SAFETY DATA SHEET

HARP® DME
Version: CLP01               Date: Aug 2011                Page 1 of 18

1. Identification of the substance / preparation and company / undertaking

Product name              Harp® DME
REACH registration number 01-2119472128-37-0000
Company
Harp International Ltd
Gellihirion Industrial Estate
Pontypridd
Rhondda Cynon Taff
CF37 5SX
Tel: +44 (0) 1443 842255
Fax: +44 (0) 1443 841805
Email: harp@harpintl.com

Emergency phone number +44 (0) 1270 502891 (24 hour)
Use
Aerosol propellant

2. Hazards identification

EC Classification of the substance or mixture
Hazard Class & category code:
- Physical hazards
  Flammable gases - Category 1 – Extremely flammable gas (H220)
  Gases under pressure - Contains gas under pressure; may explode if heated (H280)

Classification EC67/548 or EC 1999/45 : R12 – Extremely flammable.

Label Elements
Labelling Regulation EC 1272/2008 (CLP)
- Hazard pictogram(s)
  GHS02
  GHS04

- Hazard pictograms code
  GHS02 (Flame) - GHS04 (Gas cylinder).
- Signal word
  Danger
- Hazard statements
  H220 : Extremely flammable gas
  H280 : Contains gas under pressure; may explode if heated.

- Precautionary statements
  -Prevention
    P210 : Keep away from heat/sparks/open flames/hot surfaces - No smoking.
  -Response
    P377 : Leaking gas fire : Do not extinguish unless leak can be stopped safely.
    P381 : Eliminate all ignition sources if safe to do so.
  -Storage
    P403 : Store in a well ventilated place.
    P410 : Protect from sunlight.
2. Hazards identification continued

Labelling EC 67/548 or EC 1999/45
Symbol(s)  F+ : Extremely flammable.

R Phrase(s)  R12 : Extremely flammable.
S Safety phrase(s)  S9 : Keep container in a well-ventilated place.
                     S16 : Keep away from sources of ignition.

Other hazards
This substance is not considered to be persistent, bio-accumulating nor toxic (PBT).
This substance is not considered to be very persistent, nor very bio-accumulating nor toxic (vPvB).
May form explosive peroxides.
Rapid evaporation of the liquid may cause frostbite.
Vapours are heavier than air and can cause suffocation by reducing oxygen available for breathing.
May cause cardiac arrhythmia.

3. Composition / information on ingredients

<table>
<thead>
<tr>
<th>Substance / Preparation</th>
<th>Chemical name</th>
<th>Chemical formula</th>
</tr>
</thead>
<tbody>
<tr>
<td>Substances / Preparation</td>
<td>Substances.</td>
<td>(CH₃)₂O</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Substance name</th>
<th>Contents</th>
<th>CAS no.</th>
<th>EC No</th>
<th>Registration no.</th>
<th>Classification According to Directive 67/548/EEC</th>
<th>Classification According to Regulation 1272/2008 (CLP)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dimethyl ether</td>
<td>100%</td>
<td>115-10-6</td>
<td>204-065-8</td>
<td>01-2119472128-37-0000</td>
<td>F+; R12 Flam. Gas; H220 Press. Gas; H280</td>
<td></td>
</tr>
</tbody>
</table>

4. First aid measures

The first aid advice given for skin contact, eye contact and ingestion is applicable following exposures to the liquid or spray. Also see section 11.

Inhalation
Remove patient from exposure, keep warm and at rest. Administer oxygen if necessary. Apply artificial respiration if breathing has ceased or shows signs of failing. In the event of cardiac arrest apply external cardiac massage. Obtain immediate medical attention.

Skin contact
Thaw affected areas with water. Remove contaminated clothing. Caution: clothing may adhere to the skin in the case of freeze burns. After contact with skin, wash immediately with plenty of warm water. If irritation or blistering occur, obtain medical attention.
4. First aid measures continued

**Eye contact**
Immediately irrigate with eyewash solution or clean water, holding the eyelids apart for at least 15 minutes. Obtain immediate medical attention.

**Ingestion**
Unlikely route of exposure. Do not induce vomiting. Provided the patient is conscious, wash out mouth with water and give 200-300ml (half a pint) of water to drink. Obtain immediate medical attention.

