



BUSULFAN (TETRAMETHYLENE-D8, 98%)

Safety Data Sheet

according to Regulation (EC) No. 453/2010 and according to Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules and Regulations

Date of issue: 17/02/2011

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Version: 2.0

DLM-7696

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

1.1. Product identifier

Product form : Substance
Substance name : BUSULFAN (TETRAMETHYLENE-D8, 98%)
EC no : 200-250-2 (Unlabeled)
CAS No : 116653-28-2
Product code : DLM-7696
Formula : CH₃SO₂O(CD₂)₄OSO₂CH₃

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

1.2.1. Relevant identified uses

Main use category : Professional use
Industrial/Professional use spec : For professional use only

1.2.2. Uses advised against

No additional information available

1.3. Details of the supplier of the safety data sheet

Cambridge Isotope Laboratories, Inc.
50 Frontage Road
Andover, MA 01810
USA

USA: 1-800-322-1174 Int: 1-978-749-8000
cilsales@isotope.com www.isotope.com

Emergency telephone number

Emergency numbers:

Chemtrec: 1-800-424-9300 (24 hours)
International: 1-703-741-5970 (24 hours)

SECTION 2: Hazards identification

2.1. Classification of the substance or mixture

Classification according to Regulation (EC) No. 1272/2008 [CLP]

Acute Tox. 3 (Oral) H301
Acute Tox. 1 (Dermal) H310
Acute Tox. 2 (Inhalation:dust,mist) H330
Carc. 1A H350

Full text of H-statements: see section 16

Classification according to Directive 67/548/EEC [DSD] or 1999/45/EC [DPD]

T; R25
T+; R26/27
Carc.Cat.1; R45
Carc.Cat.1; R49

Full text of R-phrases: see section 16

GHS-US classification

Acute Tox. 3 (Oral) H301
Acute Tox. 1 (Dermal) H310
Acute Tox. 1 (Inhalation) H330
Carc. 1A H350

Adverse physicochemical, human health and environmental effects

Bone marrow, Eyes.

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2.2. Label elements

Labelling according to Regulation (EC) No. 1272/2008 [CLP]

Hazard pictograms (CLP) :



Signal word (CLP) :

Danger

Hazard statements (CLP) :

H301 - Toxic if swallowed
H310+H330 - Fatal in contact with skin or if inhaled
H350 - May cause cancer (in contact with skin, if inhaled, if swallowed)

Precautionary statements (CLP) :

P260 - Do not breathe dust, fume, gas, mist, spray, vapours
P264 - Wash hands, forearms and face 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 clothing, protective gloves
P284 - Wear respiratory protection
P301+P310 - IF SWALLOWED: Immediately call a doctor, a POISON CENTER
P302+P352 - IF ON SKIN: Wash with plenty of water

GHS-US labelling

Hazard pictograms (GHS-US) :



Signal word (GHS-US) :

Danger

Hazard statements (GHS-US) :

H301 - Toxic if swallowed
H310+H330 - Fatal in contact with skin or if inhaled
H350 - May cause cancer (Dermal, Inhalation, oral)

Precautionary statements (GHS-US) :

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, spray, vapours
P262 - Do not get in eyes, on skin, or on clothing
P264 - Wash hands, forearms and face 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 clothing, protective gloves
P284 - Wear respiratory protection
P301+P310 - IF SWALLOWED: immediately call a POISON CENTER or doctor/physician
P304+P340 - IF INHALED: remove victim to fresh air and keep at rest in a position comfortable for breathing
P308+P313 - IF exposed or concerned: Get medical advice/attention
P310 - Immediately call a POISON CENTER or doctor/physician
P320 - Specific treatment is urgent (see Hazard pictograms (CLP) on this label)
P321 - Specific treatment (see Hazard pictograms (CLP) on this label)
P330 - If swallowed, rinse mouth
P361 - Remove/Take off immediately all contaminated clothing
P363 - Wash contaminated clothing before reuse
P403+P233 - Store in a well-ventilated place. Keep container tightly closed
P405 - Store locked up
P501 - Dispose of contents/container to Comply with applicable regulations

2.3. Other hazards

No additional information available

SECTION 3: Composition/information on ingredients

3.1. Substance

Name	Product identifier	%	Classification according to Directive 67/548/EEC
BUSULFAN (TETRAMETHYLENE-D8, 98%) (Main constituent)	(CAS No) 116653-28-2 (EC no) 200-250-2 (Unlabeled)	100	T; R25 T+; R26/27 Carc.Cat.1; R45 Carc.Cat.1; R49

