SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers

Product name : Hydrazine
Product Number : 215155
Brand : Sigma-Aldrich
Index-No. : 007-008-00-3
CAS-No. : 302-01-2

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

Identified uses : Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich Inc.
Address : 3050 SPRUCE ST
            ST. LOUIS MO 63103
            UNITED STATES
Telephone : +1 314 771-5765
Fax : +1 800 325-5052

1.4 Emergency telephone

Emergency Phone # : 800-424-9300 CHEMTREC (USA) +1-703-527-3887 CHEMTREC (International) 24 Hours/day; 7 Days/week

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)

Flammable liquids (Category 3), H226
Acute toxicity, Oral (Category 3), H301
Acute toxicity, Inhalation (Category 2), H330
Acute toxicity, Dermal (Category 3), H311
Skin corrosion (Category 1B), H314
Serious eye damage (Category 1), H318
Skin sensitization (Category 1), H317
Carcinogenicity (Category 1B), H350
Short-term (acute) aquatic hazard (Category 1), H400
Long-term (chronic) aquatic hazard (Category 1), H410

For the full text of the H-Statements mentioned in this Section, see Section 16.
2.2 GHS Label elements, including precautionary statements

Pictogram

Signal word  Danger

Hazard statement(s)
H226  Flammable liquid and vapor.
H301 + H311  Toxic if swallowed or in contact with skin.
H314  Causes severe skin burns and eye damage.
H317  May cause an allergic skin reaction.
H330  Fatal if inhaled.
H350  May cause cancer.
H410  Very toxic to aquatic life with long lasting effects.

Precautionary statement(s)
P201  Obtain special instructions before use.
P202  Do not handle until all safety precautions have been read and understood.
P210  Keep away from heat/ sparks/ open flames/ hot surfaces. No smoking.
P233  Keep container tightly closed.
P240  Ground/bond container and receiving equipment.
P241  Use explosion-proof electrical/ ventilating/ lighting/ equipment.
P242  Use only non-sparking tools.
P243  Take precautionary measures against static discharge.
P260  Do not breathe dust/ fume/ gas/ mist/ vapors/ spray.
P264  Wash skin thoroughly after handling.
P270  Do not eat, drink or smoke when using this product.
P271  Use only outdoors or in a well-ventilated area.
P272  Contaminated work clothing must not be allowed out of the workplace.
P273  Avoid release to the environment.
P278  Wear protective gloves/ protective clothing/ eye protection/ face protection.
P280  Wear respiratory protection.
P284  Wear respiratory protection.
P301 + P310 + P330  IF SWALLOWED: Immediately call a POISON CENTER/ doctor. Rinse mouth.
P301 + P330 + P331  IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.
P303 + P361 + P353  IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/ shower.
P304 + P340 + P310  IF INHALED: Remove person to fresh air and keep comfortable for breathing. Immediately call a POISON CENTER/ doctor.
P305 + P351 + P338 + P310  IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a POISON CENTER/ doctor.
P308 + P313  IF exposed or concerned: Get medical advice/ attention.
P333 + P313  If skin irritation or rash occurs: Get medical advice/ attention.
P362  Take off contaminated clothing and wash before reuse.
P370 + P378  In case of fire: Use dry sand, dry chemical or alcohol-resistant foam to extinguish.
P391  Collect spillage.
P403 + P233  Store in a well-ventilated place. Keep container tightly closed.
P403 + P235  Store in a well-ventilated place. Keep cool.
P405  Store locked up.
2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

SECTION 3: Composition/information on ingredients

3.1 Substances

<table>
<thead>
<tr>
<th>Component</th>
<th>Classification</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydrazine</td>
<td>Flam. Liq. 3; Acute Tox. 3; Acute Tox. 2; Acute Tox. 3; Skin Corr. 1B; Eye Dam. 1; Skin Sens. 1; Carc. 1B; Aquatic Acute 1; Aquatic Chronic 1; H226, H301, H330, H311, H314, H318, H317, H350, H400, H410</td>
<td>&lt;= 100 %</td>
</tr>
</tbody>
</table>

For the full text of the H-Statements mentioned in this Section, see Section 16.

SECTION 4: First aid measures

4.1 Description of first-aid measures

General advice
First aider needs to protect himself. Show this material safety data sheet to the doctor in attendance.

If inhaled
After inhalation: fresh air. Immediately call in physician. If breathing stops: immediately apply artificial respiration, if necessary also oxygen.

