Chemical Safety Data Sheet MSDS / SDS

Diborane(6) SDS

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

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

Product identifier

Product name: Diborane(6)

CAS: 19287-45-7

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

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SECTION 2: Hazards identification

Classification of the substance or mixture

Flammable gases, Category 1A, Flammable gas
Acute toxicity - Category 1, Inhalation

GHS label elements, including precautionary statements

Pictogram(s)

Signal word Danger

Hazard statement(s)

H220 Extremely flammable gas
H280 Contains gas under pressure; may explode if heated
H330 Fatal if inhaled

Precautionary statement(s)

Prevention

P210 Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
P260 Do not breathe dust/fume/gas/mist/vapours/spray.
P271 Use only outdoors or in a well-ventilated area.
P284 [In case of inadequate ventilation] wear respiratory protection.

Response

P377 Leaking gas fire: Do not extinguish, unless leak can be stopped safely.
P381 In case of leakage, eliminate all ignition sources.
P304+P340 IF INHALED: Remove person to fresh air and keep comfortable for breathing.
P316 Get emergency medical help immediately.
P320 Specific treatment is urgent (see ... on this label).

Storage

P403 Store in a well-ventilated place.
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:	Diborane(6)
Common names and synonyms:	Diborane(6)
CAS number:	19287-45-7
EC number:	242-940-6
Concentration:	100%

SECTION 4: First aid measures

Description of necessary first-aid measures

If inhaled

Fresh air, rest. Half-upright position. Artificial respiration may be needed. Refer for medical attention.

Following skin contact

ON FROSTBITE: rinse with plenty of water, do NOT remove clothes. Refer for medical attention .

Following eye contact

First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then refer for medical attention.

Following ingestion

Rinse mouth with water. Do not induce vomiting. Never give anything by mouth to an unconscious person. Call a doctor or Poison Control Center immediately.

Most important symptoms/effects, acute and delayed

Boranes are highly toxic by inhalation, skin absorption or ingestion. They may produce acute or chronic poisoning. Diborane is an irritant to the lungs and kidneys. The primary effect of diborane poisoning is lung congestion caused by local tissue irritation produced by the exothermic reaction of hydrolysis. (EPA, 1998)

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

Maintain an open airway and assist ventilation if nescessary. treat coma, seizures, hypotension, and renal failure if they occur. There is no specific antidote. Administer activated charcoal (although boric acid is not well absorbed). Consider gastric lavage for large ingestions. Boric acid, Borates, and Boron

SECTION 5: Firefighting measures

Suitable extinguishing media

Do not use halocarbons. Use fine spray or fog to control fire by preventing its spread and absorbing some of its heat. Stop flow of gas before extinguishing fire. Liquid nitrogen may be effective for cooling and extinguishing diborane fires. Use water spray to deep fire-exposed containers cool. Explosive decomposition may occur under fire conditions. Fight fire from protected location or maximum possible distance. Approach fire from upwind to avoid hazardous vapors.

Specific hazards arising from the chemical

It will ignite spontaneously in moist air at room temperature. Also, it reacts violently with vaporizing liquid-type extinguishing agents. It hydrolyzes in water to hydrogen and boric acid. Incompatible with air, halogenated compounds, aluminum, lithium, active metals, oxidized surfaces, chlorine, fuming nitric acid, nitrogen trifluoride, oxygen, and phosphorus trifluoride. Avoid moist air, electrical sparks, open flames or any other heat source. Hazardous polymerization may occur. (EPA, 1998)

Special protective actions for fire-fighters

Shut off supply; if not possible and no risk to surroundings, let the fire burn itself out. In other cases extinguish with dry powder. NO hydrous agents. In case of fire: keep cylinder cool by spraying with water. NO direct contact 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. Ventilation. Remove all ignition sources. Turn off gas at source if possible.

Environmental precautions

Evacuate danger area! Consult an expert! Personal protection: complete protective clothing including self-contained breathing apparatus. Ventilation. Remove all ignition sources. Turn off gas at source if possible.

Methods and materials for containment and cleaning up

Evacuate danger area! Consult an expert! Ventilation. Stop flow of gas. Spilled liquid has very low temperature and evaporates quickly (extra personal protection: complete protective clothing including self-contained breathing apparatus).

SECTION 7: Handling and storage

Precautions for safe handling

NO open flames, NO sparks and NO smoking. NO contact with halogens, oxidizing agents or water. NO contact with hot surfaces. Closed system, ventilation, explosion-proof electrical equipment and lighting. Prevent build-up of electrostatic charges (e.g., by grounding). Use non-sparking handtools. 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 strong oxidants, food and feedstuffs and water. Cool. Ventilation along the floor and ceiling. Dry.Store in a cool, dry, well-ventilated location. Isolate from air, moisture, halogens, alkali metals, aluminum, and rust. Outside or detached storage is preferred. Normally refrigerated.