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Name	Product identifier	%	Classification according to Regulation (EC) No. 1272/2008 [CLP]
BUSULFAN (TETRAMETHYLENE-D8, 98%) (Main constituent)	(CAS No) 116653-28-2 (EC no) 200-250-2 (Unlabeled)	100	Acute Tox. 3 (Oral), H301 Acute Tox. 1 (Dermal), H310 Acute Tox. 2 (Inhalation:dust,mist), H330 Carc. 1A, H350

Full text of R- and H-statements: see section 16

Name	Product identifier	%	GHS-US classification
BUSULFAN (TETRAMETHYLENE-D8, 98%) (Main constituent)	(CAS No) 116653-28-2	100	Acute Tox. 3 (Oral), H301 Acute Tox. 1 (Dermal), H310 Acute Tox. 1 (Inhalation), H330 Carc. 1A, H350

Full text of H-statements: see section 16

3.2. Mixture

Not applicable

SECTION 4: First aid measures

4.1. Description of first aid measures

First-aid measures general	: Consult a physician. Show this safety data sheet to the doctor in attendance. Move out of dangerous area.
First-aid measures after inhalation	: If breathed in, move person to fresh air. If not breathing, give artificial respiration. Consult a physician.
First-aid measures after skin contact	: Wash off with soap and plenty of water. Take victim immediately to hospital. Consult a physician.
First-aid measures after eye contact	: Flush eyes with water as a precaution.
First-aid measures after ingestion	: Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2. Most important symptoms and effects, both acute and delayed

Symptoms/injuries after inhalation	: May be fatal if inhaled. May cause respiratory tract irritation.
Symptoms/injuries after skin contact	: May be fatal if absorbed through skin. May cause skin irritation.
Symptoms/injuries after eye contact	: May cause eye irritation.
Symptoms/injuries after ingestion	: Toxic if swallowed.

4.3. Indication of any immediate medical attention and special treatment needed

No additional information available

SECTION 5: Firefighting measures

5.1. Extinguishing media

Suitable extinguishing media : Use water spray, alcohol-resistant foam, dry chemical, or carbon dioxide.

5.2. Special hazards arising from the substance or mixture

Reactivity : Not available.

5.3. Advice for firefighters

Firefighting instructions : Wear self contained breathing apparatus for fire fighting if necessary.
Protection during firefighting : Do not enter fire area without proper protective equipment, including respiratory protection.

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

6.1.1. For non-emergency personnel

Emergency procedures : Wear respiratory protection. Avoid dust formation. Avoid breathing vapors, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust.

6.1.2. For emergency responders

No additional information available

6.2. Environmental precautions

Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

6.3. Methods and material for containment and cleaning up

For containment : Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

6.4. Reference to other sections

No additional information available

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SECTION 7: Handling and storage

7.1. Precautions for safe handling

- Additional hazards when processed : Avoid contact with skin and eyes. Avoid formation of dust and aerosols. Provide appropriate exhaust ventilation at places where dust is formed. Normal measures for preventive fire protection.
- Hygiene measures : Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

7.2. Conditions for safe storage, including any incompatibilities

- Technical measures : Keep container tightly closed in a dry and well-ventilated place.
- Storage conditions : Store at room temperature away from light and moisture.

7.3. Specific end use(s)

No additional information available

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

No additional information available

8.2. Exposure controls

- Appropriate engineering controls : Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.
- Personal protective equipment : Gloves. Protective clothing. Protective goggles. Self-contained breathing apparatus.



- Materials for protective clothing : Wear suitable protective clothing and gloves.
- Hand protection : Wear suitable protective clothing and gloves.
- Eye protection : Wear safety glasses with side shields (or goggles) and a face shield.
- Skin and body protection : Choose body protection according to the amount and concentration of the dangerous substance at the work place.
- Respiratory protection : When appropriate, use NIOSH/CEN approved respirator.
- Environmental exposure controls : Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

- Physical state : Solid
- Appearance : Crystalline.
- Molecular mass : 254.35 g/mol (Labeled)
- Colour : Beige.
- Odour : No data available.
- Odour threshold : No data available
- pH : No data available
- Relative evaporation rate (butylacetate=1) : No data available
- Melting point : 114 - 117 °C (237 - 243 °F) - lit.
- Freezing point : No data available
- Boiling point : No data available
- Flash point : No data available
- Auto-ignition temperature : No data available
- Decomposition temperature : No data available
- Flammability (solid, gas) : No data available
- Vapour pressure : No data available
- Relative vapour density at 20 °C : No data available
- Relative density : No data available
- Solubility : No data available
- Log Pow : No data available
- Log Kow : No data available
- Viscosity, kinematic : No data available
- Viscosity, dynamic : No data available

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Explosive properties : No data available
Oxidising properties : No data available
Explosive limits : No data available

9.2. Other information

No additional information available

SECTION 10: Stability and reactivity

10.1. Reactivity

Not available.