In case of skin contact
In case of skin contact: Take off immediately all contaminated clothing. Rinse skin with water/ shower. Call a physician immediately.
**In case of eye contact**
After eye contact: rinse out with plenty of water. Immediately call in ophthalmologist. Remove contact lenses.

**If swallowed**
If swallowed: give water to drink (two glasses at most). Seek medical advice immediately. In exceptional cases only, if medical care is not available within one hour, induce vomiting (only in persons who are wide awake and fully conscious), administer activated charcoal (20 - 40 g in a 10% slurry) and consult a doctor as quickly as possible. Do not attempt to neutralise.

4.2 **Most important symptoms and effects, both acute and delayed**
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 **Indication of any immediate medical attention and special treatment needed**
No data available

**SECTION 5: Firefighting measures**

5.1 **Extinguishing media**

**Suitable extinguishing media**
Water Foam Carbon dioxide (CO2) Dry powder

**Unsuitable extinguishing media**
For this substance/mixture no limitations of extinguishing agents are given.

5.2 **Special hazards arising from the substance or mixture**
Nitrogen oxides (NOx)
Combustible.
Vapors are heavier than air and may spread along floors.
Forms explosive mixtures with air at elevated temperatures.
Development of hazardous combustion gases or vapours possible in the event of fire.

5.3 **Advice for firefighters**
Stay in danger area only with self-contained breathing apparatus. Prevent skin contact by keeping a safe distance or by wearing suitable protective clothing.

5.4 **Further information**
Remove container from danger zone and cool with water. Suppress (knock down) gases/vapors/mists with a water spray jet. Prevent fire extinguishing water from contaminating surface water or the ground water system.

**SECTION 6: Accidental release measures**

6.1 **Personal precautions, protective equipment and emergency procedures**
Advice for non-emergency personnel: Do not breathe vapors, aerosols. Avoid substance contact. Ensure adequate ventilation. Keep away from heat and sources of ignition. Evacuate the danger area, observe emergency procedures, consult an expert. For personal protection see section 8.

6.2 **Environmental precautions**
Do not let product enter drains. Risk of explosion.
6.3 Methods and materials for containment and cleaning up
Cover drains. Collect, bind, and pump off spills. Observe possible material restrictions (see sections 7 and 10). Take up carefully with liquid-absorbent material (e.g. Chemizorb®). Dispose of properly. Clean up affected area.

6.4 Reference to other sections
For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling

Advice on safe handling
Work under hood. Do not inhale substance/mixture. Avoid generation of vapours/aerosols.

Advice on protection against fire and explosion
Keep away from open flames, hot surfaces and sources of ignition. Take precautionary measures against static discharge.

Hygiene measures
Immediately change contaminated clothing. Apply preventive skin protection. Wash hands and face after working with substance. For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities

Storage conditions
Keep container tightly closed in a dry and well-ventilated place. Keep away from heat and sources of ignition. Keep locked up or in an area accessible only to qualified or authorized persons.
Storage class (TRGS 510): 3: Flammable liquids

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated.

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Ingredients with workplace control parameters

<table>
<thead>
<tr>
<th>Component</th>
<th>CAS-No.</th>
<th>Value</th>
<th>Control parameters</th>
<th>Basis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydrazine</td>
<td>302-01-2</td>
<td>TWA</td>
<td>0.01000 ppm</td>
<td>USA. ACGIH Threshold Limit Values (TLV)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Remarks</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Upper Respiratory Tract cancer</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Confirmed animal carcinogen with unknown relevance to humans</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Danger of cutaneous absorption</td>
</tr>
<tr>
<td>Remarks</td>
<td>Upper Respiratory Tract cancer</td>
<td>TWA</td>
<td>0.01 ppm</td>
<td>USA. ACGIH Threshold Limit Values (TLV)</td>
</tr>
<tr>
<td></td>
<td>Confirmed animal carcinogen with unknown relevance to humans</td>
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</tr>
<tr>
<td></td>
<td>Danger of cutaneous absorption</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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Page 5 of 12
<table>
<thead>
<tr>
<th></th>
<th>TWA</th>
<th>USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1.000000 ppm 1.300000 mg/m³</td>
<td></td>
</tr>
</tbody>
</table>

Skin designation
The value in mg/m³ is approximate.

