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

Product information
Product Name: Sulfole® 120 Mercaptan (tert-Dodecyl Mercaptan)
Material: 1121184, 1113774, 1017942, 1024818, 1024817,
1103990, 1084934, 1101771, 1086417, 1086418, 1021548,
1036536, 1035962, 1021538, 1021539, 1021542, 1021543,
1021544, 1021546, 1021547, 1021550, 1021551, 1021552,
1021553, 1021719, 1032613, 1021545, 1021549, 10462848

EC-No. Registration number

<table>
<thead>
<tr>
<th>Chemical name</th>
<th>CAS-No.</th>
<th>Legal Entity</th>
</tr>
</thead>
<tbody>
<tr>
<td>tert-Dodecanethiol</td>
<td>25103-58-6 246-619-1</td>
<td>Chevron Phillips Chemicals International NV 01-2119486132-42-0002</td>
</tr>
</tbody>
</table>

Relevant Identified Uses Supported:
- Manufacture
- Formulation
- Use in polymer processing – industrial
- Lubricants - Industrial
- Use in mining – industrial

Company: Chevron Phillips Chemical Company LP
10001 Six Pines Drive
The Woodlands, TX 77380

Local: Chevron Phillips Chemicals International N.V.
Airport Plaza (Stockholm Building)
Leonardo Da Vinci laan 19
1831 Diegem
Belgium

SDS Requests: (800) 852-5530
Technical Information: (832) 813-4862
Responsible Party: Product Safety Group
Email: sds@cpchem.com

Emergency telephone:
SECTION 2: Hazards identification

Classification of the substance or mixture
REGULATION (EC) No 1272/2008

Skin irritation, Category 2
Skin sensitization, Sub-category 1B
Eye irritation, Category 2
Chronic aquatic toxicity, Category 4

H315: Causes skin irritation.
H317: May cause an allergic skin reaction.
H319: Causes serious eye irritation.
H413: May cause long lasting harmful effects to aquatic life.

Label elements
Labeling (REGULATION (EC) No 1272/2008)

Hazard pictograms: ⚠️

Signal Word: Warning

Hazard Statements:

- H315: Causes skin irritation.
- H317: May cause an allergic skin reaction.
- H319: Causes serious eye irritation.
- H413: May cause long lasting harmful effects to aquatic life.

Precautionary Statements:

Prevention:
- P264: Wash skin thoroughly after handling.
- P273: Avoid release to the environment.
- P280: Wear protective gloves/ eye protection/ face protection.

Response:
- P332 + P313: If skin irritation occurs: Get medical advice/ attention.
- P337 + P313: If eye irritation persists: Get medical advice/ attention.

Disposal:
- P501: Dispose of contents/ container to an
approved waste disposal plant.

Hazardous ingredients which must be listed on the label:

- 25103-58-6 tert-Dodecanethiol

SECTION 3: Composition/information on ingredients

Synonyms: TDM

Molecular formula: C12H26S

Mixtures

Hazardous ingredients

<table>
<thead>
<tr>
<th>Chemical name</th>
<th>CAS-No. EC-No. Index No.</th>
<th>Classification (REGULATION (EC) No 1272/2008)</th>
<th>Concentration [wt%]</th>
</tr>
</thead>
<tbody>
<tr>
<td>tert-Dodecanethiol</td>
<td>25103-58-6 246-619-1</td>
<td>Skin Irrit. 2; H315 Eye Irrit. 2; H319 Skin Sens. 1B; H317 Aquatic Chronic 4; H413</td>
<td>90 - 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

General advice: Move out of dangerous area. Show this material safety data sheet to the doctor in attendance. Material may produce a serious, potentially fatal pneumonia if swallowed or vomited.

If inhaled: If unconscious, place in recovery position and seek medical advice. If symptoms persist, call a physician.

In case of skin contact: If skin irritation persists, call a physician. If on skin, rinse well with water. If on clothes, remove clothes.

In case of eye contact: Immediately flush eye(s) with plenty of water. Remove contact lenses. Protect unharmed eye. Keep eye wide open while rinsing. If eye irritation persists, consult a specialist.

If swallowed: Keep respiratory tract clear. If symptoms persist, call a physician. Take victim immediately to hospital.

SECTION 5: Firefighting measures

Flash point: 98 - 110 °C (208 - 230 °F)

Autoignition temperature: 198 - 230 °C (388 - 446 °F)
SAFETY DATA SHEET

Sulfole® 120 Mercaptan (tert-Dodecyl Mercaptan)

Version 3.11  Revision Date 2017-05-31

 Unsuitable extinguishing media : High volume water jet.
 Specific hazards during fire fighting : Do not allow run-off from fire fighting to enter drains or water courses.
 Special protective equipment for fire-fighters : Wear self-contained breathing apparatus for firefighting if necessary.
 Further information : Collect contaminated fire extinguishing water separately. This must not be discharged into drains. Fire residues and contaminated fire extinguishing water must be disposed of in accordance with local regulations.
 Fire and explosion protection : Normal measures for preventive fire protection.
 Hazardous decomposition products : Carbon oxides. Sulfur oxides.

SECTION 6: Accidental release measures

 Personal precautions : Use personal protective equipment. Ensure adequate ventilation.
 Environmental precautions : Prevent product from entering drains. Prevent further leakage or spillage if safe to do so. If the product contaminates rivers and lakes or drains inform respective authorities.
 Methods for cleaning up : Soak up with inert absorbent material (e.g. sand, silica gel, acid binder, universal binder, sawdust). Keep in suitable, closed containers for disposal.

SECTION 7: Handling and storage

 Handling

 Advice on safe handling : Do not breathe vapors/dust. Avoid exposure - obtain special instructions before use. Avoid contact with skin and eyes. For personal protection see section 8. Smoking, eating and drinking should be prohibited in the application area. Dispose of rinse water in accordance with local and national regulations. Persons susceptible to skin sensitization problems or asthma, allergies, chronic or recurrent respiratory disease should not be employed in any process in which this mixture is being used.
 Advice on protection against fire and explosion : Normal measures for preventive fire protection.

 Storage

 Requirements for storage areas and containers : Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage. Observe label precautions. Electrical installations / working materials must comply with the
SAFETY DATA SHEET

Sulfole® 120 Mercaptan (tert-Dodecyl Mercaptan)

Version 3.11
Revision Date 2017-05-31

SECTION 8: Exposure controls/personal protection

Chevron Phillips Chemical Company LP

<table>
<thead>
<tr>
<th>Ingredients</th>
<th>Basis</th>
<th>Value</th>
<th>Control parameters</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>tert-Dodecanethiol</td>
<td>Manufacturer</td>
<td>TWA</td>
<td>0.1 ppm.</td>
<td></td>
</tr>
</tbody>
</table>

DNEL

: End Use: Workers
Routes of exposure: Inhalation
Potential health effects: Long-term systemic effects
Value: 0.5 mg/m³

DNEL

: End Use: Workers
Routes of exposure: Skin contact
Potential health effects: Long-term systemic effects
Value: 1.7 mg/kg

DNEL

: End Use: Workers
Routes of exposure: Skin contact
Potential health effects: Acute effects
Value: 0.665 mg/cm²

DNEL

: End Use: Consumers
Routes of exposure: Inhalation
Potential health effects: Long-term systemic effects
Value: 0.09 mg/m³

DNEL

: End Use: Consumers
Routes of exposure: Ingestion
Potential health effects: Long-term systemic effects
Value: 0.08 mg/kg

PNEC

: Fresh water sediment
Value: 3 mg/kg

PNEC

: Marine sediment
Value: 0.3 mg/kg

Engineering measures

Adequate ventilation to control airborne concentrations below the exposure guidelines/limits. Consider the potential hazards of this material (see Section 2), applicable exposure limits, job activities, and other substances in the work place when designing engineering controls and selecting personal protective equipment. If engineering controls or work practices are not adequate to prevent exposure to harmful levels of this material, the personal protective equipment listed below is recommended. The user should read and understand all instructions and limitations supplied with the equipment since protection is usually provided for a limited time or under certain circumstances.

Personal protective equipment

Respiratory protection

: Wear a supplied-air NIOSH approved respirator unless ventilation or other engineering controls are adequate to maintain minimal oxygen content of 19.5% by volume under normal atmospheric pressure. Wear a NIOSH approved respirator that provides protection when working with this
material if exposure to harmful levels of airborne material may occur, such as: Air-Purifying Respirator for Dusts and Mists / P100. Use a positive pressure, air-supplying respirator if there is potential for uncontrolled release, exposure levels are not known, or other circumstances where air-purifying respirators may not provide adequate protection.

Hand protection: The suitability for a specific workplace should be discussed with the producers of the protective gloves. Please observe the instructions regarding permeability and breakthrough time which are provided by the supplier of the gloves. Also take into consideration the specific local conditions under which the product is used, such as the danger of cuts, abrasion, and the contact time. Gloves should be discarded and replaced if there is any indication of degradation or chemical breakthrough.

Eye protection: Eye wash bottle with pure water. Tightly fitting safety goggles. Wear face-shield and protective suit for abnormal processing problems.

Skin and body protection: Choose body protection according to the amount and concentration of the dangerous substance at the work place. Wear as appropriate: Protective suit. Safety shoes.

Hygiene measures: When using do not eat or drink. When using do not smoke. Wash hands before breaks and at the end of workday.

Protective measures: Wear suitable protective equipment. When using do not eat, drink or smoke. Avoid contact with skin.

For additional details, see the Exposure Scenario in the Annex portion.

SECTION 9: Physical and chemical properties

Information on basic physical and chemical properties

Appearance
Physical state: Liquid
Color: Colorless
Odor: Repulsive

Safety data
Flash point: 98 - 110 °C (208 - 230 °F)
Lower explosion limit: No data available
Upper explosion limit: No data available
Oxidizing properties: no

Autoignition temperature: 198 - 230 °C (388 - 446 °F)
Thermal decomposition: 300 °F

Molecular formula: C12H26S
Molecular weight : 202,44 g/mol
pH : Not applicable
Pour point : No data available
Melting point/range : -16 °C (3 °F)
Boiling point/boiling range : 233 °C (451 °F)
Vapor pressure : 4,00 Pa
 at 24 °C (75 °F)
Relative density : 0,86
 at 16 °C (61 °F)
Water solubility : 0,00393 mg/l
 Method: OECD Test Guideline 105
Partition coefficient: n-octanol/water : Pow: 7,43
 at 20 °C (68 °F)
Viscosity, dynamic : 2,6 cP
 at 20 °C (68 °F)
Viscosity, kinematic : No data available
Relative vapor density : 3
 (Air = 1.0)
Evaporation rate : < 1

SECTION 10: Stability and reactivity
Chemical stability : This material is considered stable under normal ambient and anticipated storage and handling conditions of temperature and pressure.

Possibility of hazardous reactions
Conditions to avoid : Heat, sparks, fire, and oxidizing agents.
Thermal decomposition : 300 °F
Hazardous decomposition products : Carbon oxides
 : Sulfur oxides
Other data : No decomposition if stored and applied as directed.
SECTION 11: Toxicological information

Acute oral toxicity
tert-Dodecanethiol: LD50: > 5,000 mg/kg
Species: Rat
Sex: male and female
Method: OECD Test Guideline 401
Information given is based on data obtained from similar substances.

Acute inhalation toxicity
tert-Dodecanethiol: LC50: > 1.97 milligram per liter
Exposure time: 4 h
Species: Rat
Sex: male and female
Method: OECD Test Guideline 403
Information given is based on data obtained from similar substances.

Acute dermal toxicity
tert-Dodecanethiol: LD50: > 2000 mg/kg
Species: Rat
Sex: male
Method: OECD Test Guideline 402
Information given is based on data obtained from similar substances.

Skin irritation
tert-Dodecanethiol: Skin irritation

Eye irritation
tert-Dodecanethiol: Eye irritation

Sensitization
tert-Dodecanethiol: The product is a skin sensitizer, sub-category 1B.

