicity

Specific target organ toxicity - single exposure (Globally Harmonized System)

Specific target organ toxicity - repeated exposure (Globally Harmonized System)

Aspiration hazard

Potential health effects

Inhalation: May be fatal if inhaled. Material is extremely destructive to the tissue of the mucous membranes and upper respiratory tract.

Ingestion: Toxic if swallowed.

Skin: Causes skin burns.

Eyes: Causes eye burns.

Signs and Symptoms of Exposure:
unsymmetrical dimethylhydrazine can cause, Convulsions, pulmonary edema, hemolytic anemia, Central nervous system depression, death, Material is extremely destructive to tissue of the mucous membranes and upper respiratory tract, eyes, and skin., spasm, inflammation and edema of the larynx, spasm, inflammation and edema of the bronchi, pneumonitis, burning sensation, Cough, wheezing, laryngitis, Shortness of breath, Headache, Nausea, Vomiting, Liver injury may occur., Kidney injury may occur., Blood disorders, Gastrointestinal disturbance

Synergistic effects

Additional Information

RTECS: MV2450000

12. ECOLOGICAL INFORMATION

Toxicity

Toxicity to fish: LC50 - Pimephales promelas (fathead minnow) - 7.85 mg/l - 96.0 h

Toxicity to algae: Growth inhibition NOEC - Pseudokirchneriella subcapitata - 0.5 mg/l - 6 d

Persistence and degradability

Bioaccumulative potential

Mobility in soil

PBT and vPvB assessment

Other adverse effects

An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.

Toxic to aquatic life with long lasting effects.

13. DISPOSAL CONSIDERATIONS

Product

Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material.
Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN number: 1163   Class: 6.1 (3, 8)   Packing group: I
Proper shipping name: Dimethylhydrazine, unsymmetrical
Reportable Quantity (RQ): 10 lbs
Marine pollutant: No
Poison Inhalation Hazard: Hazard zone B

IMDG
UN number: 1163   Class: 6.1 (3, 8)   Packing group: I
Proper shipping name: DIMETHYLHYDRAZINE, UNSYMMETRICAL
Marine pollutant: Marine pollutant

IATA
UN number: 1163   Class: 6.1 (3, 8)
Proper shipping name: Dimethylhydrazine, unsymmetrical
IATA Passenger: Not permitted for transport
IATA Cargo: Not permitted for transport

15. REGULATORY INFORMATION

OSHA Hazards
Flammable liquid, Carcinogen, Target Organ Effect, Highly toxic by inhalation, Toxic by ingestion, Harmful by skin absorption., Corrosive

SARA 302 Components
The following components are subject to reporting levels established by SARA Title III, Section 302:

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SARA 313 Components
The following components are subject to reporting levels established by SARA Title III, Section 313:

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SARA 311/312 Hazards
Fire Hazard, Acute Health Hazard, Chronic Health Hazard

Massachusetts Right To Know Components

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Pennsylvania Right To Know Components

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New Jersey Right To Know Components

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California Prop. 65 Components
WARNING! This product contains a chemical known to the State of California to cause cancer.

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16. OTHER INFORMATION

Further information
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