Chemical Safety Data Sheet MSDS / SDS

Hydrazine SDS

Revision Date:2024-04-25 Revision Number:1

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

Product identifier

Product name: Hydrazine

CAS: 302-01-2

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

Relevant identified uses: For R&D use only. Not for medicinal, household or other use.

Uses advised against: none

Company Identification

Company: Chemicalbook.in

Address: 5 vasavi Layout Basaveswara Nilayam Pragathi Nagar Hyderabad, India -500090

Telephone: +91 9550333722

SECTION 2: Hazards identification

Classification of the substance or mixture

Flammable liquids, Category 3
Acute toxicity - Category 3, Oral

Acute toxicity - Category 3, Dermal
Skin corrosion, Sub-category 1B
Skin sensitization, Category 1
Acute toxicity - Category 3, Inhalation
Carcinogenicity, Category 1B
Hazardous to the aquatic environment, short-term (Acute) - Category Acute 1
Hazardous to the aquatic environment, long-term (Chronic) - Category Chronic 1

GHS label elements, including precautionary statements

Pictogram(s)

Signal word Danger

Hazard statement(s)

H226 Flammable liquid and vapour
H301 Toxic if swallowed
H311 Toxic in contact with skin
H314 Causes severe skin burns and eye damage
H317 May cause an allergic skin reaction
H331 Toxic if inhaled
H350 May cause cancer
H410 Very toxic to aquatic life with long lasting effects

Precautionary statement(s)

Prevention

P210 Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
P233 Keep container tightly closed.
P240 Ground and bond container and receiving equipment.
P241 Use explosion-proof [electrical/ventilating/lighting/...] equipment.
P242 Use non-sparking tools.
P243 Take action to prevent static discharges.
P280 Wear protective gloves/protective clothing/eye protection/face protection/hearing protection/...
P264 Wash ... thoroughly after handling.
P270 Do not eat, drink or smoke when using this product.
P260 Do not breathe dust/fume/gas/mist/vapours/spray.
P261 Avoid breathing dust/fume/gas/mist/vapours/spray.

P272 Contaminated work clothing should not be allowed out of the workplace.
P271 Use only outdoors or in a well-ventilated area.
P203 Obtain, read and follow all safety instructions before use.
P273 Avoid release to the environment.

Response

P303+P361+P353 IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse affected areas with water [or shower].
P370+P378 In case of fire: Use ... to extinguish.
P301+P316 IF SWALLOWED: Get emergency medical help immediately.
P321 Specific treatment (see ... on this label).
P330 Rinse mouth.
P302+P352 IF ON SKIN: Wash with plenty of water/...
P316 Get emergency medical help immediately.
P361+P364 Take off immediately all contaminated clothing and wash it before reuse.
P301+P330+P331 IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.
P363 Wash contaminated clothing before reuse.
P304+P340 IF INHALED: Remove person to fresh air and keep comfortable for breathing.
P305+P351+P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P333+P317 If skin irritation or rash occurs: Get medical help.
P362+P364 Take off contaminated clothing and wash it before reuse.
P318 IF exposed or concerned, get medical advice.
P391 Collect spillage.

Storage

P403+P235 Store in a well-ventilated place. Keep cool.
P405 Store locked up.
P403+P233 Store in a well-ventilated place. Keep container tightly closed.

Disposal

P501 Dispose of contents/container to an appropriate treatment and disposal facility in accordance with applicable laws and regulations, and product characteristics at time of disposal.

Other hazards which do not result in classification

no data available

SECTION 3: Composition/information on ingredients

Substance

Chemical name:	Hydrazine
Common names and synonyms:	Hydrazine
CAS number:	302-01-2
EC number:	206-114-9
Concentration:	100%

SECTION 4: First aid measures

Description of necessary first-aid measures

If inhaled

Fresh air, rest. Half-upright position. Refer immediately for medical attention.

