1 Identification

Product identifier

Product name: N,N-Dimethylhydrazine

Stock number: L07567
CAS Number: 57-14-7
EC number: 200-316-0
Index number: 007-012-00-5

Relevant identified uses of the substance or mixture and uses advised against.

Identified use: SU24 Scientific research and development

Details of the supplier of the safety data sheet

Manufacturer/Supplier:
Alfa Aesar
Thermo Fisher Scientific Chemicals, Inc.
30 Bond Street
Ward Hill, MA 01835-8099
Tel: 800-343-0660
Fax: 800-322-4757
Email: tech@alfa.com
www.alfa.com

Information Department: Health, Safety and Environmental Department

Emergency telephone number: During normal business hours (Monday-Friday, 8am-7pm EST), call (800) 343-0660. After normal business hours, call Carechem 24 at (866) 928-0789.

2 Hazard(s) identification

Classification of the substance or mixture in accordance with 29 CFR 1910 (OSHA HCS)

GHS02 Flame
Flam. Liq. 2 H225 Highly flammable liquid and vapor.

GHS06 Skull and crossbones
Acute Tox. 3 H301 Toxic if swallowed.
Acute Tox. 1 H330 Fatal if inhaled.

GHS08 Health hazard
Carc. 1A H350 May cause cancer.

GHS05 Corrosion
Skin Corr. 1B H314 Causes severe skin burns and eye damage.
Eye Dam. 1 H318 Causes serious eye damage.

Hazards not otherwise classified: No information known.

Label elements

GHS label elements The product is classified and labeled in accordance with 29 CFR 1910 (OSHA HCS)

Hazard pictograms

GHS02 GHS05 GHS06 GHS08

Signal word: Danger

Hazard statements
H225 Highly flammable liquid and vapor.
H301 Toxic if swallowed.
H330 Fatal if inhaled.
H314 Causes severe skin burns and eye damage.
H350 May cause cancer.

Precautionary statements

P210 Keep away from heat/sparks/open flames/hot surfaces. No smoking.
P301+P310 IF SWALLOWED: Immediately call a POISON CENTER/doctor/…
P303+P361+P338 IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower.
P305+P351+P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P320 Specific treatment is urgent [see on this label].
P405 Store locked up.
P501 Dispose of contents/container in accordance with local/regional/national/international regulations.

WHMIS classification
B2 - Flammable liquid
D1A - Very toxic material causing immediate and serious toxic effects
D2A - Very toxic material causing other toxic effects
E - Corrosive material

(Contd. on page 2)
Classification system
HMIS ratings (scale 0-4) (Hazardous Materials Identification System)

<table>
<thead>
<tr>
<th>Health (acute effects)</th>
<th>Flammability</th>
<th>Physical Hazard</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>3</td>
<td>2</td>
</tr>
</tbody>
</table>

Other hazards
Results of PBT and vPvB assessment
PBT: Not applicable.
vPvB: Not applicable.

3 Composition/information on ingredients
Chemical characterization: Substances
CAS® Description: 57-14-7 N,N-Dimethylhydrazine
Identification number(s):
EC number: 200-316-0
Index number: 007-012-00-5

4 First-aid measures
Description of first aid measures
General information
Immediately remove any clothing soiled by the product.
Remove breathing apparatus only after contaminated clothing has been completely removed.
In case of irregular breathing or respiratory arrest provide artificial respiration.
After inhalation
Supply fresh air. If required, provide artificial respiration. Keep patient warm.
Seek immediate medical advice.
After skin contact
Immediately wash with water and soap and rinse thoroughly.
Seek immediate medical advice.
After eye contact
Rinse opened eye for several minutes under running water. Then consult a doctor.
After swallowing
Do not induce vomiting; immediately call for medical help.
Information for doctor
Most important symptoms and effects, both acute and delayed
Causes severe skin burns.
Causes serious eye damage.
Indication of any immediate medical attention and special treatment needed
No further relevant information available.

5 Fire-fighting measures
Extinguishing media
Suitable extinguishing agents Carbon dioxide, extinguishing powder or water spray. Fight larger fires with water spray or alcohol resistant foam.
Special hazards arising from the substance or mixture If this product is involved in a fire, the following can be released:
Advice for firefighters
Protective equipment:
Wear self-contained respirator.
Wear fully protective impervious suit.