Repeated dose toxicity
tert-Dodecanethiol: Species: Rat, male
Sex: male
Application Route: Inhalation
Dose: 0, 26, 98 ppm
Exposure time: 4 wk
Number of exposures: 6 h/d, 5 d/wk
Lowest observable effect level: 26 ppm
Method: OECD Test Guideline 412
Target Organs: Kidney, Liver
Species: Rat, female
Sex: female
Application Route: Inhalation
Dose: 0, 26, 98 ppm
Exposure time: 4 wk
Number of exposures: 6 h/d, 5 d/wk
NOEL: 26 ppm
Method: OECD Guideline 412
Target Organs: Liver, Kidney

Species: Dog, male and female
Sex: male and female
Application Route: Inhalation
Dose: 0, 25, 106 ppm
Exposure time: 4 wk
Number of exposures: 6 h/d, 5 d/wk
NOEL: 25 ppm
Lowest observable effect level: 109 ppm
Method: OECD Test Guideline 412
Target Organs: Liver

Species: Mouse, male and female
Sex: male and female
Application Route: Inhalation
Dose: 0, 25, 109 ppm
Exposure time: 4 wk
Number of exposures: 6 h/d, 5 d/wk
Lowest observable effect level: 25 ppm
Method: OECD Test Guideline 412
Target Organs: Liver

Information given is based on data obtained from similar substances.

Species: Rat, male
Sex: male
Application Route: oral gavage
Dose: 10, 50, 250 mg/kg
Exposure time: 35 d
Number of exposures: once daily
NOEL: 50 mg/kg
Method: OECD Guideline 422
Target Organs: Liver, spleen
Information given is based on data obtained from similar substances.

Species: Rat, female
Sex: female
Application Route: oral gavage
Dose: 10, 50, 250 mg/kg
Exposure time: 53 d
Number of exposures: once daily
NOEL: 50 mg/kg
Method: OECD Guideline 422
Target Organs: Liver, spleen
Information given is based on data obtained from similar substances.

Species: Rat, male
Sex: male
Application Route: Inhalation
Dose: 5, 25, 100 ppm
Exposure time: 90 d
Sulfole® 120 Mercaptan (tert-Dodecyl Mercaptan)

Number of exposures: 6h/d, 5d/wk
NOEL: 25 ppm
Method: OECD Test Guideline 413

Species: Rat, female
Sex: female
Application Route: Inhalation
Dose: 5, 25, 100 ppm
Exposure time: 90 d
Number of exposures: 6h/d, 5d/wk
NOEL: 25 ppm
Method: OECD Test Guideline 413

Reproductive toxicity

tert-Dodecanethiol
Species: Rat
Sex: male
Application Route: oral gavage
Dose: 10, 50, 250 mg/kg/d
Exposure time: 35 d
Number of exposures: Daily
Method: OECD Guideline 422
NOAEL Parent: >= 250 mg/kg
Information given is based on data obtained from similar substances.

Species: Rat
Sex: female
Application Route: oral gavage
Dose: 10, 50, 250 mg/kg/d
Exposure time: 53 d
Number of exposures: Daily
Method: OECD Guideline 422
NOAEL Parent: 50 mg/kg
NOAEL F1: 50 mg/kg
Information given is based on data obtained from similar substances.
Decrease in Delivery Index

Developmental Toxicity

tert-Dodecanethiol
Species: Rat
Application Route: Inhalation
Dose: 0, 22.7, 88.6 ppm
Number of exposures: 6 hrs/d
Test period: GD 6-19
Method: OECD Guideline 414
NOAEL Teratogenicity: >= 88.6 ppm
No adverse effects expected
Species: Mouse  
Application Route: Inhalation  
Dose: 0, 22.7, 88.6 ppm  
Number of exposures: 6 hrs/d  
Test period: GD 6-19  
Method: OECD Guideline 414  
NOAEL Teratogenicity: >= 88.6 ppm  
No adverse effects expected

Sulfole® 120 Mercaptan (tert-Dodecyl Mercaptan)  
Aspiration toxicity: May be harmful if swallowed and enters airways.

CMR effects  
tert-Dodecanethiol: Carcinogenicity: Not available  
Mutagenicity: Tests on bacterial or mammalian cell cultures did not show mutagenic effects.  
Teratogenicity: Animal testing did not show any effects on fetal development.  
Reproductive toxicity: No toxicity to reproduction

Sulfole® 120 Mercaptan (tert-Dodecyl Mercaptan)  
Further information: Solvents may degrease the skin.

SECTION 12: Ecological information

Toxicity to fish  
tert-Dodecanethiol: LL50: > 100 mg/l  
Exposure time: 96 h  
Species: Danio rerio (Zebra Fish) static test  
Method: OECD Test Guideline 203  
No toxicity at the limit of solubility.

Toxicity to daphnia and other aquatic invertebrates  
tert-Dodecanethiol: EC50: > 0,056 mg/l  
Exposure time: 48 h  
Species: Daphnia magna (Water flea) semi-static test  
Method: OECD Test Guideline 202  
No toxicity at the limit of solubility.

Toxicity to bacteria  
tert-Dodecanethiol: NOEC: 8,6 mg/l  
Exposure time: 3 h  
Growth rate  
Respiration inhibition  
Method: OECD Test Guideline 209
### Toxicity to daphnia and other aquatic invertebrates (Chronic toxicity)

<table>
<thead>
<tr>
<th>Substance</th>
<th>NOEC</th>
<th>Exposure time</th>
<th>Species</th>
<th>Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>tert-Dodecanethiol</td>
<td>&gt; 0.0108 mg/l</td>
<td>21 d</td>
<td>Daphnia magna (Water flea)</td>
<td>OECD Test Guideline 211</td>
</tr>
</tbody>
</table>

**No toxicity at the limit of solubility.**

### Bioaccumulation

<table>
<thead>
<tr>
<th>Substance</th>
<th>Species</th>
<th>Exposure time</th>
<th>Bioconcentration factor (BCF)</th>
<th>Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>tert-Dodecanethiol</td>
<td>Danio rerio</td>
<td>15 d</td>
<td>&gt; 500 - &lt; 1.950</td>
<td>OECD Test Guideline 305</td>
</tr>
</tbody>
</table>

**Biomagnification factor <1**

The product may be accumulated in organisms.

### Biodegradability

<table>
<thead>
<tr>
<th>Substance</th>
<th>Result</th>
<th>Testing period</th>
<th>Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>tert-Dodecanethiol</td>
<td>Not readily biodegradable</td>
<td>28 d</td>
<td>OECD Test Guideline 301D</td>
</tr>
</tbody>
</table>

### Ecotoxicology Assessment

- **Acute aquatic toxicity**
  - tert-Dodecanethiol: No toxicity at the limit of solubility.

- **Chronic aquatic toxicity**
  - tert-Dodecanethiol: May cause long lasting harmful effects to aquatic life.

### Toxicity Data on Soil

- tert-Dodecanethiol: Adsorbs on soil.

### Results of PBT assessment

- tert-Dodecanethiol: Non-classified PBT substance, Non-classified vPvB substance

### Additional ecological information

- May cause long lasting harmful effects to aquatic life.

### SECTION 13: Disposal considerations

The information in this SDS pertains only to the product as shipped.
Use material for its intended purpose or recycle if possible. This material, if it must be discarded, may meet the criteria of a hazardous waste as defined by US EPA under RCRA (40 CFR 261) or other State and local regulations. Measurement of certain physical properties and analysis for regulated components may be necessary to make a correct determination. If this material is classified as a hazardous waste, federal law requires disposal at a licensed hazardous waste disposal facility.

Product: The product should not be allowed to enter drains, water courses or the soil. Do not contaminate ponds, waterways or ditches with chemical or used container. Send to a licensed waste management company.

Contaminated packaging: Empty remaining contents. Dispose of as unused product. Do not re-use empty containers.

For additional details, see the Exposure Scenario in the Annex portion

**SECTION 14: Transport information**

The shipping descriptions shown here are for bulk shipments only, and may not apply to shipments in non-bulk packages (see regulatory definition).

Consult the appropriate domestic or international mode-specific and quantity-specific Dangerous Goods Regulations for additional shipping description requirements (e.g., technical name or names, etc.) Therefore, the information shown here, may not always agree with the bill of lading shipping description for the material. Flashpoints for the material may vary slightly between the SDS and the bill of lading.

**US DOT (UNITED STATES DEPARTMENT OF TRANSPORTATION)**

NOT REGULATED AS A HAZARDOUS MATERIAL OR DANGEROUS GOODS FOR TRANSPORTATION BY THIS AGENCY.

**IMO / IMDG (INTERNATIONAL MARITIME DANGEROUS GOODS)**

NOT REGULATED AS A HAZARDOUS MATERIAL OR DANGEROUS GOODS FOR TRANSPORTATION BY THIS AGENCY.

**IATA (INTERNATIONAL AIR TRANSPORT ASSOCIATION)**

UN3334, AVIATION REGULATED LIQUID, N.O.S., (TERTIARY DODECANETHIOL), 9, III

**ADR (AGREEMENT ON DANGEROUS GOODS BY ROAD (EUROPE))**

NOT REGULATED AS A HAZARDOUS MATERIAL OR DANGEROUS GOODS FOR TRANSPORTATION BY THIS AGENCY.

**RID (REGULATIONS CONCERNING THE INTERNATIONAL TRANSPORT OF DANGEROUS GOODS (EUROPE))**

NOT REGULATED AS A HAZARDOUS MATERIAL OR DANGEROUS GOODS FOR TRANSPORTATION BY THIS AGENCY.

**ADN (EUROPEAN AGREEMENT CONCERNING THE INTERNATIONAL CARRIAGE OF DANGEROUS GOODS BY INLAND WATERWAYS)**

NOT REGULATED AS A HAZARDOUS MATERIAL OR DANGEROUS GOODS FOR TRANSPORTATION BY THIS AGENCY.
Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code

Other information : tert- Dodecanethiol, S.T. 3, Cat.Y

SECTION 15: Regulatory information

National legislation

Major Accident Hazard Legislation : 96/82/EC Update: 2003
Directive 96/82/EC does not apply

Water contaminating class (Germany) : WGK 2 water endangering VwVwS

Notification status

Europe REACH : On the inventory, or in compliance with the inventory
United States of America (USA) : On the inventory, or in compliance with the inventory
TSCA : On the inventory, or in compliance with the inventory
Canada DSL : On the inventory, or in compliance with the inventory
Australia AICS : On the inventory, or in compliance with the inventory
New Zealand NZIoC : On the inventory, or in compliance with the inventory
Japan ENCS : On the inventory, or in compliance with the inventory
Korea KECI : On the inventory, or in compliance with the inventory
Philippines PICCS : On the inventory, or in compliance with the inventory
China IECSC : On the inventory, or in compliance with the inventory

SECTION 16: Other information

NFPA Classification : Health Hazard: 2
Fire Hazard: 1
Reactivity Hazard: 0

Further information

Legacy SDS Number : 34650

Significant changes since the last version are highlighted in the margin. This version replaces all previous versions.

The information in this SDS pertains only to the product as shipped.

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a
guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.

