

Safety Data Sheet acc. to OSHA HCS

Date of issue: 01/29/2025

Revision date 01/29/2025

1 Identification

- **Product identifier**
- **Trade name:** Busulfan-d8
- **Synonym**
1,4-butane-1,1,2,2,3,3,4,4-d8-diol, dimethanesulfonate
Busulphan-d8
Mielosan-d8
Milecitan-d8
Myeloleukon-d8
Mylecytan-d8
Myleran-d8
- **CAS Number:**
116653-28-2
- **Other means of identification**
- **Article number:** 23096
- **EC number:**
110-432-2
- **Application of the substance / the mixture**
This product is for research use - Not for human or veterinary diagnostic or therapeutic use.
- **Details of the supplier of the safety data sheet**
- **Manufacturer/Supplier:**
Cayman Chemical Co.
1180 E. Ellsworth Rd.
Ann Arbor, MI 48108
USA
- **Information department:** Product safety department
- **Emergency telephone number:**
During normal opening times: +1 (734) 971-3335
US/CANADA: 800-424-9300
Outside US/CANADA: 703-741-5970

2 Hazard(s) identification

- **Classification of the substance or mixture**



GHS06 Skull and crossbones

Acute toxicity - oral 3

Acute toxicity - dermal 2

Acute toxicity - inhalation 2

H301 Toxic if swallowed.

H310 Fatal in contact with skin.

H330 Fatal if inhaled.

(Contd. on page 2)

US

Safety Data Sheet

acc. to OSHA HCS

Date of issue: 01/29/2025

Revision date 01/29/2025

Trade name: **Busulfan-d8**

(Contd. from page 1)



GHS08 Health hazard

Germ cell mutagenicity 1B	H340 May cause genetic defects.
Carcinogenicity 1A	H350 May cause cancer.
Reproductive toxicity 1B	H360 May damage fertility or the unborn child.
Specific target organ toxicity (repeated exposure) 2	H373 May cause damage to organs through prolonged or repeated exposure.



GHS07

Skin irritation 2	H315 Causes skin irritation.
Eye irritation 2A	H319 Causes serious eye irritation.
Specific target organ toxicity (single exposure) 3	H335 May cause respiratory irritation.

· **Label elements**

· **GHS label elements**

The substance is classified and labeled according to the Globally Harmonized System (GHS).

· **Hazard pictograms**



GHS06



GHS07



GHS08

· **Signal word** Danger

· **Hazard statements**

H301	Toxic if swallowed.
H310+H330	Fatal in contact with skin or if inhaled.
H315	Causes skin irritation.
H319	Causes serious eye irritation.
H340	May cause genetic defects.
H350	May cause cancer.
H360	May damage fertility or the unborn child.
H335	May cause respiratory irritation.
H373	May cause damage to organs through prolonged or repeated exposure.

· **Precautionary statements**

P201	Obtain special instructions before use.
P202	Do not handle until all safety precautions have been read and understood.
P260	Do not breathe dust/fume/gas/mist/vapors/spray.
P262	Do not get in eyes, on skin, or on clothing.
P264	Wash thoroughly after handling.
P270	Do not eat, drink or smoke when using this product.
P271	Use only outdoors or in a well-ventilated area.
P280	Wear protective gloves/protective clothing/eye protection/face protection/hearing protection.
P284	[In case of inadequate ventilation] wear respiratory protection.
P301+P310	If swallowed: Immediately call a poison center/doctor.
P330	Rinse mouth.
P302+P352	If on skin: Wash with plenty of water.
P304+P340	If inhaled: Remove person to fresh air and keep comfortable for breathing.

(Contd. on page 3)

Safety Data Sheet

acc. to OSHA HCS

Date of issue: 01/29/2025

Revision date 01/29/2025

Trade name: Busulfan-d8

(Contd. from page 2)

P305+P351+P338 If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

P308+P313 IF exposed or concerned: Get medical advice/attention.

P312 Call a poison center/doctor if you feel unwell.

P314 Get medical advice/attention if you feel unwell.

P320 Specific treatment is urgent (see on this label).

P361+P364 Take off immediately all contaminated clothing and wash it before reuse.

P332+P313 If skin irritation occurs: Get medical advice/attention.

P337+P313 If eye irritation persists: Get medical advice/attention.

P403+P233 Store in a well-ventilated place. Keep container tightly closed.

P405 Store locked up.

P501 Dispose of contents/container in accordance with local/regional/national/international regulations.