Following skin contact

First rinse with plenty of water for at least 15 minutes, then remove contaminated clothes and rinse again. See Notes. Refer immediately for medical attention.

Following eye contact

Rinse with plenty of water (remove contact lenses if easily possible). Refer immediately for medical attention.

Following ingestion

Rinse mouth. Give nothing to drink. Do NOT induce vomiting. Refer immediately for medical attention.

Most important symptoms/effects, acute and delayed

Target organs affected include central nervous system; respiratory system; skin and eyes. Chronic exposure in humans may cause pneumonia, liver and kidney damage. Liver damage may be more severe than kidney damage. It is a suspected human carcinogen. (EPA, 1998)
Excerpt from ERG Guide 132 [Flammable Liquids - Corrosive]: May cause toxic effects if inhaled or ingested/swallowed. Contact with substance may cause severe burns to skin and eyes. Fire will produce irritating, corrosive and/or toxic gases. Vapors may cause dizziness or suffocation. Runoff from fire control or dilution water may cause pollution. (ERG, 2016)
Excerpt from ERG Guide 152 [Substances - Toxic (Combustible)]: Highly toxic, may be fatal if inhaled, swallowed or absorbed

through skin. Contact with molten substance may cause severe burns to skin and eyes. Avoid any skin contact. Effects of contact or inhalation may be delayed. Fire may produce irritating, corrosive and/or toxic gases. Runoff from fire control or dilution water may be corrosive and/or toxic and cause pollution. (ERG, 2016)

Indication of immediate medical attention and special treatment needed, if necessary

Specific treatment for exposure consists of thorough washing of all exposed skin areas with soap and water, copious irrigation of the eyes, and prompt removal of the patient from the source of exposure. Hydrazines

SECTION 5: Firefighting measures

Suitable extinguishing media

If material on fire or involved in fire: Extinguish fire using agent suitable for type of surrounding fire. (Material itself does not burn or burns with difficulty.) Keep run-off water out of sewers and water sources. Hydrazine, aqueous solution

Specific hazards arising from the chemical

It is a flammable/combustible material and may be ignited by heat, sparks, or flames. Vapor may travel to a source of ignition and flash back. Container may explode in heat of fire. Vapor explosion and poison hazard indoors, outdoors, or in sewers. Runoff to sewer may create fire or explosion hazard. Vapors form explosive mixtures with air. May continue to burn in the absence of air. Decomposition gives off toxic nitrogen compound fumes. Can catch fire when in contact with porous materials such as wood, asbestos, cloth, earth, and rusty metals. Incompatible with oxidizers, hydrogen peroxide, nitric acid, metal oxides, and strong acids. Hazardous polymerization may not occur. (EPA, 1998)
Excerpt from ERG Guide 132 [Flammable Liquids - Corrosive]: Flammable/combustible material. May be ignited by heat, sparks or flames. Vapors may form explosive mixtures with air. Vapors may travel to source of ignition and flash back. Most vapors are heavier than air. They will spread along ground and collect in low or confined areas (sewers, basements, tanks). Vapor explosion hazard indoors, outdoors or in sewers. Those substances designated with a (P) may polymerize explosively when heated or involved in a fire. Runoff to sewer may create fire or explosion hazard. Containers may explode when heated. Many liquids are lighter than water. (ERG, 2016)
Excerpt from ERG Guide 152 [Substances - Toxic (Combustible)]: Combustible material: may burn but does not ignite readily. Containers may explode when heated. Runoff may pollute waterways. Substance may be transported in a molten form. (ERG, 2016)

Special protective actions for fire-fighters

Use alcohol-resistant foam, foam, water spray, dry powder, carbon dioxide. In case of fire: keep drums, etc., cool by spraying with water. Combat fire from a sheltered position.