### Key or legend to abbreviations and acronyms used in the safety data sheet

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACGIH</td>
<td>American Conference of Government Industrial Hygienists</td>
</tr>
<tr>
<td>LD50</td>
<td>Lethal Dose 50%</td>
</tr>
<tr>
<td>AICS</td>
<td>Australia, Inventory of Chemical Substances</td>
</tr>
<tr>
<td>LOAEL</td>
<td>Lowest Observed Adverse Effect Level</td>
</tr>
<tr>
<td>DSL</td>
<td>Canada, Domestic Substances List</td>
</tr>
<tr>
<td>NFPA</td>
<td>National Fire Protection Agency</td>
</tr>
<tr>
<td>NDSL</td>
<td>Canada, Non-Domestic Substances List</td>
</tr>
<tr>
<td>NIOSH</td>
<td>National Institute for Occupational Safety &amp; Health</td>
</tr>
<tr>
<td>CNS</td>
<td>Central Nervous System</td>
</tr>
<tr>
<td>NTP</td>
<td>National Toxicology Program</td>
</tr>
<tr>
<td>CAS</td>
<td>Chemical Abstract Service</td>
</tr>
<tr>
<td>NZIoC</td>
<td>New Zealand Inventory of Chemicals</td>
</tr>
<tr>
<td>EC50</td>
<td>Effective Concentration</td>
</tr>
<tr>
<td>NOAEL</td>
<td>No Observable Adverse Effect Level</td>
</tr>
<tr>
<td>EC50</td>
<td>Effective Concentration 50%</td>
</tr>
<tr>
<td>NOEC</td>
<td>No Observed Effect Concentration</td>
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<tr>
<td>EGEST</td>
<td>EOSCA Generic Exposure Scenario Tool</td>
</tr>
<tr>
<td>OSHA</td>
<td>Occupational Safety &amp; Health Administration</td>
</tr>
<tr>
<td>EOSCA</td>
<td>European Oilfield Specialty Chemicals Association</td>
</tr>
<tr>
<td>PEL</td>
<td>Permissible Exposure Limit</td>
</tr>
<tr>
<td>EINECS</td>
<td>European Inventory of Existing Chemical Substances</td>
</tr>
<tr>
<td>PICCS</td>
<td>Philippines Inventory of Commercial Chemical Substances</td>
</tr>
<tr>
<td>MAK</td>
<td>Germany Maximum Concentration Values</td>
</tr>
<tr>
<td>PRNT</td>
<td>Presumed Not Toxic</td>
</tr>
<tr>
<td>GHS</td>
<td>Globally Harmonized System</td>
</tr>
<tr>
<td>RCRA</td>
<td>Resource Conservation Recovery Act</td>
</tr>
<tr>
<td>&gt;=</td>
<td>Greater Than or Equal To</td>
</tr>
<tr>
<td>STEL</td>
<td>Short-term Exposure Limit</td>
</tr>
<tr>
<td>IC50</td>
<td>Inhibition Concentration 50%</td>
</tr>
<tr>
<td>SARA</td>
<td>Superfund Amendments and Reauthorization Act</td>
</tr>
<tr>
<td>IARC</td>
<td>International Agency for Research on Cancer</td>
</tr>
<tr>
<td>TLV</td>
<td>Threshold Limit Value</td>
</tr>
<tr>
<td>IECSC</td>
<td>Inventory of Existing Chemical Substances in China</td>
</tr>
<tr>
<td>TWA</td>
<td>Time Weighted Average</td>
</tr>
<tr>
<td>ENCS</td>
<td>Japan, Inventory of Existing and New Chemical Substances</td>
</tr>
<tr>
<td>TSCA</td>
<td>Toxic Substance Control Act</td>
</tr>
<tr>
<td>KECI</td>
<td>Korea, Existing Chemical Inventory</td>
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<tr>
<td>UVCB</td>
<td>Unknown or Variable Composition, Complex Reaction Products, and Biological Materials</td>
</tr>
<tr>
<td>&lt;=</td>
<td>Less Than or Equal To</td>
</tr>
<tr>
<td>WHMIS</td>
<td>Workplace Hazardous Materials Information System</td>
</tr>
<tr>
<td>LC50</td>
<td>Lethal Concentration 50%</td>
</tr>
</tbody>
</table>

### Full text of H-Statements referred to under sections 2 and 3.

- **H315** Causes skin irritation.
- **H317** May cause an allergic skin reaction.
- **H319** Causes serious eye irritation.
- **H413** May cause long lasting harmful effects to aquatic life.
Annex

1. Short title of Exposure Scenario: Manufacture

Main User Groups: SU 3: Industrial uses: Uses of substances as such or in preparations at industrial sites
Sector of use: SU3: Industrial Manufacturing (all)
Process category:
- PROC1: Use in closed process, no likelihood of exposure
- PROC2: Use in closed, continuous process with occasional controlled exposure
- PROC8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities
- PROC9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing)
- PROC15: Use as laboratory reagent

Environmental release category: ERC1: Manufacture of substances

2.1 Contributing scenario controlling environmental exposure for: ERC1: Manufacture of substances

Environment factors not influenced by risk management
- Flow rate: 0 m³/d
- Remarks: Not relevant since there is no release to waste water (dry process).

Other given operational conditions affecting environmental exposure
- Local release to the environment
  - Emission or Release Factor: Air: 0 %
  - Emission or Release Factor: Water: 0 %
  - Emission or Release Factor: Soil: 0 %
  - Local release rate: Water: 0 kg/day
  - Remarks: The waste of the substance is collected in a slop tank and treated as a waste by a dedicated contractor.
- Local release rate: Air: 0 kg/day
  - Remarks: Incineration of gases with efficiency 100%.
- Local release rate: Soil: 0 kg/day
  - Remarks: There is no direct exposure to soil.

Technical conditions and measures / Organizational measures
- Remarks: Not applicable

Conditions and measures related to municipal sewage treatment plant
- Type of Sewage Treatment Plant: Municipal sewage treatment plant
- Effectiveness (of a measure): 0 %
- Remarks: Not relevant since there is no release to waste water (dry process).

2.2 Contributing scenario controlling worker exposure for: PROC1: Use in closed process, no likelihood of exposure

Product characteristics
- SDS Number: 100000068802 16/46
Sulfole® 120 Mercaptan (tert-Dodecyl Mercaptan)

Physical Form (at time of use) : Liquid substance
Process Temperature : <= 40 °C

Frequency and duration of use
Exposure duration : < 4 h

Human factors not influenced by risk management
Exposed skin area : One hand face only (240 cm²)

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor
Remarks : Good general ventilation (3-5 air changes per hour)

Technical conditions and measures
Use product only in closed system.
Local exhaust ventilation- inhalation: No (Effectiveness: 0 %)

Conditions and measures related to personal protection, hygiene and health evaluation
Respiratory Protection, No (Effectiveness: 0 %)
Dermal Protection, No (Effectiveness: 0 %)

2.2 Contributing scenario controlling worker exposure for: PROC2: Use in closed, continuous process with occasional controlled exposure

Product characteristics
Physical Form (at time of use) : Liquid substance
Process Temperature : <= 40 °C

Frequency and duration of use
Exposure duration : < 1 h

Human factors not influenced by risk management
Exposed skin area : Palms of both hands (480 cm²)

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor
Remarks : Good general ventilation (3-5 air changes per hour)

Technical conditions and measures
Closed continuous process with occasional controlled exposure
Local exhaust ventilation- inhalation: Yes (Effectiveness: 90 %)
Local exhaust ventilation-dermal: No (Effectiveness: 0 %)

Conditions and measures related to personal protection, hygiene and health evaluation
Eye Protection, Yes, chemically resistant face shield, goggles, or safety glasses with side shields when there is potential for direct contact
Respiratory Protection, No (Effectiveness: 0 %)
Dermal Protection, Yes, Wear chemically resistant gloves (tested to EN374) in combination with ‘basic’ employee training. (Effectiveness: 80 %)

2.2 Contributing scenario controlling worker exposure for: PROC8b: Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at dedicated facilities

SDS Number:100000068802
### Product characteristics
- **Physical Form (at time of use):** Liquid substance
- **Process Temperature:** <= 40 °C

### Frequency and duration of use
- **Exposure duration:** < 1 h

### Human factors not influenced by risk management
- **Exposed skin area:** Two hands (960 cm²)

### Other operational conditions affecting workers exposure
- **Outdoor / Indoor:** Indoor
- **Remarks:** Good general ventilation (3-5 air changes per hour)

### Technical conditions and measures
- Semi-closed process with occasional controlled exposure
- Local exhaust ventilation - inhalation: Yes (Effectiveness: 95 %)
- Local exhaust ventilation - dermal: Yes (Effectiveness: 95 %)

### Conditions and measures related to personal protection, hygiene and health evaluation
- **Eye Protection:** Yes, chemically resistant face shield, goggles, or safety glasses with side shields when there is potential for direct contact
- **Respiratory Protection:** No (Effectiveness: 0 %)
- **Dermal Protection:** Yes, Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training. (Effectiveness: 80 %)

### 2.2 Contributing scenario controlling worker exposure for: PROC9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing)

### Product characteristics
- **Physical Form (at time of use):** Liquid substance
- **Process Temperature:** <= 40 °C

### Frequency and duration of use
- **Exposure duration:** < 1 h

### Human factors not influenced by risk management
- **Exposed skin area:** Palms of both hands (480 cm²)

### Other operational conditions affecting workers exposure
- **Outdoor / Indoor:** Indoor
- **Remarks:** Enhanced general ventilation (5-10 air changes per hour)

### Technical conditions and measures
- Semi-closed process with occasional controlled exposure
- Local exhaust ventilation - inhalation: Yes (Effectiveness: 90 %)
- Local exhaust ventilation - dermal: No (Effectiveness: 0 %)

### Conditions and measures related to personal protection, hygiene and health evaluation
- **Eye Protection:** Yes, chemically resistant face shield, goggles, or safety glasses with side shields when there is potential for direct contact
- **Respiratory Protection:** No (Effectiveness: 0 %)
- **Dermal Protection:** Yes, Wear chemically resistant gloves (tested to EN374) in combination with specific activity training. (Effectiveness: 95 %)
2.2 Contributing scenario controlling worker exposure for: PROC15: Use as laboratory reagent

Product characteristics
- Physical Form (at time of use): Liquid substance
- Process Temperature: <= 40 °C

Frequency and duration of use
- Exposure duration: < 1 h

Human factors not influenced by risk management
- Exposed skin area: One hand face only (240 cm2)

Other operational conditions affecting workers exposure
- Outdoor / Indoor: Indoor
- Remarks: Good general ventilation (3-5 air changes per hour)

Technical conditions and measures
- Local exhaust ventilation- inhalation.: Yes, Carry out in a vented booth provided with laminar airflow. (Effectiveness: 99 %)
- Local exhaust ventilation- dermal.: No (Effectiveness: 0 %)

Conditions and measures related to personal protection, hygiene and health evaluation
- Eye Protection: Yes, chemically resistant face shield, goggles, or safety glasses with side shields when there is potential for direct contact
- Respiratory Protection: No (Effectiveness: 0 %)
- Dermal Protection: Yes, Wear chemically resistant gloves (tested to EN374) in combination with ‘basic’ employee training. (Effectiveness: 80 %)

3. Exposure estimation and reference to its source

Environment

<table>
<thead>
<tr>
<th>Contributing Scenario</th>
<th>Exposure Assessment Method</th>
<th>Specific conditions</th>
<th>Compartment</th>
<th>Value type</th>
<th>Level of Exposure</th>
<th>Risk characterization ratio</th>
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<tbody>
<tr>
<td>ERC1</td>
<td>EUSES</td>
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<td>Marine sediment</td>
<td>0,0004866 mg/kg dry weight (d.w.)</td>
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<td></td>
<td>Sewage treatment plant</td>
<td>0 mg/L</td>
<td>&lt; 0,01</td>
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</table>

ERC1: Manufacture of substances

Workers/Consumers

<table>
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<th>Contributing Scenario</th>
<th>Exposure Assessment Method</th>
<th>Specific conditions</th>
<th>Value type</th>
<th>Level of Exposure</th>
<th>Risk characterization ratio</th>
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</thead>
<tbody>
<tr>
<td>PROC1</td>
<td>ECETOC TRA Modified</td>
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<td>Worker – inhalation, long-term – systemic</td>
<td>0,035 mg/m3</td>
<td>0,071</td>
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<td></td>
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<td>Worker – dermal, long-term – systemic</td>
<td>0,034 mg/kg/d</td>
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<td>Worker – long-term – systemic Combined routes</td>
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</tbody>
</table>

SDS Number:100000068802  19/46
Sulfole® 120 Mercaptan (tert-Dodecyl Mercaptan)