**Most important symptoms and effects both acute and delayed.**
Skin contact may produce the following symptoms: Frostbite. Inhalation may produce the following symptoms: Shortness of breath, dizziness, weakness, nausea, headache, narcosis, irregular cardiac activity.

**Indication of any immediate medical attention and special treatment needed**
Do not give adrenaline or similar drugs.

5. Fire-fighting measures

**Specific hazards**
Exposure to fire may cause containers to rupture/explode.

**Hazardous combustion products**
Incomplete combustion may form carbon monoxide.

**Extinguishing media**
All known extinguishants can be used.

**Suitable extinguishing media**
If possible, stop flow of product. Move away from the container and cool with water from a protected position. Do not extinguish a leaking gas flame unless absolutely necessary. Spontaneous/explosive re-ignition may occur. Extinguish any other fire.

**Specific methods**
In confined space use self-contained breathing apparatus.

6. Accidental release measures

**Personal precautions**
Evacuate personnel to safe areas. Ventilate area.. Refer to protective measures listed in sections 7 and 8.

**Environmental precautions**
Should not be released into the environment.

**Clean up measures**
Evaporates.

7. Handling and storage

**Precautions for safe handling**
Avoid breathing vapours or mist. Avoid contact with skin, eyes and clothing. Provide sufficient air exchange and/or exhaust in work rooms. For personal protection see section 8. See Annex – Section 2.2

**Advice for safe handling**


7. Handling and storage continued

Advice on protection against fire and explosion

Vapours are heavier than air and may spread along floors. Vapours may form explosive mixtures with air. The products should only be used in areas from which all naked lights and other sources of ignition have been excluded. Electrical equipment should be protected to the appropriate standard. No sparking tools should be used. Take measures to prevent the build of electrostatic charge. Keep away from heat and sources of ignition. Keep away from open flames, hot surfaces and sources of ignition. When using do not smoke. Avoid breathing vapours or mist. Avoid contact with skin, eyes and clothing.

Conditions for safe storage, including any incompatibilities

Requirements for storage areas and Containers

Keep containers tightly closed in a cool, well ventilated place. Store in original container.

Specific end uses

No data available.

8. Exposure controls / personal protection

Control parameters

Components with workplace control parameters

<table>
<thead>
<tr>
<th>Components</th>
<th>CAS-No.</th>
<th>Type form of exposure</th>
<th>Control parameters</th>
<th>Update</th>
<th>Basis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dimethyl ether</td>
<td>115-10-6</td>
<td>TWA</td>
<td>766mg/m³, 400ppm</td>
<td>2007</td>
<td>EH40 WEL</td>
</tr>
<tr>
<td></td>
<td></td>
<td>STEL</td>
<td>985mg/m³, 500ppm</td>
<td>2007</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>TWA</td>
<td>1920mg/m³, 1000ppm</td>
<td>02 2006</td>
<td></td>
</tr>
</tbody>
</table>

Derived No Effect Level

- Dimethyl ether

Type of Application (Use): Workers exposure routes: Inhalation health effect: Chronic effects, systematic toxicity value: 1894mg/m³

Type of Application (Use): Consumers exposure routes: Inhalation health effect: Chronic effects, systematic toxicity value: 471mg/m³

Predicted No Effect Concentration

- Dimethyl ether

Value: 0,155 mg/l
Compartment: Fresh water

Value: 0,016 mg/l
Compartment: Marine water

Value: 1,549 mg/l
Compartment: Water
Remarks: Intermittent use/release

Value: 160 mg/l
Compartment: Water
Remarks: sewage treatment plants

Value: 0,681 mg/l
Compartment: Fresh water sediment

Value: 0,069 mg/l
Compartment: Marine sediment
8. Exposure controls / personal protection continued

Value: 0.045 mg/l
Compartment: Soil

Personal protection

Wear suitable protective clothing, gloves and eye/face protection. Wear thermal insulating gloves when handling liquefied gases. In cases of insufficient ventilation, where exposure to high concentrations of vapour is possible, suitable respiratory protective equipment with positive air supply should be used. Do not smoke while handling product.

Safety glasses. Additionally wear a face shield where the possibility exists for face contact due to splashing, spraying or airborne contact with this material.