SECTION 6: Accidental release measures

Personal precautions, protective equipment and emergency procedures

Evacuate danger area! Consult an expert! Personal protection: complete protective clothing including self-contained breathing apparatus. Do NOT let this chemical enter the environment. Collect leaking liquid in sealable non-metallic containers. Absorb remaining liquid in sand or inert absorbent. Then store and dispose of according to local regulations. Do NOT absorb in saw-dust or other combustible absorbents.

Environmental precautions

Evacuate danger area! Consult an expert! Personal protection: complete protective clothing including self-contained breathing apparatus. Do NOT let this chemical enter the environment. Collect leaking liquid in sealable non-metallic containers. Absorb remaining liquid in sand or inert absorbent. Then store and dispose of according to local regulations. Do NOT absorb in saw-dust or other combustible absorbents.

Methods and materials for containment and cleaning up

Hydrazine removal from nuclear power plant wastewater using activated carbon and copper ion catalysts.

SECTION 7: Handling and storage

Precautions for safe handling

NO open flames, NO sparks and NO smoking. Above 40°C use a closed system, ventilation and explosion-proof electrical equipment. Handling in a well ventilated place. Wear suitable protective clothing. Avoid contact with skin and eyes. Avoid formation of dust and aerosols. Use non-sparking tools. Prevent fire caused by electrostatic discharge steam.

Conditions for safe storage, including any incompatibilities

Fireproof. Separated from acids, metals, oxidants and food and feedstuffs. Keep under inert gas. Provision to contain effluent from fire extinguishing. Store in an area without drain or sewer access.It should be stored in glass containers in a cool, dark place. ...It is usually stored under nitrogen to reduce the flammability hazard and to maintain purity.

SECTION 8: Exposure controls/personal protection

Control parameters

Occupational Exposure limit values

TLV: 0.01 ppm as TWA; (skin); A3 (confirmed animal carcinogen with unknown relevance to humans).EU-OEL: 0.013 mg/m3, 0.01 ppm as TWA; (skin).MAK: skin absorption (H); sensitization of skin (SH); carcinogen category: 2

Biological limit values

no data available

Appropriate engineering controls

Ensure adequate ventilation. Handle in accordance with good industrial hygiene and safety practice. Set up emergency exits and the risk-elimination area.

Individual protection measures, such as personal protective equipment (PPE)

Eye/face protection

Wear face shield or eye protection in combination with breathing protection.

Skin protection

Protective gloves. Protective clothing.

Respiratory protection

Use closed system and ventilation.

Thermal hazards

no data available

SECTION 9: Physical and chemical properties and safety characteristics

Physical state:	Hydrazine, anhydrous is a colorless, fuming oily liquid with an ammonia-like odor. Flash point 99°F. Explodes during distillation if traces of air are present. Toxic by inhalation and by skin absorption. Corrosive to tissue. Produces toxic oxides of nitrogen during combustion. Used as a rocket propellant and in fuel cells.
Colour:	Colorless oily liquid
Odour:	Penetrating odor resembling ammonia.
Melting point/freezing point:	2.0 °C

Boiling point or initial boiling point and boiling range:	113.5 °C, 130 °C (decomp)
Flammability:	Class IC Flammable Liquid: Fl.P. at or above 73°F and below 100°F.
Lower and upper explosion limit/flammability limit:	Lower flammable limit: 2.9% by volume; Upper flammable limit: 98% by volume
Flash point:	-4 °F
Auto-ignition temperature:	518° F (USCG, 1999)
Decomposition temperature:	no data available
pH:	Aqueous solutions of hydrazine are highly alkaline. pH of a 64 wt% aqueous solution of hydrazine is 12.75.
Kinematic viscosity:	0.974 uPa-sec at 20 deg C
Solubility:	Miscible (NIOSH, 2016)
Partition coefficient n-octanol/water:	log Kow= -2.07
Vapour pressure:	14.4 mm Hg at 77° F (EPA, 1998)
Density and/or relative density:	1.011g/mLat 25°C
Relative vapour density:	>1 (vs air)
Particle characteristics:	no data available

SECTION 10: Stability and reactivity

Reactivity

50 ppm; NIOSH considers hydrazine to be a potential occupational carcinogen.
Decomposes . This produces ammonia, hydrogen and nitrogen oxides. This generates fire and explosion hazard. The substance is a strong reducing agent. It reacts violently with oxidants. The substance is a medium strong base. Reacts violently with acids, many metals, metal oxides and porous materials. This generates fire and explosion hazard. Air or oxygen is not required for decomposition.