Version 3.11

Revision Date 2017-05-31

<table>
<thead>
<tr>
<th>PROC2</th>
<th>ECETOC TRA Modified</th>
<th>Worker – inhalation, long-term – systemic</th>
<th>0.118 mg/m³</th>
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<tr>
<td></td>
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<td>Worker – dermal, long-term – systemic</td>
<td>0.274 mg/kg/d</td>
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<td>Worker – long-term – systemic Combined routes</td>
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<td>PROC8b</td>
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<td>0.295 mg/m³</td>
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<td>0.137 mg/kg/d</td>
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<td></td>
<td></td>
<td>Worker – long-term – systemic Combined routes</td>
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<td>0.671</td>
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<td>PROC9</td>
<td>ECETOC TRA Modified</td>
<td>Worker – inhalation, long-term – systemic</td>
<td>0.253 mg/m³</td>
<td>0.506</td>
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<td>Worker – dermal, long-term – systemic</td>
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<td>Worker – long-term – systemic Combined routes</td>
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<td>0.708</td>
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<td>PROC15</td>
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<td>Worker – inhalation, long-term – systemic</td>
<td>0.059 mg/m³</td>
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<td>Worker – dermal, long-term – systemic</td>
<td>0.068 mg/kg/d</td>
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<td>Worker – long-term – systemic Combined routes</td>
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<td>0.158</td>
</tr>
</tbody>
</table>

PROC1: Use in closed process, no likelihood of exposure

PROC2: Use in closed, continuous process with occasional controlled exposure

PROC8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities

PROC9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing)

PROC15: Use as laboratory reagent

4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the Exposure Scenario

Not applicable

1. Short title of Exposure Scenario: **Formulation**

Main User Groups: **SU 3**: Industrial uses: Uses of substances as such or in preparations at industrial sites

Process category:

**PROC1**: Use in closed process, no likelihood of exposure

**PROC2**: Use in closed, continuous process with occasional controlled exposure

**PROC3**: Use in closed batch process (synthesis or formulation)

**PROC4**: Use in batch and other process (synthesis) where opportunity for exposure arises

**PROC8a**: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities

**PROC8b**: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities

SDS Number: 100000068802

20/46
**Sulfole® 120 Mercaptan (tert-Dodecyl Mercaptan)**

**Version 3.11**

**Revision Date** 2017-05-31

**PROC9:** Transfer of substance or preparation into small containers (dedicated filling line, including weighing)

**PROC15:** Use as laboratory reagent

**Environmental release category:** ERC2: Formulation of preparations

**Further information:** Formulation of preparations for Gold Paint for glassware and ceramics.

### 2.1 Contributing scenario controlling environmental exposure for: ERC2: Formulation of preparations

**Environment factors not influenced by risk management**

- **Flow rate:** 18,000 m³/d

**Other given operational conditions affecting environmental exposure**

- **Local release to the environment**
  - Emission or Release Factor: Air: 0.1%
  - Emission or Release Factor: Water: 0.3%
  - Emission or Release Factor: Soil: 0.01%

- **Local release rate**
  - Air: 0.1 kg/day
  - Water: 0.3 kg/day
  - Soil: 0.01 kg/day

**Technical conditions and measures / Organizational measures**

- **Remarks**: Sludge should be incinerated, contained or reclaimed.
- **Remarks**: No application of sewage sludge to soil

**Conditions and measures related to municipal sewage treatment plant**

- **Type of Sewage Treatment Plant**: Municipal sewage treatment plant
- **Flow rate of sewage treatment plant effluent**: 2,000 m³/d
- **Effectiveness (of a measure)**: 96%
- **Sludge Treatment**: Not applicable

### 2.2 Contributing scenario controlling worker exposure for: PROC1: Use in closed process, no likelihood of exposure

**Product characteristics**

- **Physical Form (at time of use)**: Liquid substance
- **Process Temperature**: <= 40 °C

**Frequency and duration of use**

- **Exposure duration**: < 4 h

**Human factors not influenced by risk management**

- **Exposed skin area**: One hand face only (240 cm²)

**Other operational conditions affecting workers exposure**

- **Outdoor / Indoor**: Indoor
- **Remarks**: Good general ventilation (3-5 air changes per hour)
**Sulfole® 120 Mercaptan (tert-Dodecyl Mercaptan)**

**Version 3.11**

**Revision Date** 2017-05-31

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### Technical conditions and measures

Use product only in closed system.
Local exhaust ventilation- inhalation: No (Effectiveness: 0 %)

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### Conditions and measures related to personal protection, hygiene and health evaluation

Respiratory Protection, No (Effectiveness: 0 %)
Dermal Protection, No (Effectiveness: 0 %)

---

#### 2.2 Contributing scenario controlling worker exposure for: PROC2: Use in closed, continuous process with occasional controlled exposure

**Product characteristics**

| Physical Form (at time of use) | Liquid substance |
| Process Temperature | <= 40 °C |

**Frequency and duration of use**

| Exposure duration | < 4 h |

**Human factors not influenced by risk management**

| Exposed skin area | Palms of both hands (480 cm²) |

**Other operational conditions affecting workers exposure**

| Outdoor / Indoor | Indoor |
| Remarks | Good general ventilation (3-5 air changes per hour) |

**Technical conditions and measures**

Closed continuous process with occasional controlled exposure
Local exhaust ventilation- inhalation: No (Effectiveness: 0 %)

**Conditions and measures related to personal protection, hygiene and health evaluation**

Eye Protection, Yes, chemically resistant face shield, goggles, or safety glasses with side shields when there is potential for direct contact
Respiratory Protection, No (Effectiveness: 0 %)
Dermal Protection, Yes, Wear chemically resistant gloves (tested to EN374) in combination with ‘basic’ employee training. Wear chemically resistant gloves (tested to EN374) in combination with specific activity training. (Effectiveness: 80 %)

---

#### 2.2 Contributing scenario controlling worker exposure for: PROC3: Use in closed batch process (synthesis or formulation)

**Product characteristics**

| Physical Form (at time of use) | Liquid substance |
| Process Temperature | <= 40 °C |

**Frequency and duration of use**

| Exposure duration | < 1 h |

**Human factors not influenced by risk management**

| Exposed skin area | One hand face only (240 cm²) |

**Other operational conditions affecting workers exposure**

| Outdoor / Indoor | Indoor |

---
### Remarks:
Good general ventilation (3-5 air changes per hour)

### Technical conditions and measures
- Closed continuous process with occasional controlled exposure
- Local exhaust ventilation - inhalation: No (Effectiveness: 0 %)

### Conditions and measures related to personal protection, hygiene and health evaluation
- **Eye Protection:** Yes, chemically resistant face shield, goggles, or safety glasses with side shields when there is potential for direct contact
- **Respiratory Protection:** No (Effectiveness: 0 %)
- **Dermal Protection:** Yes, Wear chemically resistant gloves (tested to EN374) in combination with ‘basic’ employee training. (Effectiveness: 80 %)

### 2.2 Contributing scenario controlling worker exposure for: PROC4, PROC9: Use in batch and other process (synthesis) where opportunity for exposure arises, Transfer of substance or preparation into small containers (dedicated filling line, including weighing)

#### Product characteristics
- **Physical Form (at time of use):** Liquid substance
- **Process Temperature:** <= 40 °C

#### Frequency and duration of use
- **Exposure duration:** < 1 h

#### Human factors not influenced by risk management
- **Exposed skin area:** Palms of both hands (480 cm²)

#### Other operational conditions affecting workers exposure
- **Outdoor / Indoor:** Indoor
- **Remarks:** Enhanced general ventilation (5-10 air changes per hour)

#### Technical conditions and measures
- Semi-closed process with occasional controlled exposure
- Local exhaust ventilation - inhalation: No (Effectiveness: 0 %)

#### Conditions and measures related to personal protection, hygiene and health evaluation
- **Eye Protection:** Yes, chemically resistant face shield, goggles, or safety glasses with side shields when there is potential for direct contact
- **Respiratory Protection:** No (Effectiveness: 0 %)
- **Dermal Protection:** Yes, Wear chemically resistant gloves (tested to EN374) in combination with ‘basic’ employee training. (Effectiveness: 80 %)

### 2.2 Contributing scenario controlling worker exposure for: PROC8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities

#### Product characteristics
- **Physical Form (at time of use):** Liquid substance
- **Process Temperature:** <= 40 °C

#### Frequency and duration of use
## Product characteristics

| Physical Form (at time of use) | Liquid substance |
| Process Temperature | <= 40 °C |

## Frequency and duration of use

| Exposure duration | < 1 h |

## Human factors not influenced by risk management

| Exposed skin area | Two hands (960 cm2) |

## Other operational conditions affecting workers exposure

| Outdoor / Indoor | Indoor |
| Remarks | Enhanced general ventilation (5-10 air changes per hour) |

## Technical conditions and measures

- Local exhaust ventilation- inhalation: No (Effectiveness: 0 %)

## Conditions and measures related to personal protection, hygiene and health evaluation

- Eye Protection, Yes, chemically resistant face shield, goggles, or safety glasses with side shields when there is potential for direct contact
- Respiratory Protection, No (Effectiveness: 0 %)
- Dermal Protection, Yes, Wear chemically resistant gloves (tested to EN374) in combination with ‘basic’ employee training. (Effectiveness: 80 %)

## 2.2 Contributing scenario controlling worker exposure for: PROC8b: Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at dedicated facilities

## Technical conditions and measures

- Semi-closed process with occasional controlled exposure
- Local exhaust ventilation- inhalation: No (Effectiveness: 0 %)

## Conditions and measures related to personal protection, hygiene and health evaluation

- Eye Protection, Yes, chemically resistant face shield, goggles, or safety glasses with side shields when there is potential for direct contact
- Respiratory Protection, No (Effectiveness: 0 %)
- Dermal Protection, Yes, Wear chemically resistant gloves (tested to EN374) in combination with ‘basic’ employee training. Wear chemically resistant gloves (tested to EN374) in combination with specific activity training. (Effectiveness: 80 %)

## 2.2 Contributing scenario controlling worker exposure for: PROC15: Use as laboratory reagent
Product characteristics
  Physical Form (at time of use) : Liquid substance
  Process Temperature : <= 40 °C

Frequency and duration of use
  Exposure duration : < 1 h

Human factors not influenced by risk management
  Exposed skin area : One hand face only (240 cm²)

Other operational conditions affecting workers exposure
  Outdoor / Indoor : Indoor
  Remarks : Enhanced general ventilation (5-10 air changes per hour)

Technical conditions and measures
  Local exhaust ventilation- inhalation: No (Effectiveness: 0 %)

Conditions and measures related to personal protection, hygiene and health evaluation
  Eye Protection, Yes, chemically resistant face shield, goggles, or safety glasses with side shields when there is potential for direct contact
  Respiratory Protection, No (Effectiveness: 0 %)
  Dermal Protection, Yes, Wear chemically resistant gloves (tested to EN374) in combination with ‘basic’ employee training., Wear chemically resistant gloves (tested to EN374) in combination with specific activity training. (Effectiveness: 80 %)

3. Exposure estimation and reference to its source

Environment

<table>
<thead>
<tr>
<th>Contributing Scenario</th>
<th>Exposure Assessment Method</th>
<th>Specific conditions</th>
<th>Compartment</th>
<th>Value type</th>
<th>Level of Exposure</th>
<th>Risk characterization ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>ERC2</td>
<td>EUSES</td>
<td></td>
<td>Freshwater sediment</td>
<td>0,253 mg/kg dry weight (d.w.)</td>
<td>0,084</td>
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<td></td>
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<td>Marine sediment</td>
<td>0,025 mg/kg dry weight (d.w.)</td>
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<td></td>
<td>Sewage treatment plant</td>
<td>0,006 mg/L</td>
<td>&lt; 0,01</td>
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ERC2: Formulation of preparations

Workers/Consumers

<table>
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<tr>
<th>Contributing Scenario</th>
<th>Exposure Assessment Method</th>
<th>Specific conditions</th>
<th>Value type</th>
<th>Level of Exposure</th>
<th>Risk characterization ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>PROC1</td>
<td>ECETOC TRA Modified</td>
<td></td>
<td>Worker – inhalation, long-term – systemic</td>
<td>0,004 mg/m³</td>
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<td></td>
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<td>Worker – dermal, long-term – systemic</td>
<td>0,003 mg/kg/d</td>
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<td></td>
<td></td>
<td></td>
<td>Worker – long-term – systemic Combined routes</td>
<td>&lt; 0,01</td>
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<tr>
<td>PROC2</td>
<td>ECETOC TRA Modified</td>
<td></td>
<td>Worker – inhalation, long-term – systemic</td>
<td>0,354 mg/m³</td>
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</tbody>
</table>