SECTION 8: Exposure controls/personal protection

Control parameters

Occupational Exposure limit values

TLV: 0.1 ppm as TWA

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 safety goggles or eye protection in combination with breathing protection.

Skin protection

Cold-insulating gloves.

Respiratory protection

Use ventilation, local exhaust or breathing protection.

Thermal hazards

no data available

SECTION 9: Physical and chemical properties and safety characteristics

Physical state:	Diborane is a colorless gas with an offensive odor. It is toxic by inhalation. Diborane is decomposed by water giving off hydrogen, another flammable gas and boric acid a non-regulated material. Its vapors are heavier than air. Long term exposure to low concentrations or short term exposure to high concentrations can result in adverse health effects from inhalation. It is used in electronics. Rate of onset: Immediate Persistence: Minutes to hours Odor threshold: 2.5 ppm Source/use/other hazard: Intermediate chemical manufacturing; very flammable.
Colour:	Colorless gas
Odour:	Repulsively, sickly-sweet odor
Melting point/freezing point:	-165°C
Boiling point or initial boiling point and boiling range:	72-74?°C15?mm Hg(lit.)
Flammability:	Flammable Gas
Lower and upper explosion limit/flammability limit:	0.8% LOWER and 88% UPPER /table/

Flash point:	170?°F
Auto-ignition temperature:	100 to 126° F (NTP, 1992)
Decomposition temperature:	no data available
pH:	no data available
Kinematic viscosity:	Gas: 0.00785 mPa.s at 101.325 kPa at 10 deg C. Liquid: 0.177 mPa.s at -109.2 deg C.
Solubility:	Decomposes (NTP, 1992)
Partition coefficient n-octanol/water:	no data available
Vapour pressure:	224 mm Hg at -169.6° F (EPA, 1998)
Density and/or relative density:	1.157?g/mL?at 25?°C(lit.)
Relative vapour density:	1 (EPA, 1998) (Relative to Air)
Particle characteristics:	no data available

SECTION 10: Stability and reactivity

Reactivity

The substance polymerizes. This produces liquid pentaborane. Reacts violently with oxidants. Decomposes rapidly on heating. This produces hydrogen, boric acid and boric oxide.

Chemical stability

Conditions contributing to instability: Temperatures above -18 deg C (0 deg F).

Possibility of hazardous reactions

Flammable gas. Evolves hydrogen and ignites on contact with water or moist air. Pyrophoric; may ignite spontaneously on exposure to air. May accumulate then explode in air without a source of ignition.The gas mixes well with air, explosive mixtures are easily

formed.It is a colorless, air and moisture-sensitive gas, highly toxic. It ignites in air. It is very explosive when exposed to heat or flame, on contact with moisture it produces hydrogen gas. Explosive reaction with benzene vapor, chlorine, nitric acid and tetravinyllead [Bretherick, 5th ed., 1995, p. 77]. Explosive reaction with dimethyl sulfoxide [Shriver, 1969, p. 209], violent reaction with halocarbon liquids used as fire extinguishants (e.g., carbon tetrachloride). Reaction with Al or Li produces complex hydrides that may ignite spontaneously in air [Haz. Chem. Data, 1975, p. 114].

Conditions to avoid

no data available

Incompatible materials

A violent explosion occurred when carbon tetrachloride was used on a borane fire.

Hazardous decomposition products

Heat can cause /diborane/ to decompose violently ...

SECTION 11: Toxicological information

Acute toxicity

Oral: no data available

Inhalation: LC50 Rat inhalation 40 or 80 ppm/4 hr (Depends on age of animals)

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

no data available

Reproductive toxicity

no data available

STOT-single exposure

The substance is corrosive to the eyes, skin and respiratory tract. Inhalation may cause lung oedema. See Notes. The effects may be delayed. Exposure could cause death.

STOT-repeated exposure

Inhalation may cause asthma-like reactions (RADS).

Aspiration hazard

A harmful concentration of this gas in the air will be reached very quickly on loss of containment.

SECTION 12: Ecological information

Toxicity

Toxicity to fish: no data available

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

no data available

Bioaccumulative potential

no data available

Mobility in soil

no data available

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: UN1911 (For reference only, please check.)
IMDG: UN1911 (For reference only, please check.)
IATA: UN1911 (For reference only, please check.)

UN Proper Shipping Name

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

Transport hazard class(es)

ADR/RID: 2.3 (For reference only, please check.)
IMDG: 2.3 (For reference only, please check.)
IATA: 2.3 (For reference only, please check.)

Packing group, if applicable

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

Environmental hazards

ADR/RID: No
IMDG: No
IATA: No

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

The presence of contaminants may lower the auto-ignition temperature so that ignition may occur at or below room temperature.Reacts violently with fire extinguishing agents such as water.The symptoms of lung oedema often do not become manifest until a few hours have passed and they are aggravated by physical effort.Rest and medical observation is therefore essential.The odour warning when the exposure limit value is exceeded is insufficient.Turn leaking cylinder with the leak up to prevent escape of gas in liquid state.