<table>
<thead>
<tr>
<th></th>
<th>C</th>
<th>USA. NIOSH Recommended Exposure Limits</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0.030000 ppm 0.040000 mg/m³</td>
<td></td>
</tr>
</tbody>
</table>

Potential Occupational Carcinogen
See Appendix A
2 hour ceiling value

<table>
<thead>
<tr>
<th></th>
<th>PEL</th>
<th>California permissible exposure limits for chemical contaminants (Title 8, Article 107)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0.01 ppm 0.013 mg/m³</td>
<td></td>
</tr>
</tbody>
</table>

Skin

8.2 Exposure controls

Appropriate engineering controls
Immediately change contaminated clothing. Apply preventive skin protection. Wash hands and face after working with substance.

Personal protective equipment

Eye/face protection
Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU). Tightly fitting safety goggles

Skin protection
This recommendation applies only to the product stated in the safety data sheet, supplied by us and for the designated use. When dissolving in or mixing with other substances and under conditions deviating from those stated in EN374 please contact the supplier of CE-approved gloves (e.g. KCL GmbH, D-36124 Eichenzell, Internet: www.kcl.de).

Full contact
Material: butyl-rubber
Minimum layer thickness: 0.7 mm
Break through time: 480 min
Material tested:Butoject® (KCL 898)

This recommendation applies only to the product stated in the safety data sheet, supplied by us and for the designated use. When dissolving in or mixing with other substances and under conditions deviating from those stated in EN374 please contact the supplier of CE-approved gloves (e.g. KCL GmbH, D-36124 Eichenzell, Internet: www.kcl.de).

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.4 mm
Break through time: 240 min
Material tested:Camatril® (KCL 730 / Aldrich Z677442, Size M)

Body Protection
Flame retardant antistatic protective clothing.
Respiratory protection
required when vapours/aerosols are generated.
Our recommendations on filtering respiratory protection are based on the following standards: DIN EN 143, DIN 14387 and other accompanying standards relating to the used respiratory protection system.

Control of environmental exposure
Do not let product enter drains. Risk of explosion.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

a) Appearance
Form: oily
Color: colorless

b) Odor
Ammonia odor

c) Odor Threshold
No data available

d) pH
No data available

e) Melting point/freezing point
Melting point: 2 °C (36 °F)

f) Initial boiling point and boiling range
113.5 °C 236.3 °F at 1,013 hPa

g) Flash point
38 °C (100 °F) - closed cup

h) Evaporation rate
No data available

i) Flammability (solid, gas)
No data available

j) Upper/lower flammability or explosive limits
Upper explosion limit: 99.99 % (V)
Lower explosion limit: 4.7 % (V)

k) Vapor pressure
19.2 hPa at 25 °C (77 °F)

l) Vapor density
1.11 - (Air = 1.0)

m) Relative density
1 g/cm³ at 25 °C (77 °F)

n) Water solubility
completely miscible

o) Partition coefficient: n-octanol/water
log Pow: -0.16 at 25 °C (77 °F) - Bioaccumulation is not expected.

p) Autoignition temperature
24 °C (75 °F) at 1,013 hPa

q) Decomposition temperature
No data available

r) Viscosity
No data available

s) Explosive properties
No data available

t) Oxidizing properties
No data available

9.2 Other safety information

Dissociation constant
6.05 at 25 °C (77 °F)

Relative vapor
1.11 - (Air = 1.0)
SECTION 10: Stability and reactivity

10.1 Reactivity
Vapor/air-mixtures are explosive at intense warming.

10.2 Chemical stability
The product is chemically stable under standard ambient conditions (room temperature).

10.3 Possibility of hazardous reactions
Risk of explosion with:
- alkali compounds
- perchlorates
- barium oxide
- nitrites
- Calcium amides
- Calcium oxide
- chromates/perchromates
- chromium(VI) oxide
- Fluorine
- Salts of hydrazine
- azides
- Potassium
- potassium dichromate
- potassium permanganate
- copper compounds
- nitrates
- Raney-nickel
- metal catalysts
- sodium
- Organic Substances
- mercury compounds
- mercury(II) nitrate
- mercury oxide
- Nitric acid
- Mild steel
- nitrogen oxides
- Tetryl (N-Methyl-N-2,4,6-tetranitroaniline)
- hydrogen peroxide
- zinc diethyl
- tin (II) chloride
- halogen oxides
- Wood/Sawdust
- metallic oxides
- Steam
- organic nitro compounds
- metallic salts
- Sulfides
- phosphorus halides
- silver compounds
- Oxygen
- liquid
silver with Catalyst Nitromethane with Methanol Ammonia with Alkali metals Sodium hydroxide with Air Methanol with Nitromethane absorbents, filter materials, wiping cloths and protective clothing with Heavy metals Risk of ignition or formation of inflammable gases or vapours with: Chlorine nitrogen dioxide Rust Air Oxidizing agents Exothermic reaction with: chlorates halogens Acids metals metallic chlorides Oxygen Phosgene