SDS Number:100000068802 25/46
## SAFETY DATA SHEET

### Sulfole® 120 Mercaptan (tert-Dodecyl Mercaptan)

**Version 3.11**

**Revision Date** 2017-05-31

<table>
<thead>
<tr>
<th>Scenario Code</th>
<th>ECETOC TRA</th>
<th>Description</th>
<th>Worker – dermal, long-term – systemic</th>
<th>Worker – long-term – systemic Combined routes</th>
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<td>PROC3</td>
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<td>Worker – dermal, long-term – systemic</td>
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<td>Worker – long-term – systemic Combined routes</td>
<td></td>
</tr>
<tr>
<td>PROC4, PROC9</td>
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<td>0,354 mg/m3</td>
<td>0,708 mg/m3</td>
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<td></td>
<td>Worker – inhalation, long-term – systemic</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Worker – dermal, long-term – systemic</td>
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<td></td>
<td></td>
<td></td>
<td>Worker – long-term – systemic Combined routes</td>
<td></td>
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<td>PROC8a</td>
<td>Modified</td>
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<td>0,253 mg/m3</td>
<td>0,506 mg/m3</td>
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<td>Worker – inhalation, long-term – systemic</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Worker – dermal, long-term – systemic</td>
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<td></td>
<td></td>
<td></td>
<td>Worker – long-term – systemic Combined routes</td>
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<td>PROC8b</td>
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<td>Worker – inhalation, long-term – systemic</td>
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<tr>
<td></td>
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<td>Worker – dermal, long-term – systemic</td>
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<td>Worker – long-term – systemic Combined routes</td>
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<td></td>
<td>0,253 mg/m3</td>
<td>0,506 mg/m3</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Worker – inhalation, long-term – systemic</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Worker – dermal, long-term – systemic</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Worker – long-term – systemic Combined routes</td>
<td></td>
</tr>
</tbody>
</table>

**PROC1**: Use in closed process, no likelihood of exposure

**PROC2**: Use in closed, continuous process with occasional controlled exposure

**PROC3**: Use in closed batch process (synthesis or formulation)

**PROC4**: Use in batch and other process (synthesis) where opportunity for exposure arises

**PROC9**: Transfer of substance or preparation into small containers (dedicated filling line, including weighing)

**PROC8a**: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities

**PROC8b**: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities

**PROC15**: Use as laboratory reagent

### 4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the Exposure Scenario

Not applicable

1. **Short title of Exposure Scenario**: Use in polymer processing – industrial

**SDS Number**: 100000068802
## Sulfole® 120 Mercaptan (tert-Dodecyl Mercaptan)

### Main User Groups
- SU 3: Industrial uses: Uses of substances as such or in preparations at industrial sites
- SU11: Manufacture of rubber products

### Sector of use
- PROC1: Use in closed process, no likelihood of exposure
- PROC2: Use in closed, continuous process with occasional controlled exposure
- PROC3: Use in closed batch process (synthesis or formulation)
- PROC4: Use in batch and other process (synthesis) where opportunity for exposure arises
- PROC8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities
- PROC8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities
- PROC9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing)
- PROC15: Use as laboratory reagent

### Process category
- ERC6d: Industrial use of process regulators for polymerisation processes in production of resins, rubbers, polymers

### Environmental release category

### Further information
- Chain Transfer Agent for the production of styrene butadiene latex for rubber and paper coating, nitrile rubber, acrylonitrile butadiene styrene (ABS) and also for the production of expandable polystyrene.

### 2.1 Contributing scenario controlling environmental exposure for: ERC6d: Industrial use of process regulators for polymerisation processes in production of resins, rubbers, polymers

#### Environment factors not influenced by risk management
- Flow rate: 400,000 m³/d

#### Other given operational conditions affecting environmental exposure
- Emission or Release Factor: Air: 0 %
- Emission or Release Factor: Water: 0,1 %
- Emission or Release Factor: Soil: 0,025 %
- Local release rate: Water: 2,5 kg/day
- Local release rate: Air: 0 kg/day

#### Technical conditions and measures / Organizational measures
- Remarks: Sludge should be incinerated, contained or reclaimed.
- Remarks: No application of sewage sludge to soil

#### Conditions and measures related to municipal sewage treatment plant
- Type of Sewage Treatment Plant: Municipal sewage treatment plant
- Flow rate of sewage treatment plant effluent: 10,000 m³/d
- Effectiveness (of a measure): 96 %
### 2.2 Contributing scenario controlling worker exposure for: PROC1: Use in closed process, no likelihood of exposure

#### Product characteristics
- **Physical Form (at time of use)**: Liquid substance
- **Process Temperature**: <= 40 °C

#### Frequency and duration of use
- **Exposure duration**: < 4 h

#### Human factors not influenced by risk management
- **Exposed skin area**: One hand face only (240 cm²)

#### Other operational conditions affecting workers exposure
- **Outdoor / Indoor**: Indoor
- **Remarks**: Good general ventilation (3-5 air changes per hour)

#### Technical conditions and measures
- Use product only in closed system.
- Local exhaust ventilation - inhalation: No (Effectiveness: 0 %)

#### Conditions and measures related to personal protection, hygiene and health evaluation
- **Respiratory Protection**: No (Effectiveness: 0 %)
- **Dermal Protection**: No (Effectiveness: 0 %)

### 2.2 Contributing scenario controlling worker exposure for: PROC2: Use in closed, continuous process with occasional controlled exposure

#### Product characteristics
- **Physical Form (at time of use)**: Liquid substance
- **Process Temperature**: <= 40 °C

#### Frequency and duration of use
- **Exposure duration**: < 4 h

#### Human factors not influenced by risk management
- **Exposed skin area**: Palms of both hands (480 cm²)

#### Other operational conditions affecting workers exposure
- **Outdoor / Indoor**: Indoor
- **Remarks**: Good general ventilation (3-5 air changes per hour)

#### Technical conditions and measures
- Closed continuous process with occasional controlled exposure
- Local exhaust ventilation - inhalation: No (Effectiveness: 0 %)

#### Conditions and measures related to personal protection, hygiene and health evaluation
- **Eye Protection**: Yes, chemically resistant face shield, goggles, or safety glasses with side shields when there is potential for direct contact
- **Respiratory Protection**: No (Effectiveness: 0 %)
- **Dermal Protection**: Yes, Wear chemically resistant gloves (tested to EN374) in combination with ‘basic’ employee training., Wear chemically resistant gloves (tested to EN374) in combination with specific
2.2 Contributing scenario controlling worker exposure for: PROC3: Use in closed batch process (synthesis or formulation)

**Product characteristics**
- Physical Form (at time of use): Liquid substance
- Process Temperature: \(<= 40 \, ^{\circ}\text{C}\)

**Frequency and duration of use**
- Exposure duration: \(< 1 \, \text{h}\)

**Human factors not influenced by risk management**
- Exposed skin area: One hand face only (240 cm²)

**Other operational conditions affecting workers exposure**
- Outdoor / Indoor: Indoor
- Remarks: Good general ventilation (3-5 air changes per hour)

**Technical conditions and measures**
- Closed continuous process with occasional controlled exposure
- Local exhaust ventilation — inhalation: No (Effectiveness: 0 %)

**Conditions and measures related to personal protection, hygiene and health evaluation**
- Eye Protection: Yes, chemically resistant face shield, goggles, or safety glasses with side shields when there is potential for direct contact
- Respiratory Protection: No (Effectiveness: 0 %)
- Dermal Protection: Yes, Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training. Wear chemically resistant gloves (tested to EN374) in combination with specific activity training. (Effectiveness: 80 %)

2.2 Contributing scenario controlling worker exposure for: PROC4, PROC9: Use in batch and other process (synthesis) where opportunity for exposure arises, Transfer of substance or preparation into small containers (dedicated filling line, including weighing)

**Product characteristics**
- Physical Form (at time of use): Liquid substance
- Process Temperature: \(<= 40 \, ^{\circ}\text{C}\)

**Frequency and duration of use**
- Exposure duration: \(< 1 \, \text{h}\)

**Human factors not influenced by risk management**
- Exposed skin area: Palms of both hands (480 cm²)

**Other operational conditions affecting workers exposure**
- Outdoor / Indoor: Indoor
- Remarks: Enhanced general ventilation (5-10 air changes per hour)

**Technical conditions and measures**
- Semi-closed process with occasional controlled exposure
- Local exhaust ventilation — inhalation: No (Effectiveness: 0 %)
Conditions and measures related to personal protection, hygiene and health evaluation

Eye Protection: Yes, chemically resistant face shield, goggles, or safety glasses with side shields when there is potential for direct contact

Respiratory Protection: No (Effectiveness: 0 %)
Dermal Protection: Yes, Wear chemically resistant gloves (tested to EN374) in combination with ‘basic’ employee training.; Wear chemically resistant gloves (tested to EN374) in combination with specific activity training. (Effectiveness: 80 %)

2.2 Contributing scenario controlling worker exposure for: PROC8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities

Product characteristics
| Physical Form (at time of use) | Liquid substance |
| Process Temperature           | <= 40 °C         |

Frequency and duration of use
| Exposure duration | < 15 min |

Human factors not influenced by risk management
Exposed skin area: Two hands (960 cm²)

Other operational conditions affecting workers exposure
Outdoor / Indoor: Indoor
Remarks: Enhanced general ventilation (5-10 air changes per hour)

Technical conditions and measures
Local exhaust ventilation- inhalation.; No (Effectiveness: 0 %)

Conditions and measures related to personal protection, hygiene and health evaluation

Eye Protection: Yes, chemically resistant face shield, goggles, or safety glasses with side shields when there is potential for direct contact

Respiratory Protection: No (Effectiveness: 0 %)
Dermal Protection: Yes, Wear chemically resistant gloves (tested to EN374) in combination with ‘basic’ employee training.; Wear chemically resistant gloves (tested to EN374) in combination with specific activity training. (Effectiveness: 80 %)

2.2 Contributing scenario controlling worker exposure for: PROC8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities

Product characteristics
| Physical Form (at time of use) | Liquid substance |
| Process Temperature           | <= 40 °C         |

Frequency and duration of use
| Exposure duration | < 1 h |

Human factors not influenced by risk management
Exposed skin area: Two hands (960 cm²)
Sulfole® 120 Mercaptan (tert-Dodecyl Mercaptan)

Other operational conditions affecting workers exposure
- Outdoor / Indoor: Indoor
- Remarks: Enhanced general ventilation (5-10 air changes per hour)

Technical conditions and measures
- Semi-closed process with occasional controlled exposure
- Local exhaust ventilation - inhalation: No (Effectiveness: 0 %)

Conditions and measures related to personal protection, hygiene and health evaluation
- Eye Protection: Yes, chemically resistant face shield, goggles, or safety glasses with side shields when there is potential for direct contact
- Respiratory Protection: No (Effectiveness: 0 %)
- Dermal Protection: Yes, Wear chemically resistant gloves (tested to EN374) in combination with ‘basic’ employee training., Wear chemically resistant gloves (tested to EN374) in combination with specific activity training. (Effectiveness: 80 %)

2.2 Contributing scenario controlling worker exposure for: PROC15: Use as laboratory reagent

Product characteristics
- Physical Form (at time of use): Liquid substance
- Process Temperature: <= 40 °C

Frequency and duration of use
- Exposure duration: < 1 h

Human factors not influenced by risk management
- Exposed skin area: One hand face only (240 cm²)

Other operational conditions affecting workers exposure
- Outdoor / Indoor: Indoor
- Remarks: Enhanced general ventilation (5-10 air changes per hour)