- Information pertaining to particular dangers for man and environment:
- Classification system:
- NFPA ratings (scale 0 - 4)



Health = 4
Fire = 0
Reactivity = 0

- HMIS-ratings (scale 0 - 4)



Health = *4
Fire = 0
Reactivity = 0

- Other hazards
- Results of PBT and vPvB assessment
- PBT: Not applicable.
- vPvB: Not applicable.
- Classification according to (d)(1)(ii) of § 1910.1200
The SDS issuer does not object to the classifications provided by importers or manufacturers of precursor products.
- Hazards not otherwise classified
There are no adverse physical or health effects known that are not covered by the hazard classes of the Hazard Communications Standard.

3 Composition/information on ingredients

- Chemical characterization: Substances
- CAS No. Description
116653-28-2 Busulfan-d8
- Identification number(s)
- EC number: 110-432-2

4 First-aid measures

- Description of first aid measures
- General information:
Immediately remove any clothing soiled by the product.
Symptoms of poisoning may even occur after several hours; therefore medical observation for at least 48 hours after the accident.

(Contd. on page 4)

US

Safety Data Sheet

acc. to OSHA HCS

Date of issue: 01/29/2025

Revision date 01/29/2025

Trade name: Busulfan-d8

(Contd. from page 3)

Remove breathing apparatus only after contaminated clothing have been completely removed.

In case of irregular breathing or respiratory arrest provide artificial respiration.

- **After inhalation:**

Supply fresh air or oxygen; call for doctor.

In case of unconsciousness place patient stably in side position for transportation.

- **After skin contact:** Immediately wash with water and soap and rinse thoroughly.

- **After eye contact:**

Rinse opened eye for several minutes under running water. If symptoms persist, consult a doctor.

- **After swallowing:** Do not induce vomiting; immediately call for medical help.

- **Most important symptoms and effects, both acute and delayed**

No further relevant information available.

- **Indication of any immediate medical attention and special treatment needed**

No further relevant information available.

5 Fire-fighting measures

- **Extinguishing media**

- **Suitable extinguishing agents:**

Use fire fighting measures that suit the environment.

A solid water stream may be inefficient.

- **Special hazards arising from the substance or mixture** No further relevant information available.

- **Advice for firefighters**

- **Protective equipment:** Mouth respiratory protective device.

6 Accidental release measures

- **Personal precautions, protective equipment and emergency procedures** Not required.

- **Environmental precautions:** Do not allow to enter sewers/ surface or ground water.

- **Methods and material for containment and cleaning up:**

Dispose contaminated material as waste according to section 13.

Ensure adequate ventilation.

- **Protective Action Criteria for Chemicals**

- **PAC-1:** Substance is not listed.

- **PAC-2:** Substance is not listed.

- **PAC-3:** Substance is not listed.

- **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

- **Precautions for safe handling**

Thorough dedusting.

Ensure good ventilation/exhaustion at the workplace.

Open and handle receptacle with care.

- **Information about protection against explosions and fires:**

Keep respiratory protective device available.

- **Conditions for safe storage, including any incompatibilities**

- **Storage:** Store in accordance with information listed on the product insert.

- **Requirements to be met by storerooms and receptacles:** No special requirements.

(Contd. on page 5)

Safety Data Sheet

acc. to OSHA HCS

Date of issue: 01/29/2025

Revision date 01/29/2025

Trade name: Busulfan-d8

(Contd. from page 4)

- **Information about storage in one common storage facility:** Not required.
- **Further information about storage conditions:** Keep receptacle tightly sealed.
- **Specific end use(s)** No further relevant information available.

* 8 Exposure controls/personal protection

- **Control parameters**
- **Components with limit values that require monitoring at the workplace:** Not required.
- **Additional information:** The lists that were valid during the creation were used as basis.
- **Exposure controls**
- **Appropriate engineering controls** No further data; see section 7.
- **Personal protective equipment:**
- **General protective and hygienic measures:**
Keep away from foodstuffs, beverages and feed.
Immediately remove all soiled and contaminated clothing.
Wash hands before breaks and at the end of work.
Store protective clothing separately.
Avoid contact with the eyes and skin.
- **Breathing equipment:**
In case of brief exposure or low pollution use respiratory filter device. In case of intensive or longer exposure use respiratory protective device that is independent of circulating air.
- **Protection of hands:**



Protective gloves

The glove material has to be impermeable and resistant to the product/ the substance/ the preparation. Due to missing tests no recommendation to the glove material can be given for the product/ the preparation/ the chemical mixture.