6 Accidental release measures
Personal precautions, protective equipment and emergency procedures
Wear protective equipment. Keep unprotected persons away.
Ensure adequate ventilation.
Keep away from ignition sources.
Environmental precautions: Do not allow material to be released to the environment without proper governmental permits.
Methods and material for containment and cleaning up:
Keep away from ignition sources.
Absorb with liquid-binding material (sand, diatomite, acid binders, universal binders, sawdust).
Use neutralizing agent.
Dispose of contaminated material as waste according to section 13.
Ensure adequate ventilation.
Prevention of secondary hazards: Keep away from ignition sources.
Reference to other sections
See Section 7 for information on safe handling.
See Section 8 for information on personal protection equipment.
See Section 13 for disposal information.

7 Handling and storage
Handling
Precautions for safe handling
Handle under dry argon.
Keep container tightly sealed.
Store in cool dry place in tightly closed containers.
Ensure good ventilation at the workplace.
Open and handle container with care.
Information about protection against explosions and fires:
Protect against electrostatic charges.
Fumes can combine with air to form an explosive mixture.
Keep ignition sources away.
Conditions for safe storage, including any incompatibilities
Storage
Requirements to be met by storerooms and receptacles: Store in a cool location.
Information about storage in one common storage facility: Store away from oxidizing agents.
Store away from metals.
Further information about storage conditions:
Keep container tightly sealed.
Store in cool, dry conditions in well sealed containers.
Product name: N,N-Dimethylhydrazine

8 Exposure controls/personal protection

Additional information about design of technical systems:
Properly operating chemical fume hood designed for hazardous chemicals and having an average face velocity of at least 100 feet per minute.

Control parameters

Components with limit values that require monitoring at the workplace:

N,N-Dimethylhydrazine (1,1-Dimethylhydrazine)

ppm

ACGIH TLV 0.01; A3 (skin)
Denmark TWA 0.1 (skin; carcinogen)
Finland TWA 0.1 (skin; carcinogen)
France TWA 0.1 (carcinogen)
Germany TWA (skin; carcinogen)
Ireland TWA 0.5 (carcinogen)
Netherlands TWA 0.5 (skin)
Sweden TWA 0.1; 0.5-STEL (skin; carcinogen)
Switzerland TWA 0.5 (skin; carcinogen)
OSHA PEL 0.5 (skin)

57-14-7 N,N-Dimethylhydrazine (100.0%)

PEL (USA) Long-term value: 1 mg/m³, 0.5 ppm
Skin
REL (USA) Ceiling limit value: 0.15 mg/m³, 0.06 ppm
120-min; See Pocket Guide App. A
TLV (USA) Long-term value: 0.025 mg/m³, 0.01 ppm
Skin
EL (Canada) Long-term value: 0.01 ppm
Skin; IARC 2B
EV (Canada) Long-term value: 0.01 ppm
Skin

Additional information: No data

Exposure controls

Personal protective equipment

General protective and hygienic measures
The usual precautionary measures for handling chemicals should be followed. Keep away from foodstuffs, beverages and feed. Remove all soiled and contaminated clothing immediately. Wash hands before breaks and at the end of work. Store protective clothing separately. Avoid contact with the eyes and skin. Maintain an ergonomically appropriate working environment.

Protection of hands:
Impervious gloves
Check protective gloves prior to each use for their proper condition. The selection of suitable gloves not only depends on the material, but also on quality. Quality will vary from manufacturer to manufacturer.

Eye protection:
Tightly sealed goggles
Full face protection

Body protection: Protective work clothing.

9 Physical and chemical properties

Information on basic physical and chemical properties

General Information

Appearance:
Form: Liquid
Color: Light yellow
Odor: Odorless
Odor threshold: Not determined.

pH-value: Not determined.

Change in condition
Melting point/Melting range: -58 °C (-72 °F)
Boiling point/Boiling range: 62-64 °C (144-147 °F) (753mm Hg)
Sublimation temperature / start: Not determined

Flash point: 1 °C (34 °F)
Flammability (solid, gaseous) Not determined.
Ignition temperature: 478 °C (892 °F)
Decomposition temperature: Not determined
Auto igniting: Not determined.

Danger of explosion: Product is not explosive. However, formation of explosive air/vapor mixtures is possible.