Heat insulating gloves

9. Physical and chemical properties

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Form</td>
<td>Liquefied gas</td>
</tr>
<tr>
<td>Physical state at 20°C</td>
<td>Gas</td>
</tr>
<tr>
<td>Colour</td>
<td>Colourless</td>
</tr>
<tr>
<td>Odour</td>
<td>Slight ether-like.</td>
</tr>
<tr>
<td>Molecular weight [g/mol]</td>
<td>46.07</td>
</tr>
<tr>
<td>Solubility in water [g/l]</td>
<td>45.6 at 25°C at 1013 hPa</td>
</tr>
<tr>
<td>Boiling point/boiling range (°C)</td>
<td>-24.8 at 1013 hPa</td>
</tr>
<tr>
<td>Melting point/range (°C)</td>
<td>-141.5 at 1013 hPa</td>
</tr>
<tr>
<td>Relative density</td>
<td>1.88 at 25°C</td>
</tr>
<tr>
<td>Vapour pressure (25°C)</td>
<td>5132.9 hPa</td>
</tr>
<tr>
<td>Flammability range [vol% in air]</td>
<td>3.3 to 26.2</td>
</tr>
<tr>
<td>Auto ignition temperature [°C]</td>
<td>226 at 1013 hPa</td>
</tr>
<tr>
<td>Explosive properties</td>
<td>Not explosive</td>
</tr>
<tr>
<td>Partition coefficient: n-octanol/water</td>
<td>POW 0.07 at 25°C</td>
</tr>
<tr>
<td>Other data</td>
<td>No data available.</td>
</tr>
</tbody>
</table>

10. Stability and reactivity

Reactivity

Extremely flammable gas.

Chemical Stability

The product is chemically stable

Possibility of hazardous reactions

Vapours may form explosive mixture with air.

Conditions to avoid

Temperatures > 52°C

Incompatible materials

Oxygen, oxidising agents, acid anhydrides, strong acids, Carbon monoxide, acetic anhydride, powdered metals.

Hazardous decomposition products

Hazardous thermal decomposition products may include:
Formaldehyde, carbon dioxide, Carbon monoxide, Methanol.
11. Toxicological information

Information on toxicological effects

Acute oral toxicity
- Dimethyl ether: Not applicable

Acute inhalation toxicity
- Dimethyl ether: LC50/rat: 164000 ppm
  Respiratory effects, anaesthetic effects, central nervous system depression, narcosis, cardiac irregularities, coma.

/ dog
  Cardiac sensitization.

Acute dermal toxicity
- Dimethyl ether: Not applicable

Skin irritation
- Dimethyl ether: Not tested on animals.
  Classification: Not classified as irritant.
  Result: No skin irritation.
  Not expected to cause skin irritation based on expert review of the properties of the substance.

Eye irritation
- Dimethyl ether: Not tested on animals.
  Classification: Not classified as irritant.
  Result: No eye irritation.
  Not expected to cause eye irritation based on expert review of the properties of the substance.

Sensitisation
- Dimethyl ether: Not tested on animals.
  Classification: Not classified as skin sensitizer.
  Not expected to cause sensitization based on expert review of the properties of the substance.

- Dimethyl ether: There are no reports of human skin sensitization.

Repeated dose toxicity
- Dimethyl ether: Inhalation rat: No toxicologically significant effects were found.

Mutagenicity assessment
- Dimethyl ether: Animal testing did not show mutagenic effects. Tests on bacterial or mammalian cell cultures did not show mutagenic effects.

Carcinogenicity assessment
- Dimethyl ether: Animal testing did not show any carcinogenic effects.

Toxicity to reproduction assessment
- Dimethyl ether: No toxicity to reproduction.

Further information
- Dimethyl ether: May cause cardiac arrhythmia. Rapid evaporation of the liquid may cause frostbite.
12. Ecological information

Toxicity
Toxicity to fish
  • Dimethyl ether  
    \[ \text{LC50/96 h/Poecilia reticulate (guppy): >4000 mg/l} \]

Toxicity to aquatic invertebrates
  • Dimethyl ether  
    \[ \text{EC50/48 h/Daphnia: >4000 mg/l} \]
    \[ \text{LC50/48 h/Daphnia: 755,549 mg/l} \]

Chronic toxicity to fish
  • Dimethyl ether  
    Due to its physical properties, there is no potential for adverse effects.

Persistence and degradability
Biodegradability
  Method: Closed bottle test. According to the results of tests of biodegradability this product is not readily biodegradable.