Chemical stability

no data available

Possibility of hazardous reactions

Hydrazine vapor is exceptionally hazardous in that once it is ignited it will continue to burn by exothermic decomposition in complete absence of air or other oxidant.HYDRAZINE is a powerful reducing agent. May ignite spontaneously if mixed with hydrogen peroxide or with nitric acid. Decomposes with flame on contact with many metallic oxide surfaces [Haz. Chem. Data(1966)]. While boiling a piece of polyester fiber in hydrazine in a glass beaker, a technician put a somewhat rusty pair of metal tweezers into the hydrazine, which then ignited [MCA Case History 1893 (1973)]. Forms explosive metal hydrazides when mixed with alkali metals in presence of ammonia [Mellor 8, Supp. 2:95(1967)]. During the measurement of the shock sensitivity of a mixture containing hydrazine, a drop of the mixture fell on a tetryl explosive. The tetryl immediately burst into flames [ASESB 105]. Ignites spontaneously if mixed with nitrous oxide [Mellor 8, Supp. 2:214(1967)]. Reacts explosively with potassium and sodium dichromate [Mellor 11:234(1946-1947)].

Conditions to avoid

no data available

Incompatible materials

Residue from dehydrating hydrazine with barium or calcium oxide slowly decomposes exothermically in daylight and finally explodes.

Hazardous decomposition products

When heated to decomposition it emits highly toxic fumes of /nitrogen oxide/ and /ammonia/.

SECTION 11: Toxicological information

Acute toxicity

Oral: LD50 Rat oral 60 mg/kg

Inhalation: LC50 Rat inhalation 570 ppm/4 hr

Dermal: no data available

Skin corrosion/irritation

no data available

Serious eye damage/irritation

no data available

Respiratory or skin sensitization

no data available

Germ cell mutagenicity

no data available

Carcinogenicity

NTP: Reasonably anticipated to be a human carcinogen

Reproductive toxicity

Information is not available on the reproductive or developmental effects of hydrazine in humans. Data regarding developmental effects in animals are limited to a study in which hydrazine injected into pregnant rats resulted in fetotoxicity including increased fetal and neonatal mortality. (,10) Inhalation of hydrazine for a year resulted in effects to the ovaries, endometrium, and uterus in female rats and to the testes in male hamsters. (10)

STOT-single exposure

The substance is corrosive to the eyes, skin and respiratory tract. Inhalation may cause lung oedema, but only after initial corrosive effects on eyes and/or airways have become manifest. Corrosive on ingestion. The substance may cause effects on the liver and central nervous system. Exposure could cause death.

STOT-repeated exposure

Repeated or prolonged contact may cause skin sensitization. The substance may have effects on the liver, kidneys and central

nervous system. This substance is possibly carcinogenic to humans.

Aspiration hazard

A harmful contamination of the air can be reached very quickly on evaporation of this substance at 20°C.