Explosion limits:
Lower: 2 Vol %
Upper: 95 Vol %

Vapor pressure at 20 °C (68 °F): 137 hPa (103 mm Hg)
Density at 20 °C (68 °F): 0.78 g/cm³ (6.509 lbs/gal)
Relative density Not determined.
Vapor density Not determined.
Evaporation rate Not determined.
Solubility in / Miscibility with
Water: Partly miscible
Partition coefficient (n-octanol/water): Not determined.
Viscosity:
dynamic: Not determined.
kinematic: Not determined.
Product name: N,N-Dimethylhydrazine

**10 Stability and reactivity**

Reactivity: No information known.

Chemical stability: Stable under recommended storage conditions.

Thermal decomposition / conditions to be avoided: Decomposition will not occur if used and stored according to specifications.

Possibility of hazardous reactions: Reacts with oxidizing agents

Conditions to avoid: No further relevant information available.

Incompatible materials: Oxidizing agents

Hazardous decomposition products: Nitrogen oxides, Carbon monoxide and carbon dioxide

**11 Toxicological information**

Information on toxicological effects

Acute toxicity:
- Fatal if inhaled.
- Toxic if swallowed.
- Fatal if inhaled.
- Swallowing will lead to a strong corrosive effect on mouth and throat and to the danger of perforation of esophagus and stomach.

LD/LC50 values that are relevant for classification:

<table>
<thead>
<tr>
<th>Route</th>
<th>LD50</th>
<th>LC50/4H</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oral</td>
<td>122 mg/kg (rat)</td>
<td>252 mg/m3/4H (rat)</td>
</tr>
</tbody>
</table>

Skin irritation or corrosion: Causes severe skin burns.
Eye irritation or corrosion: Causes serious eye damage.

Sensitization: No sensitizing effects known.

Germ cell mutagenicity: No effects known.

Carcinogenicity:
- May cause cancer.

IARC-2B: Possibly carcinogenic to humans: limited evidence in humans in the absence of sufficient evidence in experimental animals.

NTP-R: Reasonably anticipated to be a carcinogen: limited evidence from studies in humans or sufficient evidence from studies in experimental animals.

ACGIH A3: Animal carcinogen: Agent is carcinogenic in experimental animals at a relatively high dose, by route(s) of administration, at site(s), of histologic type(s), or by mechanism(s) not considered relevant to worker exposure. Available epidemiologic studies do not confirm an increased risk of cancer in exposed humans.

Available evidence suggests that the agent is not likely to cause cancer in humans except under uncommon or unlikely routes or levels of exposure.

The Registry of Toxic Effects of Chemical Substances (RTECS) contains tumorigenic and/or carcinogenic and/or neoplastic data for this substance.

Reproductive toxicity: No effects known.

Specific target organ system toxicity - repeated exposure: No effects known.

Specific target organ system toxicity - single exposure: No effects known.

Aspiration hazard: No effects known.

Other information (about experimental toxicology): Tumorigenic effects have been observed on tests with laboratory animals.

Subacute to chronic toxicity: No effects known.

Subacute to chronic toxicity: N,N-Dimethylhydrazine can cause convulsions resulting in death, CNS stimulation, damage to the kidneys and liver, genetic damage, pulmonary edema and hemolytic anemia.

Additional toxicological information: To the best of our knowledge the acute and chronic toxicity of this substance is not fully known.

**12 Ecological information**

Toxicity:
- No further relevant information available.

Aquatic toxicity:
- No further relevant information available.

Persistence and degradability:
- No further relevant information available.

Bioaccumulative potential:
- No further relevant information available.

Mobility in soil:
- No further relevant information available.

Ecotoxicological effects:
- Remark: Toxic for aquatic organisms

Additional ecological information:
- General notes: Do not allow material to be released to the environment without proper governmental permits.
- Toxic for aquatic organisms:
- Do not allow product to reach ground water, water course or sewage system, even in small quantities.
- Danger to drinking water if even extremely small quantities leak into the ground.
- Also poisonous for fish and plankton in water bodies.
- Toxic to aquatic life:
- May cause long lasting harmful effects to aquatic life.
- Avoid transfer into the environment.

Results of PBT and vPvB assessment:
- PBT: Not applicable.
- vPvB: Not applicable.

Other adverse effects:
- No further relevant information available.

**13 Disposal considerations**

Waste treatment methods:
- Recommendation: Consult state, local or national regulations to ensure proper disposal.

Uncleaned packagings:
- Recommendation: Disposal must be made according to official regulations.