10.4 Conditions to avoid
Heating.

10.5 Incompatible materials
Iron, Mild steel, Copper, Nickel, Lead, silver, metal alloys, glass, rubber

10.6 Hazardous decomposition products
In the event of fire: see section 5

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - Rat - male - 262 mg/kg (OECD Test Guideline 401)
LC50 Inhalation - Rat - male - 4 h - 0.76 mg/l
Remarks: (ECHA)
Dermal: No data available
No data available
**Skin corrosion/irritation**
Skin - Rabbit
Result: Corrosive - 4 h
(OECD Test Guideline 404)
Remarks: (55% solution)
(Regulation (EC) No 1272/2008, Annex VI)

**Serious eye damage/eye irritation**
Causes serious eye damage.

**Respiratory or skin sensitization**
(Regulation (EC) No 1272/2008, Annex VI)

**Germ cell mutagenicity**
No data available

**Carcinogenicity**
Presumed to have carcinogenic potential for humans
IARC: 2A - Group 2A: Probably carcinogenic to humans (Hydrazine)
NTP: No ingredient of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.
OSHA: No component of this product present at levels greater than or equal to 0.1% is on OSHA’s list of regulated carcinogens.

**Reproductive toxicity**
No data available

**Specific target organ toxicity - single exposure**
No data available

**Specific target organ toxicity - repeated exposure**
No data available

**Aspiration hazard**
No data available

**11.2 Additional Information**
RTECS: MU7175000

spasm, inflammation and edema of the larynx, spasm, inflammation and edema of the bronchi, pneumonitis, pulmonary edema, burning sensation, Cough, wheezing, laryngitis, Shortness of breath, Headache, Nausea, Vomiting
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.
Liver - Irregularities - Based on Human Evidence
Liver - Irregularities - Based on Human Evidence

---
**SECTION 12: Ecological information**

**12.1 Toxicity**

Toxicity to fish
static test LC50 - Poecilia reticulata (guppy) - 0.61 mg/l - 96 h
Remarks: (ECHA)

Toxicity to daphnia and other aquatic invertebrates
semi-static test EC50 - Daphnia pulex (Water flea) - 0.16 mg/l - 48 h
(US-EPA)
Remarks: (in analogy to similar products)

Toxicity to algae
- static test ErC50 - Desmodesmus subspicatus (green algae) - 0.017 mg/l - 48 h

Toxicity to bacteria
- static test EC50 - activated sludge - 5.5 mg/l - 3 h
  (OECD Test Guideline 209)

12.2 Persistence and degradability
- Biodegradability aerobic - Exposure time 24 h
  Result: 99 % - Inherently biodegradable.
  (OECD Test Guideline 302B)

12.3 Bioaccumulative potential
No data available

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
- PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects
No data available

SECTION 13: Disposal considerations

13.1 Waste treatment methods
- Product
  Waste material must be disposed of in accordance with the national and local regulations. Avoid mixing with other waste. Handle uncleaned containers like the product. See www.retrologistik.com for processes regarding the return of chemicals and containers, or contact us there if you have further questions.

SECTION 14: Transport information

DOT (US)
- UN number: 2029  Class: 8 (3, 6.1)  Packing group: I
- Proper shipping name: Hydrazine, anhydrous
- Reportable Quantity (RQ): 1 lbs
- Poison Inhalation Hazard: No

IMDG
- UN number: 2029  Class: 8 (3, 6.1)  Packing group: I
- Proper shipping name: HYDRAZINE, ANHYDROUS
- Marine pollutant: yes

IATA
- UN number: 2029  Class: 8 (3, 6.1)  Packing group: I
- Proper shipping name: Hydrazine, anhydrous
- IATA Passenger: Not permitted for transport
SECTION 15: Regulatory information

SARA 302 Components
Hydrazine 302-01-2 2007-07-01

SARA 313 Components
The following components are subject to reporting levels established by SARA Title III, Section 313:
Hydrazine 302-01-2 2007-07-01

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

Massachusetts Right To Know Components
No components are subject to the Massachusetts Right to Know Act.

SECTION 16: Other information

Further information
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 Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

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Version: 6.5  Revision Date: 12/16/2020  Print Date: 06/19/2021