10.2. Chemical stability

Stable if stored under recommended conditions.

10.3. Possibility of hazardous reactions

No additional information available

10.4. Conditions to avoid

Not available.

10.5. Incompatible materials

Strong oxidizing agents.

10.6. Hazardous decomposition products

Carbon oxides (CO, CO₂). Sulphur oxides.

SECTION 11: Toxicological information

11.1. Information on toxicological effects

Acute toxicity : Toxic if swallowed. Fatal in contact with skin. Fatal if inhaled.

BUSULFAN (TETRAMETHYLENE-D8, 98%) (116653-28-2)	
LD50 oral	110 mg/kg - mouse Remarks: Diarrhea. Skin and appendages: Other: Hair.
ATE CLP (oral)	100.000 mg/kg bodyweight
ATE CLP (dermal)	5.000 mg/kg bodyweight
ATE CLP (dust,mist)	0.050 mg/l/4h

Skin corrosion/irritation : Not classified
No data available

Serious eye damage/irritation : Not classified
No data available

Respiratory or skin sensitisation : Not available
No data available

Germ cell mutagenicity : Not available

Carcinogenicity : Possible human carcinogen.

Reproductive toxicity : Overexposure may cause reproductive disorder(s) based on tests with laboratory animals.

Specific target organ toxicity (single exposure) : Not classified
No data available

Specific target organ toxicity (repeated exposure) : Not classified
No data available

Aspiration hazard : Not classified

Potential adverse human health effects and symptoms : The chemical, physical, and toxicological properties have not been thoroughly investigated.

IARC group : 1

Symptoms/injuries after inhalation : May be fatal if inhaled. May cause respiratory tract irritation.

Symptoms/injuries after skin contact : May be fatal if absorbed through skin. May cause skin irritation.

Symptoms/injuries after eye contact : May cause eye irritation.

Symptoms/injuries after ingestion : Toxic if swallowed.

SECTION 12: Ecological information

12.1. Toxicity

No additional information available

12.2. Persistence and degradability

No additional information available

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12.3. Bioaccumulative potential

No additional information available

12.4. Mobility in soil

No additional information available

12.5. Results of PBT and vPvB assessment

No additional information available

12.6. Other adverse effects

No additional information available

SECTION 13: Disposal considerations

13.1. Waste treatment methods

- Regional legislation (waste) : Waste materials should be disposed of under conditions which meet Federal, State, and Local environmental control regulations.
- Waste disposal recommendations : Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material.
- Ecology - waste materials : Dispose of as unused product.

SECTION 14: Transport information

In accordance with ADR / RID / IMDG / IATA / ADN

14.1. UN number

- UN-No.(DOT) : 2811
- DOT NA no. UN2811

14.2. UN proper shipping name

- Proper Shipping Name (DOT) : Toxic solids, organic, n.o.s.
(Busulfan)
- Transport hazard class(es) (DOT) : 6.1 - Class 6.1 - Poisonous materials 49 CFR 173.132
- Hazard labels (DOT) : 6.1 - Poison inhalation hazard



- DOT Symbols : G - Identifies PSN requiring a technical name
- Packing group (DOT) : III - Minor Danger
- DOT Special Provisions (49 CFR 172.102) : IB8 - Authorized IBCs: Metal (11A, 11B, 11N, 21A, 21B, 21N, 31A, 31B and 31N); Rigid plastics (11H1, 11H2, 21H1, 21H2, 31H1 and 31H2); Composite (11HZ1, 11HZ2, 21HZ1, 21HZ2, 31HZ1 and 31HZ2); Fiberboard (11G); Wooden (11C, 11D and 11F); Flexible (13H1, 13H2, 13H3, 13H4, 13H5, 13L1, 13L2, 13L3, 13L4, 13M1 or 13M2).
IP3 - Flexible IBCs must be sift-proof and water-resistant or must be fitted with a sift-proof and water-resistant liner.
T1 - 1.5 178.274(d)(2) Normal..... 178.275(d)(2)
TP33 - The portable tank instruction assigned for this substance applies for granular and powdered solids and for solids which are filled and discharged at temperatures above their melting point which are cooled and transported as a solid mass. Solid substances transported or offered for transport above their melting point are authorized for transportation in portable tanks conforming to the provisions of portable tank instruction T4 for solid substances of packing group III or T7 for solid substances of packing group II, unless a tank with more stringent requirements for minimum shell thickness, maximum allowable working pressure, pressure-relief devices or bottom outlets are assigned in which case the more stringent tank instruction and special provisions shall apply. Filling limits must be in accordance with portable tank special provision TP3. Solids meeting the definition of an elevated temperature material must be transported in accordance with the applicable requirements of this subchapter.
- DOT Packaging Exceptions (49 CFR 173.xxx) : 153
- DOT Packaging Non Bulk (49 CFR 173.xxx) : 213
- DOT Packaging Bulk (49 CFR 173.xxx) : 240
- Marine pollutant : No

14.3. Additional information

- Other information : No supplementary information available.