**14 Transport information**

<table>
<thead>
<tr>
<th>UN-Number</th>
<th>DOT, IMDG, IATA</th>
</tr>
</thead>
<tbody>
<tr>
<td>UN1163</td>
<td>RQ Dimethylhydrazine, unsymmetrical</td>
</tr>
<tr>
<td></td>
<td>DIMETHYLHYDRAZINE, UNSYMETRICAL</td>
</tr>
</tbody>
</table>

(Contd. on page 5) USA
Safety Data Sheet
per OSHA HazCom 2012

Product name: N,N-Dimethylhydrazine

(Contd. of page 4)

Transport hazard class(es)

DOT

Class 6.1 Toxic substances.
Label 6.1 + 3 + 8
Class 6.1 (TFC) Toxic substances
Label 6.1+3+8

IMDG, IATA

Class 6.1 Toxic substances.
Label 6.1 + 3 + 8

Packing group

DOT, IMDG, IATA / 
Environmental hazards: Environmentally hazardous substance, liquid
Special precautions for user Warning: Toxic substances
Poison inhalation hazard: Yes
Segregation groups Alkalis

Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code Not applicable.

Transport/Additional information:

DOT
Hazardous substance: 10 lbs, 4.54 kg
Marine Pollutant (DOT): No

UN "Model Regulation":

UN1163, Dimethylhydrazine, unsymmetrical, 6.1 (3+8), I

15 Regulatory information

Safety, health and environmental regulations/legislation specific for the substance or mixture

GHS label elements The product is classified and labeled in accordance with 29 CFR 1910 (OSHA HCS)

Hazard pictograms

GHS02 GHS05 GHS06 GHS08

Signal word Danger

Hazard statements
H225 Highly flammable liquid and vapor.
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Precautionary statements
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P305+P351+P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P320 Specific treatment is urgent [see on this label].
P405 Store locked up.
P501 Dispose of contents/container in accordance with local/regional/national/international regulations.

National regulations
All components of this product are listed in the U.S. Environmental Protection Agency Toxic Substances Control Act Chemical substance Inventory.
All components of this product are listed on the Canadian Non-Domestic Substances List (NDSL).

SARA Section 313 (specific toxic chemical listings)
57-14-7 N,N-Dimethylhydrazine

California Proposition 65

Prop 65 - Chemicals known to cause cancer

57-14-7 N,N-Dimethylhydrazine

California Proposition 65

Prop 65 - Developmental toxicity Substance is not listed.
Prop 65 - Developmental toxicity, female Substance is not listed.
Prop 65 - Developmental toxicity, male Substance is not listed.

Information about use of all components of this product are listed in the U.S. Environmental Protection Agency Toxic Substances Control Act Chemical substance Inventory.

Other regulations, limitations and prohibitive regulations

Substance of Very High Concern (SVHC) according to the REACH Regulations (EC) No. 1907/2006. Substance is not listed.

The conditions of restrictions according to Article 67 and Annex XVII of the Regulation (EC) No 1907/2006 (REACH) for the manufacturing, placing on the market and use must be observed.
Substance is not listed.

Annex XIV of the REACH Regulations (requiring Authorisation for use) Substance is not listed.

Chemical safety assessment: A Chemical Safety Assessment has not been carried out.

16 Other information

Employers should use this information only as a supplement to other information gathered by them, and should make independent judgement of suitability of this information to ensure proper use and protect the health and safety of employees. This information is furnished without warranty, and any use of the product not in conformance with this Material Safety Data Sheet, or in combination with any other product or process, is the responsibility of the user.

Department issuing SDS: Global Marketing Department

Date of preparation / last revision 11/23/2015 / -

Abbreviations and acronyms:
ADR: Accord européen sur le transport des marchandises dangereuses par Route (European Agreement concerning the International Carriage of Dangerous Goods by Road)
IMDG: International Maritime Code for Dangerous Goods
DOT: US Department of Transportation

USA
Product name: N,N-Dimethylhydrazine

IATA: International Air Transport Association
EINECS: European Inventory of Existing Commercial Chemical Substances
CAS: Chemical Abstracts Service (division of the American Chemical Society)
HMIS: Hazardous Materials Identification System (USA)
WHMIS: Workplace Hazardous Materials Information System (Canada)
LC50: Lethal concentration, 50 percent
LD50: Lethal dose, 50 percent
vPvB: very Persistent and very Bioaccumulative
ACGIH: American Conference of Governmental Industrial Hygienists (USA)
OSHA: Occupational Safety and Health Administration (USA)
NTP: National Toxicology Program (USA)
IARC: International Agency for Research on Cancer
EPA: Environmental Protection Agency (USA)