SECTION 12: Ecological information

Toxicity

Toxicity to fish: LC50 Lepomis macrochirus (Bluegill sunfish) 1.08 mg/L/96 hr; static, 23-24 deg C, pH 7.2-8.4, 240-292 mg CaCO3/L /from table

Toxicity to daphnia and other aquatic invertebrates: no data available

Toxicity to algae: no data available

Toxicity to microorganisms: no data available

Persistence and degradability

Pure cultures of Azotobacter vinelandii are capable of metabolizing hydrazine to three carboxylic acids related to 3,4-dihydropyridazinone-5-carboxylic acid and ammonia and nitrogen gas(1) and unidentified, acid-labile compounds(2). The degradation of hydrazine hydrate in river water follows 1st order reaction kinetics(3). The degradation rate increases with increasing temperature, dissolved oxygen, and the presence of microorganisms at pH values of 6-8(3). Hydrazine at 500 mg/l, present in a wastewater mixture of other hydrazine compounds, was incubated with an inoculum prepared from a trickling filter plant; following a 24 hour lag period, this mixture of compounds was readily biodegraded as measured by oxygen uptake(4). No specific information on the fate of hydrazine alone was available in this study(4).

Bioaccumulative potential

An estimated BCF of 3 was calculated for hydrazine(SRC), using a log Kow of -2.07(1) and a regression-derived equation(2). According to a classification scheme(3), this BCF suggests the potential for bioconcentration in aquatic organisms is low (SRC). Bioconcentration in guppies was studied using both "hard" (440 mg/L CACO3) and "soft" (22 mg/L CACO3) water (4). Little uptake was noted in the soft water experiments, but mild bioconcentration was observed in the experiments conducted using hard water(4). After 96 hours, the concentration of hydrazine in guppies was about 144 ug/g(4).

Mobility in soil

The Koc of hydrazine is estimated as 2(SRC), using a log Kow of -2.07(1) and a regression-derived equation(2). According to a classification scheme(3), this estimated Koc value suggests that hydrazine is expected to have very high mobility in soil(SRC).

Hydrazine is a weak base (pKa= 7.96); at pH values well below the pKa, hydrazine exists primarily as the protonated form and can take part in cation exchange reactions(4). The nature and extent of hydrazine adsorption by clays and soils is very dependent on suspension pH and on the types of surface functional groups present on the solid matrix. Under acidic conditions, pH 4.0, 99.9% of the hydrazine is present as the protonated species and should be able to readily replace Na^+ from exchange sites(4). Under alkaline conditions, pH 8.0, approximately 50% of the hydrazine is protonated and 50% is in neutral form. The primary mechanism of hydrazine adsorption in a montmorillonite clay suspension was cation exchange, both at pH 4 and 8; adsorption of hydrazine was lower at the higher pH value(4). The main mechanism for hydrazine retention at pH 4 and at low hydrazine concentrations in the upper Arrendondo soil horizon (fine sand) was also cation exchange. At higher concentrations more than 60% of the hydrazine interacted with a different type of binding site, possibly with organic-surface functional groups such as carbonyl groups(4). Under alkaline conditions, using upper horizon Arrendondo soil, (at pH 8.0) hydrazine was adsorbed more readily than at pH 4(4).

Other adverse effects

no data available

SECTION 13: Disposal considerations

Disposal methods

Product

The material can be disposed of by removal to a licensed chemical destruction plant or by controlled incineration with flue gas scrubbing. Do not contaminate water, foodstuffs, feed or seed by storage or disposal. Do not discharge to sewer systems.

Contaminated packaging

Containers can be triply rinsed (or equivalent) and offered for recycling or reconditioning. Alternatively, the packaging can be punctured to make it unusable for other purposes and then be disposed of in a sanitary landfill. Controlled incineration with flue gas scrubbing is possible for combustible packaging materials.

SECTION 14: Transport information

UN Number

ADR/RID: UN2030 (For reference only, please check.)
IMDG: UN2030 (For reference only, please check.)
IATA: UN2030 (For reference only, please check.)

UN Proper Shipping Name

ADR/RID: HYDRAZINE AQUEOUS SOLUTION with more than 37% hydrazine, by mass (For reference only, please check.)
IMDG: HYDRAZINE AQUEOUS SOLUTION with more than 37% hydrazine, by mass (For reference only, please check.)
IATA: HYDRAZINE AQUEOUS SOLUTION with more than 37% hydrazine, by mass (For reference only, please check.)