Technical conditions and measures
- Local exhaust ventilation - inhalation: No (Effectiveness: 0 %)

Conditions and measures related to personal protection, hygiene and health evaluation
- Eye Protection: Yes, chemically resistant face shield, goggles, or safety glasses with side shields when there is potential for direct contact
- Respiratory Protection: No (Effectiveness: 0 %)
- Dermal Protection: Yes, Wear chemically resistant gloves (tested to EN374) in combination with ‘basic’ employee training., Wear chemically resistant gloves (tested to EN374) in combination with specific activity training. (Effectiveness: 80 %)

3. Exposure estimation and reference to its source

<table>
<thead>
<tr>
<th>Environment</th>
<th>Contributing Scenario</th>
<th>Exposure Assessment Method</th>
<th>Specific conditions</th>
<th>Compartment</th>
<th>Value type</th>
<th>Level of Exposure</th>
<th>Risk characterization ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ERC6d</td>
<td>EUSES</td>
<td>Freshwater</td>
<td>0.106 mg/kg</td>
<td>0.035</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

SDS Number: 100000068802
**SAFETY DATA SHEET**

**Sulfole® 120 Mercaptan (tert-Dodecyl Mercaptan)**

Version 3.11  
Revision Date 2017-05-31

<table>
<thead>
<tr>
<th>Sediment</th>
<th>Dry weight (d.w.)</th>
<th>Level of Exposure</th>
<th>Risk characterization ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Marine sediment</td>
<td>0.042 mg/kg dry weight (d.w.)</td>
<td>0.139</td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td>Sewage treatment plant</td>
<td>0.01 mg/L</td>
<td>&lt; 0.01</td>
<td></td>
</tr>
</tbody>
</table>

**ERC6d**: Industrial use of process regulators for polymerisation processes in production of resins, rubbers, polymers

**Workers/Consumers**

<table>
<thead>
<tr>
<th>Contributing Scenario</th>
<th>Exposure Assessment Method</th>
<th>Specific conditions</th>
<th>Value type</th>
<th>Level of Exposure</th>
<th>Risk characterization ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>PROC1</td>
<td>ECETOC TRA Modified</td>
<td>Worker – inhalation, long-term – systemic</td>
<td>0.004 mg/m³</td>
<td>&lt; 0.01</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Worker – dermal, long-term – systemic</td>
<td>0.003 mg/kg/d</td>
<td>&lt; 0.01</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Worker – long-term – systemic Combined routes</td>
<td></td>
<td>&lt; 0.01</td>
<td></td>
</tr>
<tr>
<td>PROC2</td>
<td>ECETOC TRA Modified</td>
<td>Worker – inhalation, long-term – systemic</td>
<td>0.354 mg/m³</td>
<td>0.708</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Worker – dermal, long-term – systemic</td>
<td>0.027 mg/kg/d</td>
<td>0.016</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Worker – long-term – systemic Combined routes</td>
<td></td>
<td>0.724</td>
<td></td>
</tr>
<tr>
<td>PROC3</td>
<td>ECETOC TRA Modified</td>
<td>Worker – inhalation, long-term – systemic</td>
<td>0.354 mg/m³</td>
<td>0.708</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Worker – inhalation, long-term – systemic</td>
<td>0.014 mg/kg/d</td>
<td>&lt; 0.01</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Worker – long-term – systemic Combined routes</td>
<td></td>
<td>0.716</td>
<td></td>
</tr>
<tr>
<td>PROC4, PROC9</td>
<td>ECETOC TRA Modified</td>
<td>Worker – inhalation, long-term – systemic</td>
<td>0.253 mg/m³</td>
<td>0.506</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Worker – dermal, long-term – systemic</td>
<td>0.137 mg/kg/d</td>
<td>0.081</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Worker – long-term – systemic Combined routes</td>
<td></td>
<td>0.587</td>
<td></td>
</tr>
<tr>
<td>PROC8a</td>
<td>ECETOC TRA Modified</td>
<td>Worker – inhalation, long-term – systemic</td>
<td>0.253 mg/m³</td>
<td>0.506</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Worker – dermal, long-term – systemic</td>
<td>0.274 mg/kg/d</td>
<td>0.161</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Worker – long-term – systemic Combined routes</td>
<td></td>
<td>0.667</td>
<td></td>
</tr>
<tr>
<td>PROC8b</td>
<td>ECETOC TRA Modified</td>
<td>Worker – inhalation, long-term – systemic</td>
<td>0.253 mg/m³</td>
<td>0.506</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Worker – dermal, long-term – systemic</td>
<td>0.274 mg/kg/d</td>
<td>0.161</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Worker – long-term – systemic Combined routes</td>
<td></td>
<td>0.667</td>
<td></td>
</tr>
<tr>
<td>PROC15</td>
<td>ECETOC TRA Modified</td>
<td>Worker – inhalation, long-term – systemic</td>
<td>0.253 mg/m³</td>
<td>0.506</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Worker – dermal, long-term – systemic</td>
<td>0.007 mg/kg/d</td>
<td>&lt; 0.01</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Worker – long-term – systemic Combined routes</td>
<td></td>
<td>0.51</td>
<td></td>
</tr>
</tbody>
</table>

PROC1: Use in closed process, no likelihood of exposure

PROC2: Use in closed, continuous process with occasional controlled exposure

PROC3: Use in closed batch process (synthesis or formulation)

SDS Number: 100000068802  32/46
PROC4: Use in batch and other process (synthesis) where opportunity for exposure arises
PROC9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing)

PROC8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities
PROC8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities
PROC15: Use as laboratory reagent

4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the Exposure Scenario

Not applicable
1. Short title of Exposure Scenario: Lubricants - Industrial

Main User Groups: SU 3: Industrial uses: Uses of substances as such or in preparations at industrial sites
Sector of use: SU0: Other
Process category: PROC1: Use in closed process, no likelihood of exposure
PROC2: Use in closed, continuous process with occasional controlled exposure
PROC3: Use in closed batch process (synthesis or formulation)
PROC4: Use in batch and other process (synthesis) where opportunity for exposure arises
PROC8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities
PROC8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities
PROC9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing)
PROC15: Use as laboratory reagent

Environmental release category: ERC6a: Industrial use resulting in manufacture of another substance (use of intermediates)

2.1 Contributing scenario controlling environmental exposure for: ERC6a: Industrial use resulting in manufacture of another substance (use of intermediates)

Environment factors not influenced by risk management
Flow rate: 400,000 m3/d

Other given operational conditions affecting environmental exposure
Local release to the environment
Emission or Release Factor: Air: 0,001 %
Emission or Release Factor: Water: 0,3 %
Emission or Release Factor: Soil: 0,001 %
Local release rate: Air: 0,025 kg/day
Local release rate: Water: 7,5 kg/day

Technical conditions and measures / Organizational measures
Remarks: Sludge should be incinerated, contained or reclaimed.
Remarks: No application of sewage sludge to soil

Conditions and measures related to municipal sewage treatment plant
Type of Sewage Treatment Plant: Municipal sewage treatment plant
Flow rate of sewage treatment plant effluent: 10.000 m3/d
Sludge Treatment: Not applicable

2.2 Contributing scenario controlling worker exposure for: PROC1: Use in closed process, no likelihood of exposure

Product characteristics
Physical Form (at time of use): Liquid substance
Process Temperature: <= 40 °C

Frequency and duration of use
Exposure duration: < 15 min

Human factors not influenced by risk management
Exposed skin area: One hand face only (240 cm2)

Other operational conditions affecting workers exposure
Outdoor / Indoor: Indoor
Remarks: Good general ventilation (3-5 air changes per hour)

Technical conditions and measures
Use product only in closed system.
Local exhaust ventilation- inhalation: No (Effectiveness: 0 %)
Local exhaust ventilation-dermal: No (Effectiveness: 0 %)

Conditions and measures related to personal protection, hygiene and health evaluation
Eye Protection: Yes, chemically resistant face shield, goggles, or safety glasses with side shields when there is potential for direct contact
Respiratory Protection: No (Effectiveness: 0 %)
Dermal Protection: No (Effectiveness: 0 %)

2.2 Contributing scenario controlling worker exposure for: PROC2: Use in closed, continuous process with occasional controlled exposure

Product characteristics
Physical Form (at time of use): Liquid substance
Process Temperature: <= 40 °C

Frequency and duration of use
Exposure duration: < 15 min

Human factors not influenced by risk management
Exposed skin area: Palms of both hands (480 cm2)

Other operational conditions affecting workers exposure
**Safely Data Sheet**

**Sulfole® 120 Mercaptan (tert-Dodecyl Mercaptan)**

**Version 3.11**

**Revision Date 2017-05-31**

Outdoor / Indoor: Indoor  
Remarks: Good general ventilation (3-5 air changes per hour)

### Technical conditions and measures

- Closed continuous process with occasional controlled exposure
- Local exhaust ventilation - inhalation: Yes (Effectiveness: 90 %)
- Local exhaust ventilation - dermal: No (Effectiveness: 0 %)

### Conditions and measures related to personal protection, hygiene and health evaluation

- Eye Protection: Yes, chemically resistant face shield, goggles, or safety glasses with side shields when there is potential for direct contact
- Respiratory Protection: Yes, Respirator with APF of 10 (Effectiveness: 90 %)
- Dermal Protection: Yes, Wear chemically resistant gloves (tested to EN374) in combination with ‘basic’ employee training. (Effectiveness: 80 %)

#### 2.2 Contributing scenario controlling worker exposure for: PROC3: Use in closed batch process (synthesis or formulation)

<table>
<thead>
<tr>
<th>Product characteristics</th>
</tr>
</thead>
</table>
| Physical Form (at time of use) | Liquid substance  
| Process Temperature | <= 40 °C  

<table>
<thead>
<tr>
<th>Frequency and duration of use</th>
</tr>
</thead>
</table>
| Exposure duration | < 15 min  

<table>
<thead>
<tr>
<th>Human factors not influenced by risk management</th>
</tr>
</thead>
</table>
| Exposed skin area | One hand face only (240 cm²)  

### Other operational conditions affecting workers exposure

Outdoor / Indoor: Indoor  
Remarks: Good general ventilation (3-5 air changes per hour)

### Technical conditions and measures

- Closed continuous process with occasional controlled exposure
- Local exhaust ventilation - inhalation: Yes (Effectiveness: 90 %)
- Local exhaust ventilation - dermal: No

### Conditions and measures related to personal protection, hygiene and health evaluation

- Eye Protection: Yes, chemically resistant face shield, goggles, or safety glasses with side shields when there is potential for direct contact
- Respiratory Protection: Yes, Respirator with APF of 10 (Effectiveness: 90 %)
- Dermal Protection: Yes, Wear chemically resistant gloves (tested to EN374) in combination with ‘basic’ employee training. (Effectiveness: 80 %)

#### 2.2 Contributing scenario controlling worker exposure for: PROC4: Use in batch and other process (synthesis) where opportunity for exposure arises

<table>
<thead>
<tr>
<th>Product characteristics</th>
</tr>
</thead>
</table>
| Physical Form (at time of use) | Liquid substance  
| Process Temperature | <= 40 °C  

<table>
<thead>
<tr>
<th>Frequency and duration of use</th>
</tr>
</thead>
</table>
| Exposure duration | < 15 min  

SDS Number: 100000068802  
35/46
## Human factors not influenced by risk management
- **Exposed skin area**: Palms of both hands (480 cm²)

## Other operational conditions affecting workers exposure
- **Outdoor / Indoor**: Indoor
- **Remarks**: Good general ventilation (3-5 air changes per hour)

## Technical conditions and measures
- **Semi-closed process with occasional controlled exposure**
- **Local exhaust ventilation- inhalation**: Yes (Effectiveness: 90 %)
- **Local exhaust ventilation- dermal**: No (Effectiveness: 0 %)

## Conditions and measures related to personal protection, hygiene and health evaluation
- **Eye Protection**: Yes, chemically resistant face shield, goggles, or safety glasses with side shields when there is potential for direct contact
- **Respiratory Protection**: Yes, Respirator with APF of 10 (Effectiveness: 90 %)
- **Dermal Protection**: Yes, Wear chemically resistant gloves (tested to EN374) in combination with ‘basic’ employee training. (Effectiveness: 90 %)