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Overland transport

Packing group (ADR) : III
Class (ADR) : 6.1 - Toxic substances
Hazard identification number (Kemler No.) : 60
Classification code (ADR) : T2
Danger labels (ADR) : 6.1 - Toxic substances



Orange plates : 

Tunnel restriction code : E
Limited quantities (ADR) : 5kg
EAC code : 2X
Excepted quantities (ADR) : E1

Transport by sea

DOT Vessel Stowage Location : A - The material may be stowed "on deck" or "under deck" on a cargo vessel and on a passenger vessel.
MFAG-No : 154

Air transport

DOT Quantity Limitations Passenger aircraft/rail (49 CFR 173.27) : 100 kg
DOT Quantity Limitations Cargo aircraft only (49 CFR 175.75) : 200 kg
Civil Aeronautics Law : Toxic and infectious substances/Toxic substances (Hazardous materials notice Appended Table 1 Article 194 of the Enforcement Regulations)

14.4. Environmental hazards

Other information : No supplementary information available.

14.5. Special precautions for user

14.6. Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code

Not applicable

SECTION 15: Regulatory information

15.1. US Federal regulations

BUSULFAN (TETRAMETHYLENE-D8, 98%) (116653-28-2)	
SARA Section 302 Threshold Planning Quantity (TPQ)	Not subject to reporting requirements of the United States SARA Section 302.
SARA Section 311/312 Hazard Classes	Immediate (acute) health hazard Delayed (chronic) health hazard
SARA Section 313 - Emission Reporting	Not subject to reporting requirements of the United States SARA Section 313.

15.2. International regulations

CANADA

BUSULFAN (TETRAMETHYLENE-D8, 98%) (116653-28-2)
Listed on the Canadian DSL (Domestic Substances List)

15.2.1. National regulations

No additional information available

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15.3. US State regulations

BUSULFAN (TETRAMETHYLENE-D8, 98%)(116653-28-2)

State or local regulations	U.S. - Massachusetts - Right To Know List U.S. - Pennsylvania - RTK (Right to Know) List U.S. - New Jersey - Right to Know Hazardous Substance List WARNING! This product contains a chemical known by the state of California to cause cancer, birth defects or other reproductive harm.
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SECTION 16: Other information

Other information : This product is not radioactive. The data given for this product are those of the corresponding unlabeled compound, unless specifically indicated otherwise. Health and safety data for labeled compounds are generally not available, but are assumed to be similar or identical to the corresponding unlabeled compound.

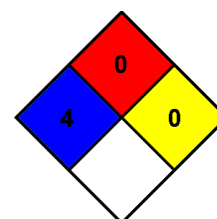
Full text of R-, H- and EUH-statements:

Acute Tox. 1 (Dermal)	Acute toxicity (dermal), Category 1
Acute Tox. 2 (Inhalation:dust,mist)	Acute toxicity (inhalation:dust,mist) Category 2
Acute Tox. 3 (Oral)	Acute toxicity (oral), Category 3
Carc. 1A	Carcinogenicity, Category 1A
H301	Toxic if swallowed
H310	Fatal in contact with skin
H330	Fatal if inhaled
H350	May cause cancer
R25	Toxic if swallowed
R26/27	Very toxic by inhalation and in contact with skin
R45	May cause cancer
R49	May cause cancer by inhalation
T	Toxic
T+	Very toxic

NFPA health hazard : 4 - Very short exposure could cause death or serious residual injury even though prompt medical attention was given.

NFPA fire hazard : 0 - Materials that will not burn.

NFPA reactivity : 0 - Normally stable, even under fire exposure conditions, and are not reactive with water.



HMIS III Rating

Health : 4 Severe Hazard - Life-threatening, major or permanent damage may result from single or repeated overexposures

Flammability : 0 Minimal Hazard

Physical : 0 Minimal Hazard

CIL Multi-Solvent Mixture SDS

This information is based on our current knowledge and is intended to describe the product for the purposes of health, safety and environmental requirements only. It should not therefore be construed as guaranteeing any specific property of the product