Transport hazard class(es)

ADR/RID: 8 (For reference only, please check.)
IMDG: 8 (For reference only, please check.)
IATA: 8 (For reference only, please check.)

Packing group, if applicable

ADR/RID: I (For reference only, please check.)
IMDG: I (For reference only, please check.)
IATA: I (For reference only, please check.)

Environmental hazards

ADR/RID: Yes
IMDG: Yes
IATA: Yes

Special precautions for user

no data available

Transport in bulk according to IMO instruments

no data available

SECTION 15: Regulatory information

Safety, health and environmental regulations specific for the product in question

European Inventory of Existing Commercial Chemical Substances (EINECS)

Listed.

EC Inventory

Listed.

United States Toxic Substances Control Act (TSCA) Inventory

Listed.

China Catalog of Hazardous chemicals 2015

Listed.

New Zealand Inventory of Chemicals (NZIoC)

Listed.

(PICCS)

Listed.

Vietnam National Chemical Inventory

Listed.

IECSC)

Listed.

Korea Existing Chemicals List (KECL)

Listed.

SECTION 16: Other information

Abbreviations and acronyms

CAS: Chemical Abstracts Service

ADR: European Agreement concerning the International Carriage of Dangerous Goods by Road

RID: Regulation concerning the International Carriage of Dangerous Goods by Rail

IMDG: International Maritime Dangerous Goods

IATA: International Air Transportation Association

TWA: Time Weighted Average

STEL: Short term exposure limit

LC50: Lethal Concentration 50%

LD50: Lethal Dose 50%

EC50: Effective Concentration 50%

References

IPCS - The International Chemical Safety Cards (ICSC), website: http://www.ilo.org/dyn/icsc/showcard.home

HSDB - Hazardous Substances Data Bank, website: https://toxnet.nlm.nih.gov/newtoxnet/hsdb.htm

IARC - International Agency for Research on Cancer, website: http://www.iarc.fr/

eChemPortal - The Global Portal to Information on Chemical Substances by OECD, website: http://www.echemportal.org/echemportal/index?pageID=0&request_locale=en

CAMEO Chemicals, website: http://cameochemicals.noaa.gov/search/simple

ChemIDplus, website: http://chem.sis.nlm.nih.gov/chemidplus/chemidlite.jsp

ERG - Emergency Response Guidebook by U.S. Department of Transportation, website: http://www.phmsa.dot.gov/hazmat/library/erg

Germany GESTIS-database on hazard substance, website: http://www.dguv.de/ifa/gestis/gestis-stoffdatenbank/index-2.jsp

ECHA - European Chemicals Agency, website: https://echa.europa.eu/

Other Information

Auto-ignition temperature varies from 24°C on a rusty iron surface to 270°C on glass surface.The symptoms of asthma often do not become manifest until a few hours have passed and they are aggravated by physical effort. Rest and medical observation are therefore essential.Specific treatment is necessary in case of poisoning with this substance; the appropriate means with instructions must be available.The odour warning when the exposure limit value is exceeded is insufficient.Rinse contaminated clothing with plenty of water because of fire hazard.Do NOT take working clothes home.Other UN numbers are: UN 2030 Hydrazine aqueous solution, with more than 37% hydrazine by mass, having a flash-point of not more than 60 °C: hazard class: 8, subsdiary risks: 3 and/or 6.1, packing group: I; Hydrazine aqueous solution, with more than 37% hydrazine by mass: hazard class: 8, subsdiary risk: 6.1, packing group: II-III. UN 3293 Hydrazine, aqueous solutions with not more than 37% of hydrazine, hazard class: 6.1, packing group: III. Other CAS-numbers are: 7803-57-8 for the 64% aqueous solution and 10217-52-4 for the 55% aqueous solution.