Selection of the glove material on consideration of the penetration times, rates of diffusion and the degradation

- **Material of gloves**
The selection of the suitable gloves does not only depend on the material, but also on further marks of quality and varies from manufacturer to manufacturer.
- **Penetration time of glove material**
The exact break through time has to be found out by the manufacturer of the protective gloves and has to be observed.
- **Eye protection:**



Tightly sealed goggles

* 9 Physical and chemical properties

- **Information on basic physical and chemical properties**
- **General Information**
- **Physical state** Solid
- **Color:** Not determined.
- **Odor:** Characteristic

(Contd. on page 6)

US

Safety Data Sheet

acc. to OSHA HCS

Date of issue: 01/29/2025

Revision date 01/29/2025

Trade name: Busulfan-d8

(Contd. from page 5)

· Structural Formula	C6H6D8O6S2
· Molecular Weight	254.3 g/mol
· Storage Buffer	
· Odor threshold:	Not determined.
· Formulation	
· Melting point/Melting range:	Undetermined.
· Boiling point/Boiling range:	Undetermined.
· Flammability:	Product is not flammable.
· Explosion limits:	
· Lower:	Not determined.
· Upper:	Not determined.
· Flash point:	Not applicable.
· Decomposition temperature:	Not determined.
· pH-value:	Not applicable.
· Viscosity:	
· Kinematic:	Not applicable.
· SOLUBILITY	DMF: 16.7 mg/ml; DMSO: 16.7 mg/ml; DMSO:PBS (pH 7.2) (1:1): 0.5 mg/ml
· Dynamic:	Not applicable.
· Solubility in / Miscibility with	
· Water:	Not determined.
· Partition coefficient (n-octanol/water):	Not determined.
· Vapor pressure:	Not applicable.
· Vapor pressure:	
· Density:	Not determined.
· Relative density	Not determined.
· Vapor density	Not applicable.
· Particle characteristics	Not determined.
· Other information	
· Appearance:	
· Form:	Solid
· Important information on protection of health and environment, and on safety.	
· Ignition temperature:	Not determined.
· Danger of explosion:	Product does not present an explosion hazard.
· Change in condition	
· Evaporation rate	Not applicable.

10 Stability and reactivity

- **Reactivity** No further relevant information available.
- **Chemical stability**
- **Thermal decomposition / conditions to be avoided:**
No decomposition if used according to specifications.
- **Possibility of hazardous reactions** No dangerous reactions known.
- **Conditions to avoid** No further relevant information available.
- **Incompatible materials:** strong oxidizing agents
- **Hazardous decomposition products:** carbon dioxide, carbon monoxide, hydrogen sulfide

US

(Contd. on page 7)

Safety Data Sheet

acc. to OSHA HCS

Date of issue: 01/29/2025

Revision date 01/29/2025

Trade name: Busulfan-d8

(Contd. from page 6)

11 Toxicological information

- **Information on toxicological effects**
- **Acute toxicity:**
- **Primary irritant effect:**
- **on the skin:** Irritant to skin and mucous membranes.
- **on the eye:** Irritating effect.
- **Sensitization:** No sensitizing effects known.
- **Additional toxicological information:**
- **Interactive effects** No interactive effects between components are known.
- **Carcinogenic categories**
- **IARC (International Agency for Research on Cancer)** Substance is not listed.
- **NTP (National Toxicology Program)** Substance is not listed.
- **OSHA-Ca (Occupational Safety & Health Administration)** Substance is not listed.
- **Alternative sources for toxicological information**
- No non-standard sources for toxicological information where used.

12 Ecological information

- **Toxicity**
- **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.
- **Results of PBT and vPvB assessment**
- **PBT:** Not applicable.
- **vPvB:** Not applicable.
- **Other adverse effects**
- **Additional ecological information:**
- **General notes:**
- Water hazard class 3 (Self-assessment): extremely hazardous for water
- 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.

13 Disposal considerations

- **Waste treatment methods**
- **Recommendation:**
- Must not be disposed of together with household garbage. Do not allow product to reach sewage system.
- **Uncleaned packagings:**
- **Recommendation:** Disposal must be made according to official regulations.

14 Transport information

- **UN-Number**
- **DOT, IMDG, IATA** UN2811

(Contd. on page 8)

-US

Safety Data Sheet

acc. to OSHA HCS

Date of issue: 01/29/2025

Revision date 01/29/2025

Trade name: Busulfan-d8

(Contd. from page 7)

<ul style="list-style-type: none"> · UN proper shipping name · DOT · IMDG · IATA 	Toxic solids, organic, n.o.s. (Busulfan-d8) TOXIC SOLID, ORGANIC, N.O.S. (Busulfan-d8) Toxic solid, organic, n.o.s. (Busulfan-d8)
--	---

- **Transport hazard class(es)**

- **DOT**



<ul style="list-style-type: none"> · Class · Label 	6.1 Toxic substances 6.1
--	-----------------------------

- **IMDG, IATA**



<ul style="list-style-type: none"> · Class · Label 	6.1 Toxic substances 6.1
--	-----------------------------

- **Packing group**

- **DOT, IMDG, IATA**

I

- **Environmental hazards:**

Not applicable.

- **Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code**

Not applicable.