### 2.2 Contributing scenario controlling worker exposure for: PROC8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities

<table>
<thead>
<tr>
<th>Product characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Physical Form (at time of use)</strong></td>
</tr>
<tr>
<td><strong>Process Temperature</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Frequency and duration of use</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Exposure duration</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Human factors not influenced by risk management</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exposed skin area: Two hands (960 cm²)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Other operational conditions affecting workers exposure</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Outdoor / Indoor</strong>: Indoor</td>
</tr>
<tr>
<td><strong>Remarks</strong>: Good general ventilation (3-5 air changes per hour)</td>
</tr>
</tbody>
</table>

## Technical conditions and measures
- **Local exhaust ventilation- inhalation**: Yes (Effectiveness: 90 %)
- **Local exhaust ventilation- dermal**: No (Effectiveness: 0 %)

## Conditions and measures related to personal protection, hygiene and health evaluation
- **Eye Protection**: Yes, chemically resistant face shield, goggles, or safety glasses with side shields when there is potential for direct contact
- **Respiratory Protection**: Yes, Respirator with APF of 10 (Effectiveness: 90 %)
- **Dermal Protection**: Yes, Wear chemically resistant gloves (tested to EN374) in combination with specific activity training. (Effectiveness: 95 %)

### 2.2 Contributing scenario controlling worker exposure for: PROC8b: Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at dedicated facilities

<table>
<thead>
<tr>
<th>Product characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>SDS Number: 100000068802</td>
</tr>
</tbody>
</table>
**Sulfole® 120 Mercaptan (tert-Dodecyl Mercaptan)**

**Physical Form (at time of use):** Liquid substance  
**Process Temperature:** <= 40 °C

**Frequency and duration of use**  
**Exposure duration:** < 15 min

**Human factors not influenced by risk management**  
**Exposed skin area:** Two hands (960 cm²)

**Other operational conditions affecting workers exposure**  
**Outdoor / Indoor:** Indoor  
**Remarks:** Good general ventilation (3-5 air changes per hour)

**Technical conditions and measures**  
Semi-closed process with occasional controlled exposure  
Local exhaust ventilation- inhalation:: Yes (Effectiveness: 95 %)  
Local exhaust ventilation-dermal:: No (Effectiveness: 0 %)

**Conditions and measures related to personal protection, hygiene and health evaluation**  
Eye Protection,Yes,chemically resistant face shield, goggles, or safety glasses with side shields when there is potential for direct contact  
Respiratory Protection, Yes, Respirator with APF of 10 (Effectiveness: 90 %)  
Dermal Protection, Yes, Wear chemically resistant gloves (tested to EN374) in combination with specific activity training. (Effectiveness: 95 %)

### 2.2 Contributing scenario controlling worker exposure for: PROC9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing)

**Product characteristics**  
**Physical Form (at time of use):** Liquid substance  
**Process Temperature:** <= 40 °C

**Frequency and duration of use**  
**Exposure duration:** < 15 min

**Human factors not influenced by risk management**  
**Exposed skin area:** Palms of both hands (480 cm²)

**Other operational conditions affecting workers exposure**  
**Outdoor / Indoor:** Indoor  
**Remarks:** Good general ventilation (3-5 air changes per hour)

**Technical conditions and measures**  
Semi-closed process with occasional controlled exposure  
Local exhaust ventilation- inhalation:: Yes (Effectiveness: 90 %)  
Local exhaust ventilation-dermal:: No (Effectiveness: 0 %)

**Conditions and measures related to personal protection, hygiene and health evaluation**  
Eye Protection,Yes,chemically resistant face shield, goggles, or safety glasses with side shields when there is potential for direct contact  
Respiratory Protection, Yes, Respirator with APF of 10 (Effectiveness: 90 %)  
Dermal Protection, Yes, Wear chemically resistant gloves (tested to EN374) in combination with ‘basic’ employee training. (Effectiveness: 90 %)
### 2.2 Contributing scenario controlling worker exposure for: PROC15: Use as laboratory reagent

**Product characteristics**
- **Physical Form (at time of use):** Liquid substance
- **Process Temperature:** \(\leq 40 \, ^\circ\text{C}\)

**Frequency and duration of use**
- **Exposure duration:** < 15 min

**Human factors not influenced by risk management**
- **Exposed skin area:** One hand face only (240 cm²)

**Other operational conditions affecting workers exposure**
- **Outdoor / Indoor:** Indoor
- **Remarks:** Good general ventilation (3-5 air changes per hour)

**Technical conditions and measures**
- Local exhaust ventilation- inhalation: Yes (Effectiveness: 90 %)
- Local exhaust ventilation-dermal: No (Effectiveness: 0 %)

**Conditions and measures related to personal protection, hygiene and health evaluation**
- **Eye Protection:** Yes, chemically resistant face shield, goggles, or safety glasses with side shields when there is potential for direct contact
- **Respiratory Protection:** Yes, Respirator with APF of 10 (Effectiveness: 90 %)
- **Dermal Protection:** Yes, Wear chemically resistant gloves (tested to EN374) in combination with specific activity training. (Effectiveness: 80 %)

### 3. Exposure estimation and reference to its source

#### Environment

<table>
<thead>
<tr>
<th>Contributing Scenario</th>
<th>Exposure Assessment Method</th>
<th>Specific conditions</th>
<th>Compartment</th>
<th>Value type</th>
<th>Level of Exposure</th>
<th>Risk characterization ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>ERC6a</td>
<td>EUSES</td>
<td>Freshwater sediment</td>
<td>0,307 mg/kg dry weight (d.w.)</td>
<td>0,102</td>
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<tr>
<td></td>
<td></td>
<td>Marine sediment</td>
<td>0,124 mg/kg dry weight (d.w.)</td>
<td>0,414</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Sewage treatment plant</td>
<td>0,031 mg/L</td>
<td>&lt; 0,01</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

ERC6a: Industrial use resulting in manufacture of another substance (use of intermediates)

#### Workers/Consumers

<table>
<thead>
<tr>
<th>Contributing Scenario</th>
<th>Exposure Assessment Method</th>
<th>Specific conditions</th>
<th>Value type</th>
<th>Level of Exposure</th>
<th>Risk characterization ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>PROC1</td>
<td>ECETOC TRA Modified</td>
<td>Worker – inhalation, long-term – systemic</td>
<td>0,006 mg/m³</td>
<td>0,012</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Worker – dermal, long-term – systemic</td>
<td>0,034 mg/kg/d</td>
<td>0,02</td>
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</tr>
<tr>
<td></td>
<td></td>
<td>Worker – long-term – systemic Combined routes</td>
<td></td>
<td>0,032</td>
<td></td>
</tr>
<tr>
<td>PROC2</td>
<td>ECETOC TRA</td>
<td>Worker – inhalation,</td>
<td>0,006 mg/m³</td>
<td>0,012</td>
<td></td>
</tr>
</tbody>
</table>

SDS Number: 100000068802 38/46
## SAFETY DATA SHEET

### Sulfole® 120 Mercaptan (tert-Dodecyl Mercaptan)

**Version 3.11**

**Revision Date 2017-05-31**

<table>
<thead>
<tr>
<th>PROC</th>
<th>ECETOC TRA</th>
<th>Modified</th>
<th>long-term – systemic</th>
<th>Combined routes</th>
</tr>
</thead>
<tbody>
<tr>
<td>PROC3</td>
<td>ECETOC TRA</td>
<td>Modified</td>
<td>Worker – inhalation, long-term – systemic</td>
<td>0.018 mg/m³</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Worker – dermal, long-term – systemic</td>
<td>0.138 mg/kg/d</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Worker – long-term – systemic Combined routes</td>
<td></td>
</tr>
<tr>
<td>PROC4</td>
<td>ECETOC TRA</td>
<td>Modified</td>
<td>Worker – inhalation, long-term – systemic</td>
<td>0.03 mg/m³</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Worker – dermal, long-term – systemic</td>
<td>0.686 mg/kg/d</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Worker – long-term – systemic Combined routes</td>
<td></td>
</tr>
<tr>
<td>PROC8a</td>
<td>ECETOC TRA</td>
<td>Modified</td>
<td>Worker – inhalation, long-term – systemic</td>
<td>0.059 mg/m³</td>
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<tr>
<td></td>
<td></td>
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<td>Worker – dermal, long-term – systemic</td>
<td>0.686 mg/kg/d</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Worker – long-term – systemic Combined routes</td>
<td></td>
</tr>
<tr>
<td>PROC8b</td>
<td>ECETOC TRA</td>
<td>Modified</td>
<td>Worker – inhalation, long-term – systemic</td>
<td>0.015 mg/m³</td>
</tr>
<tr>
<td></td>
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<td>Worker – dermal, long-term – systemic</td>
<td>0.686 mg/kg/d</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Worker – long-term – systemic Combined routes</td>
<td></td>
</tr>
<tr>
<td>PROC9</td>
<td>ECETOC TRA</td>
<td>Modified</td>
<td>Worker – inhalation, long-term – systemic</td>
<td>0.03 mg/m³</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Worker – dermal, long-term – systemic</td>
<td>0.686 mg/kg/d</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Worker – long-term – systemic Combined routes</td>
<td></td>
</tr>
<tr>
<td>PROC15</td>
<td>ECETOC TRA</td>
<td>Modified</td>
<td>Worker – inhalation, long-term – systemic</td>
<td>0.03 mg/m³</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Worker – dermal, long-term – systemic</td>
<td>0.068 mg/kg/d</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Worker – long-term – systemic Combined routes</td>
<td></td>
</tr>
</tbody>
</table>

**PROC1:** Use in closed process, no likelihood of exposure

**PROC2:** Use in closed, continuous process with occasional controlled exposure

**PROC3:** Use in closed batch process (synthesis or formulation)

**PROC4:** Use in batch and other process (synthesis) where opportunity for exposure arises

**PROC8a:** Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities

**PROC8b:** Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities

**PROC9:** Transfer of substance or preparation into small containers (dedicated filling line, including weighing)

**PROC15:** Use as laboratory reagent

**SDS Number:** 100000068802

39/46
4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the Exposure Scenario

Not applicable

1. Short title of Exposure Scenario: **Use in mining – industrial**

<table>
<thead>
<tr>
<th>Main User Groups</th>
<th>SU 3: Industrial uses: Uses of substances as such or in preparations at industrial sites</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sector of use</td>
<td>SU2a: Mining, (without offshore industries)</td>
</tr>
<tr>
<td>Process category</td>
<td>PROC1: Use in closed process, no likelihood of exposure</td>
</tr>
<tr>
<td></td>
<td>PROC2: Use in closed, continuous process with occasional controlled exposure</td>
</tr>
<tr>
<td></td>
<td>PROC3: Use in closed batch process (synthesis or formulation)</td>
</tr>
<tr>
<td></td>
<td>PROC4: Use in batch and other process (synthesis) where opportunity for exposure arises</td>
</tr>
<tr>
<td></td>
<td>PROC8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities</td>
</tr>
<tr>
<td></td>
<td>PROC8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities</td>
</tr>
<tr>
<td></td>
<td>PROC9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Environmental release category</th>
<th>ERC4: Industrial use of processing aids in processes and products, not becoming part of articles</th>
</tr>
</thead>
<tbody>
<tr>
<td>Further information</td>
<td>Used effectively as a secondary/scavenger collector for base metal sulfides.</td>
</tr>
</tbody>
</table>

2.1 Contributing scenario controlling environmental exposure for: **ERC4: Industrial use of processing aids in processes and products, not becoming part of articles**