Physio-chemical removability
  The product can be degraded by abiotic (e.g. chemical or photolytic) processes.

Bio-accumulative potential
Bio-accumulation
  No data available.

Mobility in soil
Mobility in soil
  \[ \text{Koc: 7,759} \]

Results of PBT and vPvB assessment
Results of PBT and vPvB Assessment
  This substance is not considered to be persistent, bio-accumulating nor toxic (PBT). This substance is not considered to be very persistent nor very bio-accumulating (vPvB).

Other adverse effects
Ozone depletion potential
  0

Global warming potential (GWP)
  1

13. Disposal information

Waste treatment methods
Product
  Can be used after re-conditioning. In accordance with local and national regulations. Must be incinerated in suitable incineration plant holding a permit delivered by the competent authorities. See Annex – Section 2.1

Contaminated packaging
  Empty pressure vessels should be returned to the supplier.
14. Transport information

UN No. 1033
Labelling ADR, IMDG, IATA

2.1 : flammable gas

Land transport
ADR/RID
H.I.nr 23
UN No. 1033
UN Proper shipping name Dimethyl ether
Labelling No. 2.1
Transport hazard class(es) 2
DR/RID Classification code 2 F
Tunnel instructions (B/D)

Sea transport
IMO-IMDG code
Proper shipping name Dimethyl ether
Class 2.1
UN No. 1033
Labelling No. 2.1

Air transport
IATA_C
-Proper shipping name Dimethyl ether
Class 2.1
UN No. 1033
Labelling No. 2.1

Further information ICAO/IATA cargo aircraft only.

15. Regulatory information

Safety, health and environmental regulations/legislation specific for the substance or mixture
No data available.

Chemical safety Assessment
A chemical Safety Assessment has been carried out for this substance.

16. Other information

Text of R-phrases mentioned in Section 3
R12 Extremely flammable

Full text of H-Statements referred to Under Section 3
H220 - Extremely flammable gas.
H280 - Contains gas under pressure; may explode if heated.
16. Other information continued

Further information
For further information contact Harp International Limited.

This datasheet was prepared in accordance with Regulation (EC) No. 1907/2006.

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Annex:

1 Exposure Scenario (2)

Formulation and repacking

| SU 3, 10 | PC1, 3, 4, 8, 9a, 14, 15, 21, 23, 24, 25, 26, 27, 29, 31, 32, 34, 35, 38, 39 | PROC 1, 2, 3, 4, 5, 8b, 9 | ERC 2 |

Formulaion/blending in batch processes, transfers and packaging will describe the group of contributing scenarios listed below:

<table>
<thead>
<tr>
<th>Scenario name</th>
<th>Process Category (PROC)</th>
<th>Type of setting</th>
<th>Short name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Use in closed process</td>
<td>PROC 1</td>
<td>Industrial</td>
<td>CS 1</td>
</tr>
<tr>
<td>Use in closed continuous process</td>
<td>PROC 2</td>
<td>Industrial</td>
<td>CS 2</td>
</tr>
<tr>
<td>w/occasional controlled exposure</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Use in closed batch process</td>
<td>PROC 3</td>
<td>Industrial</td>
<td>CS 3</td>
</tr>
<tr>
<td>Use in batch and other process where opportunity for exposure</td>
<td>PROC 4</td>
<td>Industrial</td>
<td>CS 4</td>
</tr>
<tr>
<td>Mixing and blending</td>
<td>PROC 5</td>
<td>Industrial</td>
<td>CS 5</td>
</tr>
<tr>
<td>Transfer to small containers</td>
<td>PROC 9</td>
<td>Industrial</td>
<td>CS 6</td>
</tr>
<tr>
<td>Transfer at dedicated facilities</td>
<td>PROC 8b</td>
<td>Industrial</td>
<td>CS 7</td>
</tr>
</tbody>
</table>

2.1 Contributing scenario (1) controlling environmental exposure for formulation/blending in batch processes and packaging

Product characteristics

Physical state: gas/liquefied gas
Concentration: max. 100%

Amounts used

Max. 6000 t/year or 20 t/day [largest site tonnage]

Frequency and duration of use

300 days/year

Environment factors not influenced by risk management

Dilution factor river: 10
Dilution factor marine: 100

Other given operational conditions affecting environmental exposure

None

Technical conditions and measures at process level (source) to prevent release

Containment in process

Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil

None

Organisational measures to prevent/limit release from site

None

Conditions and measures related to municipal sewage treatment

Effluent rate of municipal STP: 2000 m³/day
River flow rate: 18000 m³/day

Conditions and measures related to external treatment of waste disposal

No waste generated as substance is a gas and will evaporate to air.