- **Transport/Additional information:**

- **DOT**

- **Quantity limitations**

On passenger aircraft/rail: 5 kg
 On cargo aircraft only: 50 kg

- **IMDG**

- **Limited quantities (LQ)**

0

- **Excepted quantities (EQ)**

Code: E5
 Maximum net quantity per inner packaging: 1 g
 Maximum net quantity per outer packaging: 300 g

- **IATA**

- **Remarks:**

When sold in quantities of less than or equal to 1 mL, or 1 g, with an Excepted Quantity Code of E1, E2, E4, or E5, this item meets the De Minimis Quantities exemption, per IATA 2.6.10. Therefore packaging does not have to be labeled as Dangerous Goods/Excepted Quantity.

- **Special precautions for user**

Warning: Toxic substances

- **Hazard identification number (Kemler code):** 66

- **EMS Number:**

F-A,S-A

- **Stowage Category**

B

(Contd. on page 9)

US

Safety Data Sheet

acc. to OSHA HCS

Date of issue: 01/29/2025

Revision date 01/29/2025

Trade name: Busulfan-d8

(Contd. from page 8)

· UN "Model Regulation":	UN 2811 TOXIC SOLID, ORGANIC, N.O.S. (BUSULFAN-D8), 6.1, I
---------------------------------	---

15 Regulatory information

- **Safety, health and environmental regulations/legislation specific for the substance or mixture**
- **Sara**
- **Section 355 (extremely hazardous substances):** Substance is not listed.
- **Section 313 (Specific toxic chemical listings):** Substance is not listed.
- **TSCA (Toxic Substances Control Act):** Substance is not listed.
- **Hazardous Air Pollutants** Substance is not listed.
- **Chemicals known to cause cancer:** Substance is not listed.
- **Chemicals known to cause reproductive toxicity for females:** Substance is not listed.
- **Chemicals known to cause reproductive toxicity for males:** Substance is not listed.
- **Chemicals known to cause developmental toxicity:** Substance is not listed.

- **Carcinogenic categories**
- **EPA (Environmental Protection Agency)** Substance is not listed.
- **TLV (Threshold Limit Value)** Substance is not listed.
- **NIOSH-Ca (National Institute for Occupational Safety and Health)** Substance is not listed.

- **National regulations:**
- **Information about limitation of use:**
Workers are not allowed to be exposed to this hazardous material. Exceptions can be made by the authorities in certain cases.
- **Chemical safety assessment:** A Chemical Safety Assessment has not been carried out.

16 Other information

All chemicals may pose unknown hazards and should be used with caution. This SDS applies only to the material as packaged. If this product is combined with other materials, deteriorates, or becomes contaminated, it may pose hazards not mentioned in this SDS. Cayman Chemical Company assumes no responsibility for incidental or consequential damages, including lost profits, arising from the use of these data. It shall be the user's responsibility to develop proper methods of handling and personal protection based on the actual conditions of use. While this SDS is based on technical data judged to be reliable, Cayman Chemical Company assumes no responsibility for the completeness or accuracy of the information contained herein.

- **Department issuing SDS:** Environment protection department.
- **Contact:** -
- **Date of previous version** 04/19/2022
- **Date of preparation** 01/29/2025
- **Abbreviations and acronyms:**
 IMDG: International Maritime Code for Dangerous Goods
 DOT: US Department of Transportation
 IATA: International Air Transport Association
 EINECS: European Inventory of Existing Commercial Chemical Substances
 CAS: Chemical Abstracts Service (division of the American Chemical Society)
 NFPA: National Fire Protection Association (USA)
 HMIS: Hazardous Materials Identification System (USA)
 PBT: Persistent, Bioaccumulative and Toxic
 vPvB: very Persistent and very Bioaccumulative
 NIOSH: National Institute for Occupational Safety
 OSHA: Occupational Safety & Health
 TLV: Threshold Limit Value

(Contd. on page 10)

Safety Data Sheet

acc. to OSHA HCS

Date of issue: 01/29/2025

Revision date 01/29/2025

Trade name: Busulfan-d8

(Contd. from page 9)

PEL: Permissible Exposure Limit

REL: Recommended Exposure Limit

Acute toxicity - oral 3: Acute toxicity – Category 3

Acute toxicity - dermal 2: Acute toxicity – Category 2

Skin irritation 2: Skin corrosion/irritation – Category 2

Eye irritation 2A: Serious eye damage/eye irritation – Category 2A

Germ cell mutagenicity 1B: Germ cell mutagenicity – Category 1B

Carcinogenicity 1A: Carcinogenicity – Category 1A

Reproductive toxicity 1B: Reproductive toxicity – Category 1B

Specific target organ toxicity (single exposure) 3: Specific target organ toxicity (single exposure) – Category 3

Specific target organ toxicity (repeated exposure) 2: Specific target organ toxicity (repeated exposure) – Category 2

*** Data compared to the previous version altered.**

US