<table>
<thead>
<tr>
<th>Environment factors not influenced by risk management</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flow rate</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Other given operational conditions affecting environmental exposure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Local release to the environment</td>
</tr>
<tr>
<td>Emission or Release Factor: Air</td>
</tr>
<tr>
<td>Emission or Release Factor: Water</td>
</tr>
<tr>
<td>Emission or Release Factor: Soil</td>
</tr>
<tr>
<td>Local release rate: Air</td>
</tr>
<tr>
<td>Local release rate: Water</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Technical conditions and measures / Organizational measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Remarks:</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Conditions and measures related to municipal sewage treatment plant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type of Sewage Treatment Plant</td>
</tr>
<tr>
<td>Flow rate of sewage treatment plant effluent</td>
</tr>
</tbody>
</table>

SDS Number:100000068802
### 2.2 Contributing scenario controlling worker exposure for: PROC1: Use in closed process, no likelihood of exposure

#### Product characteristics
- **Physical Form (at time of use):** Liquid substance
- **Process Temperature:** <= 40 °C

#### Frequency and duration of use
- **Exposure duration:** < 4 h

#### Human factors not influenced by risk management
- **Exposed skin area:** One hand face only (240 cm²)

#### Other operational conditions affecting workers exposure
- **Outdoor / Indoor:** Indoor
- **Remarks:** Good general ventilation (3-5 air changes per hour)

#### Technical conditions and measures
- Use product only in closed system.
- Local exhaust ventilation - inhalation:, No (Effectiveness: 0 %)

#### Conditions and measures related to personal protection, hygiene and health evaluation
- Respiratory Protection, No (Effectiveness: 0 %)
- Dermal Protection, No (Effectiveness: 0 %)

### 2.2 Contributing scenario controlling worker exposure for: PROC2: Use in closed, continuous process with occasional controlled exposure

#### Product characteristics
- **Physical Form (at time of use):** Liquid substance
- **Process Temperature:** <= 40 °C

#### Frequency and duration of use
- **Exposure duration:** < 4 h

#### Human factors not influenced by risk management
- **Exposed skin area:** Palms of both hands (480 cm²)

#### Other operational conditions affecting workers exposure
- **Outdoor / Indoor:** Indoor
- **Remarks:** Good general ventilation (3-5 air changes per hour)

#### Technical conditions and measures
- Closed continuous process with occasional controlled exposure
- Local exhaust ventilation- inhalation:, No (Effectiveness: 0 %)

#### Conditions and measures related to personal protection, hygiene and health evaluation
- Eye Protection, Yes, chemically resistant face shield, goggles, or safety glasses with side shields when there is potential for direct contact
- Respiratory Protection, No (Effectiveness: 0 %)
## 2.2 Contributing scenario controlling worker exposure for: PROC3: Use in closed batch process (synthesis or formulation)

**Product characteristics**
- **Physical Form (at time of use):** Liquid substance
- **Process Temperature:** \( \leq 40 \, ^\circ\text{C} \)

**Frequency and duration of use**
- **Exposure duration:** \(< 1 \, \text{h}\)

**Human factors not influenced by risk management**
- **Exposed skin area:** One hand face only (240 cm²)

**Other operational conditions affecting workers exposure**
- **Outdoor / Indoor:** Indoor
- **Remarks:** Good general ventilation (3-5 air changes per hour)

**Technical conditions and measures**
- Closed batch process with occasional controlled exposure.
- Local exhaust ventilation - inhalation: No (Effectiveness: 0 %)

**Conditions and measures related to personal protection, hygiene and health evaluation**
- **Eye Protection:** Yes, chemically resistant face shield, goggles, or safety glasses with side shields when there is potential for direct contact
- **Respiratory Protection:** No (Effectiveness: 0 %)
- **Dermal Protection:** Yes, Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training. (Effectiveness: 80 %)

## 2.2 Contributing scenario controlling worker exposure for: PROC4: Use in batch and other process (synthesis) where opportunity for exposure arises

**Product characteristics**
- **Physical Form (at time of use):** Liquid substance
- **Process Temperature:** \( \leq 40 \, ^\circ\text{C} \)

**Frequency and duration of use**
- **Exposure duration:** \(< 1 \, \text{h}\)

**Human factors not influenced by risk management**
- **Exposed skin area:** Palms of both hands (480 cm²)

**Other operational conditions affecting workers exposure**
- **Outdoor / Indoor:** Indoor
- **Remarks:** Enhanced general ventilation (5-10 air changes per hour)

**Technical conditions and measures**
- Semi-closed process with occasional controlled exposure
- Local exhaust ventilation - inhalation: No (Effectiveness: 0 %)

**Conditions and measures related to personal protection, hygiene and health evaluation**

SDS Number: 100000068802 42/46
### 2.2 Contributing scenario controlling worker exposure for: PROC8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities

#### Product characteristics
- Physical Form (at time of use): Liquid substance
- Process Temperature: \(\leq 40 \, ^\circ C\)

#### Frequency and duration of use
- Exposure duration: \(< 15 \text{ min}\)

#### Human factors not influenced by risk management
- Exposed skin area: Two hands (960 cm\(^2\))

#### Other operational conditions affecting workers exposure
- Outdoor / Indoor: Indoor
- Remarks: Enhanced general ventilation (5-10 air changes per hour)

#### Technical conditions and measures
- Local exhaust ventilation- inhalation: No (Effectiveness: 0 %)

#### Conditions and measures related to personal protection, hygiene and health evaluation
- Eye Protection: Yes, chemically resistant face shield, goggles, or safety glasses with side shields when there is potential for direct contact
- Respiratory Protection: No (Effectiveness: 0 %)
- Dermal Protection: Yes, Wear chemically resistant gloves (tested to EN374) in combination with ‘basic’ employee training. (Effectiveness: 80 %)

### 2.2 Contributing scenario controlling worker exposure for: PROC8b: Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at dedicated facilities

#### Product characteristics
- Physical Form (at time of use): Liquid substance
- Process Temperature: \(\leq 40 \, ^\circ C\)

#### Frequency and duration of use
- Exposure duration: \(< 1 \text{ h}\)

#### Human factors not influenced by risk management
- Exposed skin area: Two hands (960 cm\(^2\))

#### Other operational conditions affecting workers exposure
- Outdoor / Indoor: Indoor
- Remarks: Enhanced general ventilation (5-10 air changes per hour)
Sulfole® 120 Mercaptan (tert-Dodecyl Mercaptan)

Technical conditions and measures
Semi-closed process with occasional controlled exposure
Local exhaust ventilation- inhalation: No (Effectiveness: 0 %)

Conditions and measures related to personal protection, hygiene and health evaluation
Eye Protection, Yes, chemically resistant face shield, goggles, or safety glasses with side shields when there is potential for direct contact
Respiratory Protection, No (Effectiveness: 0 %)
Dermal Protection, Yes, Wear chemically resistant gloves (tested to EN374) in combination with ‘basic’ employee training. (Effectiveness: 80 %)

2.2 Contributing scenario controlling worker exposure for: PROC9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing)

Product characteristics
Physical Form (at time of use) : Liquid substance
Process Temperature : <= 40 °C

Frequency and duration of use
Exposure duration : < 1 h

Human factors not influenced by risk management
Exposed skin area : Palms of both hands (480 cm²)

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor
Remarks : Enhanced general ventilation (5-10 air changes per hour)

Technical conditions and measures
Semi-closed process with occasional controlled exposure
Local exhaust ventilation- inhalation: No (Effectiveness: 0 %)

Conditions and measures related to personal protection, hygiene and health evaluation
Eye Protection, Yes, chemically resistant face shield, goggles, or safety glasses with side shields when there is potential for direct contact
Respiratory Protection, No (Effectiveness: 0 %)
Dermal Protection, Yes, Wear chemically resistant gloves (tested to EN374) in combination with ‘basic’ employee training. (Effectiveness: 80 %)

3. Exposure estimation and reference to its source

<table>
<thead>
<tr>
<th>Contributing Scenario</th>
<th>Exposure Assessment Method</th>
<th>Specific conditions</th>
<th>Compartment</th>
<th>Value type</th>
<th>Level of Exposure</th>
<th>Risk characterization ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>ERC6a</td>
<td>EUSES</td>
<td></td>
<td>Freshwater sediment</td>
<td>0.83 mg/kg dry weight (d.w.)</td>
<td>0.277</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Marine sediment</td>
<td>0.083 mg/kg dry weight (d.w.)</td>
<td>0.277</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Sewage</td>
<td>0.021 mg/L</td>
<td>&lt; 0.01</td>
<td></td>
</tr>
</tbody>
</table>

SDS Number: 100000068802

44/46
## Workers/Consumers

<table>
<thead>
<tr>
<th>Contributing Scenario</th>
<th>Exposure Assessment Method</th>
<th>Specific conditions</th>
<th>Value type</th>
<th>Level of Exposure</th>
<th>Risk characterization ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>PROC1</td>
<td>ECETOC TRA Modified</td>
<td>Worker – inhalation, long-term – systemic</td>
<td>0.004 mg/m³</td>
<td>&lt; 0.01</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Worker – dermal, long-term – systemic</td>
<td>0.003 mg/kg/d</td>
<td>&lt; 0.01</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Worker – long-term – systemic Combined routes</td>
<td>&lt; 0.01</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PROC2</td>
<td>ECETOC TRA Modified</td>
<td>Worker – inhalation, long-term – systemic</td>
<td>0.354 mg/m³</td>
<td>0.708</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Worker – dermal, long-term – systemic</td>
<td>0.027 mg/kg/d</td>
<td>0.016</td>
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<tr>
<td></td>
<td></td>
<td>Worker – long-term – systemic Combined routes</td>
<td>0.724</td>
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</tr>
<tr>
<td>PROC3</td>
<td>ECETOC TRA Modified</td>
<td>Worker – inhalation, long-term – systemic</td>
<td>0.354 mg/m³</td>
<td>0.708</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Worker – dermal, long-term – systemic</td>
<td>0.014 mg/kg/d</td>
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<tr>
<td></td>
<td></td>
<td>Worker – long-term – systemic Combined routes</td>
<td>0.716</td>
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<tr>
<td>PROC4</td>
<td>ECETOC TRA Modified</td>
<td>Worker – inhalation, long-term – systemic</td>
<td>0.253 mg/m³</td>
<td>0.506</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Worker – dermal, long-term – systemic</td>
<td>0.137 mg/kg/d</td>
<td>0.081</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Worker – long-term – systemic Combined routes</td>
<td>0.587</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PROC8a</td>
<td>ECETOC TRA Modified</td>
<td>Worker – inhalation, long-term – systemic</td>
<td>0.235 mg/m³</td>
<td>0.506</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Worker – dermal, long-term – systemic</td>
<td>0.274 mg/kg/d</td>
<td>0.161</td>
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<td></td>
<td></td>
<td>Worker – long-term – systemic Combined routes</td>
<td>0.667</td>
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<tr>
<td>PROC8b</td>
<td>ECETOC TRA Modified</td>
<td>Worker – inhalation, long-term – systemic</td>
<td>0.253 mg/m³</td>
<td>0.506</td>
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</tr>
<tr>
<td></td>
<td></td>
<td>Worker – dermal, long-term – systemic</td>
<td>0.274 mg/kg/d</td>
<td>0.161</td>
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<tr>
<td></td>
<td></td>
<td>Worker – long-term – systemic Combined routes</td>
<td>0.667</td>
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<tr>
<td>PROC9</td>
<td>ECETOC TRA Modified</td>
<td>Worker – inhalation, long-term – systemic</td>
<td>0.253 mg/m³</td>
<td>0.506</td>
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<tr>
<td></td>
<td></td>
<td>Worker – dermal, long-term – systemic</td>
<td>0.137 mg/kg/d</td>
<td>0.081</td>
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</tr>
<tr>
<td></td>
<td></td>
<td>Worker – long-term – systemic Combined routes</td>
<td>0.587</td>
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<td></td>
</tr>
</tbody>
</table>

PROC1: Use in closed process, no likelihood of exposure

PROC2: Use in closed, continuous process with occasional controlled exposure

PROC3: Use in closed batch process (synthesis or formulation)

PROC4: Use in batch and other process (synthesis) where opportunity for exposure arises

PROC8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities
### PROC8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities

PROC9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing)

### 4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the Exposure Scenario

Not applicable