Conditions and measures related to external recovery of waste

None.

2.2 Contributing scenario (2) controlling worker exposure for Formulation/blending in batch processes, transfers and packaging

Product characteristics

Physical state: gas/liquefied gas
Concentration: max. 100%
Amounts used
Not relevant

Frequency & duration of exposure
Exposure frequency: daily for all PROCs

<table>
<thead>
<tr>
<th>Scenario name</th>
<th>Duration of activity [hours/day]</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS1</td>
<td>&gt;4 hours</td>
</tr>
<tr>
<td>CS2</td>
<td>&gt;4 hours</td>
</tr>
<tr>
<td>CS3</td>
<td>&gt;4 hours</td>
</tr>
<tr>
<td>CS4</td>
<td>&gt;4 hours</td>
</tr>
<tr>
<td>CS5</td>
<td>&gt;4 hours</td>
</tr>
<tr>
<td>CS6</td>
<td>&gt;4 hours</td>
</tr>
<tr>
<td>CS7</td>
<td>&gt;4 hours</td>
</tr>
</tbody>
</table>

Human factors not influenced by risk management
None

Other given operational conditions affecting workers exposure

<table>
<thead>
<tr>
<th>Scenario name</th>
<th>Use of ventilation</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS1</td>
<td>Indoors without LEV</td>
</tr>
<tr>
<td>CS2</td>
<td>Indoors without LEV</td>
</tr>
<tr>
<td>CS3</td>
<td>Indoors without LEV</td>
</tr>
<tr>
<td>CS4</td>
<td>Indoors without LEV</td>
</tr>
<tr>
<td>CS5</td>
<td>Indoors without LEV</td>
</tr>
<tr>
<td>CS6</td>
<td>Indoors without LEV</td>
</tr>
<tr>
<td>CS7</td>
<td>Indoors without LEV</td>
</tr>
</tbody>
</table>

Technical conditions and measures at process level (source) to prevent release
Handling in industrial settings.
Containment according to definition of PROCs for liquefied gas.
See SDS section 7.

Technical conditions and measures to control dispersion from source towards the worker
None

Organisational measures to prevent/limit release, dispersion and exposure
See SDS.

Conditions and measures related to personal protection, hygiene and health evaluation
See SDS section 8.

3. Exposure estimation and reference to its source

<table>
<thead>
<tr>
<th>Scenario name</th>
<th>Inhalative Exposure Estimate (mg/m³)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS1</td>
<td>0.0192</td>
</tr>
<tr>
<td>CS2</td>
<td>96.0</td>
</tr>
<tr>
<td>CS3</td>
<td>192</td>
</tr>
<tr>
<td>CS4</td>
<td>192</td>
</tr>
<tr>
<td>CS5</td>
<td>480</td>
</tr>
<tr>
<td>CS6</td>
<td>384</td>
</tr>
<tr>
<td>CS7</td>
<td>288</td>
</tr>
</tbody>
</table>

Comment: Tables below are reporting worst case values for PROC 5 – CS 5:

(Semi) Quantitative risk characterisation for workers

<table>
<thead>
<tr>
<th>Leading toxic end point/critical effect</th>
<th>Risk characterisation ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Long term- systematic effects - inhalation</td>
<td>Anaesthetic</td>
</tr>
</tbody>
</table>

(Semi) Quantitative risk characterisation for humans exposed via environment

<table>
<thead>
<tr>
<th>Route</th>
<th>Leading toxic end point/critical effect</th>
<th>Risk characterisation ratio (RCR)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Long term- systematic effects - inhalation</td>
<td>Anaesthetic</td>
<td>0.00002</td>
</tr>
</tbody>
</table>
Risk characterisation for the aquatic compartment

<table>
<thead>
<tr>
<th>Compartments</th>
<th>RCR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Freshwater</td>
<td>0.00001</td>
</tr>
<tr>
<td>Marine water</td>
<td>0.00006</td>
</tr>
<tr>
<td>Sediment</td>
<td>0.00001</td>
</tr>
<tr>
<td>Marine sediment</td>
<td>0.00006</td>
</tr>
</tbody>
</table>

Risk characterisation for the terrestrial compartment

<table>
<thead>
<tr>
<th>Compartments</th>
<th>RCR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agricultural soil</td>
<td>0.07</td>
</tr>
<tr>
<td>Grassland</td>
<td>0.07</td>
</tr>
</tbody>
</table>

Microbiological activity in sewage treatment systems

<table>
<thead>
<tr>
<th>Compartments</th>
<th>RCR</th>
<th>Discussion</th>
</tr>
</thead>
<tbody>
<tr>
<td>STRP (mg/l)</td>
<td>0.003</td>
<td>No release to STP</td>
</tr>
</tbody>
</table>

Assessment method:
Worker inhalation: ECETOC TRAM worker (May 2010 release)
Man via Environment: ECETOC TRAM Environment (May 2010 release)
Consumer: ECETOC TRAM Consumer (May 2010 release)
Environment: ECETOC TRAM Environment (May 2010 release)

Release factors:
Air: 0.2%, max release rate of 40 kg/day per site
Wastewater: no release to wastewater
Soil: no processes/process steps leading to direct release to soil

4. Guidance to DU to evaluate whether he works inside the boundaries set by the ES

Worker exposure
Input parameters resulting in highest exposure estimates (worst-case) were used to evaluate worker exposures (see section 3). If the downstream user reduces exposure duration each activity/process to less than 8 hours, it may be necessary to consider summing exposure estimates if the same worker may be engaged in multiple tasks during the day.

For DNELs, see SDS section 8.

Environmental exposure
Downstream users should check whether they are still within the boundaries of the ES if:
- Release factors exceed those listed (see Section 3),
- Number of operating days is less than the frequency and duration of use (see Section 2.1), or
- Actual tonnage (one location) exceeds amount used (see Section 2.1)

ECETOC/TRAM basic input parameters
Molecular weight: 46.07 g/mol
Vapour pressure, water solubility, octanol-water partition coefficient [Kow] (see SDS Section 9), organic-carbon adsorption coefficient [Koc], bio-degradability (see SDS Section 12)

For PNECs, see SDS Section 8.
1 Exposure Scenario (6)
Industrial/professional use of propellants

<table>
<thead>
<tr>
<th>Scenario name</th>
<th>Process Category (PROC)</th>
<th>Type of setting</th>
<th>Short name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Industrial spraying</td>
<td>PROC 7</td>
<td>Industrial</td>
<td>CS 1</td>
</tr>
<tr>
<td>Industrial spraying</td>
<td>PROC 7</td>
<td>Industrial</td>
<td>CS 2</td>
</tr>
<tr>
<td>Professional spraying</td>
<td>PROC 11</td>
<td>Professional</td>
<td>CS 3</td>
</tr>
<tr>
<td>Professional spraying</td>
<td>PROC 11</td>
<td>Professional</td>
<td>CS 4</td>
</tr>
<tr>
<td>Use of laboratory in small scale laboratory</td>
<td>PROC 15</td>
<td>Professional</td>
<td>CS 5</td>
</tr>
</tbody>
</table>

Spraying of propellant and laboratory use as a chemical will describe the group contributing scenarios listed below:

2.1 Contributing scenario (1) controlling environmental exposure for spraying of propellant and laboratory use as a chemical

**Product characteristics**

- Physical state: gas/liquefied gas
- Concentration: >25% (ECETOC TRAM does not modify exposure estimates for substances in mixtures if >25%)

**Amounts used**

- Max. 15000 t/year
- Fraction to region 0.1 (default for wide dispersive use)
- Fraction used at main local source: 0.002 (default for wide dispersive use)

**Frequency and duration of use**

- Continuous release, 365 days/year (default for wide dispersive use)

**Environment factors not influenced by risk management**

- Dilution factor river: 10
- Dilution factor marine: 100

**Other given operational conditions affecting environmental exposure**

- None

**Technical conditions and measures at process level (source) to prevent release**

- None

**Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil**

- None

**Organisational measures to prevent/limit release from site**

- None

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

- Effluent rate of municipal STP: 2000 m³/days
- River flow rate: 18000 m³/days

**Conditions and measures related to external treatment of waste disposal**

- No waste generated as substance is a gas and will evaporate to air.

**Conditions and measures related to external recovery of waste**

- None.

2.2 Contributing scenario (2) controlling worker exposure for spraying of propellant and laboratory use as a chemical

**Product characteristic**

- Physical state: gas/liquefied gas
- Concentration: >25% (ECETOC TRAM does not modify exposure estimates for substances in mixtures if >25%)
### Amounts used
Not applicable

### Frequency & duration of exposure
Exposure frequency: daily for all PROCs

<table>
<thead>
<tr>
<th>Scenario name</th>
<th>Duration of activity [hours/day]</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS1</td>
<td>&gt;4 hours</td>
</tr>
<tr>
<td>CS2</td>
<td>&gt;4 hours</td>
</tr>
<tr>
<td>CS3</td>
<td>&gt;4 hours</td>
</tr>
<tr>
<td>CS4</td>
<td>1-4 hours</td>
</tr>
<tr>
<td>CS5</td>
<td>&gt;4 hours</td>
</tr>
</tbody>
</table>

### Human factors not influenced by risk management
None

### Other given operational conditions affecting workers exposure

<table>
<thead>
<tr>
<th>Scenario name</th>
<th>Use of ventilation</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS1</td>
<td>Outdoors</td>
</tr>
<tr>
<td>CS2</td>
<td>Indoors without LEV</td>
</tr>
<tr>
<td>CS3</td>
<td>Outdoors</td>
</tr>
<tr>
<td>CS4</td>
<td>Indoors without LEV</td>
</tr>
<tr>
<td>CS5</td>
<td>Indoors without LEV</td>
</tr>
</tbody>
</table>

### Technical conditions and measures at process level (source) to prevent release
Handling in industrial settings.
Containment according to definition of PROCs for liquefied gas.
See SDS section 7.

### Technical conditions and measures to control dispersion from source towards the worker
None

### Organisational measures to prevent/limit release, dispersion and exposure
See SDS.

### Conditions and measures related to personal protection, hygiene and health evaluation
See SDS section 8.

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

<table>
<thead>
<tr>
<th>Scenario name</th>
<th>Inhalative Exposure Estimate (mg/m³)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS1</td>
<td>672</td>
</tr>
<tr>
<td>CS2</td>
<td>960</td>
</tr>
<tr>
<td>CS3</td>
<td>1340</td>
</tr>
<tr>
<td>CS4</td>
<td>1150</td>
</tr>
<tr>
<td>CS5</td>
<td>96</td>
</tr>
</tbody>
</table>

Comment: Tables below are reporting worst case values for PROC 5 – CS 3:

(Semi) Quantitative risk characterisation for workers

<table>
<thead>
<tr>
<th>Leading toxic end point/critical effect</th>
<th>Risk characterisation ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anaesthetic</td>
<td>0.7</td>
</tr>
</tbody>
</table>

(Semi) Quantitative risk characterisation for humans exposed via environment

<table>
<thead>
<tr>
<th>Route</th>
<th>Leading toxic end point/critical effect</th>
<th>Risk characterisation ratio (RCR)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Long term- systematic effects - inhalation</td>
<td>Anaesthetic</td>
<td>0.0000005</td>
</tr>
</tbody>
</table>
Risk characterisation for the aquatic compartment

<table>
<thead>
<tr>
<th>Compartments</th>
<th>RCR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Freshwater</td>
<td>0.00001</td>
</tr>
<tr>
<td>Marine water</td>
<td>0.00006</td>
</tr>
<tr>
<td>Sediment</td>
<td>0.00001</td>
</tr>
<tr>
<td>Marine sediment</td>
<td>0.00006</td>
</tr>
</tbody>
</table>

Risk characterisation for the terrestrial compartment

<table>
<thead>
<tr>
<th>Compartments</th>
<th>RCR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agricultural soil</td>
<td>0.03</td>
</tr>
<tr>
<td>Grassland</td>
<td>0.004</td>
</tr>
</tbody>
</table>

Assessment method:
Worker inhalation: ECETOC TRAM worker (May 2010 release)
Man via Environment: ECETOC TRAM Environment (May 2010 release)
Consumer: ECETOC TRAM Consumer (May 2010 release)
Environment: ECETOC TRAM Environment (May 2010 release)

Release factors:
Air: 100%, max release rate of 4110 kg/day (regional release)
Wastewater: no release to STP
Soil: no direct release to soil

4. Guidance to DU to evaluate whether he works inside the boundaries set by the ES

Worker exposure

Input parameters resulting in highest exposure estimates (worst-case) were used for all activities/processes except for professional spraying (PROC 11), which is limited to 4 hours or less where the activity occurs indoors without LEV. If operating conditions differ, exposure estimates can be scaled using ECETOC TRAM exposure modifiers as follows:

\[
R_{CR_s} = R_{CR_o} \times \sum_{i=1}^{n} CF_{s,i} \div CF_{o,i} 
\]

\( R_{CR_o} \) = original exposure prediction
\( R_{CR_s} \) = scaled exposure prediction
\( CF_{s,i} \) = original correction factor
\( CF_{o,i} \) = correction factor for the ith determinant scaling

Correction factor for professional spraying (PROC 11) indoors without LEV = 1 (\( CF_{o} \))
Correction factor for professional spraying indoors with LEV = 0.2 (\( CF_{s} \))

Other notes
If the downstream user reduces the exposure duration for each activity/process to less than 8 hours, it may be necessary to consider summing exposure estimates if the same worker may be engaged in multiple tasks during the day.

For DNELs, see SDS section 8.
Environmental exposure
If conditions differ significantly from those listed in Section 2.1, downstream user (DU) should check whether they are still within the boundaries of the ES. For wide-dispersive releases, DU should check that the RCR from all wide-dispersive releases are below one. This is shown in column ET of the “datasheets” worksheet in ECETOC TRAM.

Basic input parameters required for the environmental assessment using ECETOC TRAM are:

ECETOC/TRAM basic input parameters
Molecular weight: 46.07 g/mol
Vapour pressure, water solubility, octanol-water partition coefficient [Kow] (see SDS Section 9), organic-carbon adsorption coefficient [Koc], bio-degradability (see SDS Section 12)

For PNECs, see SDS Section 8.
1 Exposure Scenario (7)
Consumer use of propellants

SU 21
PC1, 3, 4, 8, 9a, 24, 39
ERC 8a, 8d (ERC 8a covered by ERC 8d)

<table>
<thead>
<tr>
<th>Scenario name</th>
<th>Product Category (PC)</th>
<th>Type of setting</th>
<th>Short name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spraying of propellants indoors and outdoors</td>
<td>PROC1, 3, 4, 8 9a, 24, 39</td>
<td>Consumer</td>
<td>CS 1</td>
</tr>
</tbody>
</table>

2.1 Contributing scenario (1) controlling environmental exposure for spraying of propellant indoors and outdoors

Product characteristics
Concentration: typically <50% substance in preparation
Physical state: gas/liquefied gas

Amounts used
3000 t/year
Fraction to region 0.1 (default for wide dispersive use)
Fraction used at main local source: 0.002 (ESVOC spERC 8.23b.v1 [ESVOC 22])

Frequency and duration of use
Continuous release, 365 days/year (default for wide dispersive use)

Environment factors not influenced by risk management
Dilution factor river: 10
Dilution factor marine: 100

Other given operational conditions affecting environmental exposure
None

Conditions and measures related to municipal sewage treatment plant
Effluent rate of municipal STP: 2000m$^3$/day
River flow rate: 18000m$^3$/day

Conditions and measures related to external treatment of waste disposal
None

Conditions and measures related to external recovery of waste
None.

2.2 Contributing scenario (2) controlling worker exposure for spraying of propellants indoors and outdoors

Product characteristic
Concentration: typically <50% substance in preparation
Physical state: gas/liquefied gas

Amounts used
Up to 10g per application

Frequency & duration of exposure
Frequency: 4 times/day
Duration [for contact]: 15 minutes

Human factors not influenced by risk management
None

Other given operational conditions affecting workers exposure
This product is used indoors and outdoors. Only indoors is considered since it leads to worst case potential exposure.
Indoor air volume: min. >2.5m$^3$, 1.5/hr air exchange rate

Conditions and measures related to information and behavioural advice to consumers
Label advices on safe use.

Conditions and measures related to personal protection and hygiene
Label advices on safe use.
3. Exposure estimation and reference to its source

Scenario name: CS1
Inhalative Exposure Estimate (mg/m³): 57.1

Comment: Tables below are reporting worst case values for PC 9a:

(Semi) Quantitative risk characterisation for workers

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(Semi) Quantitative risk characterisation for humans exposed via environment

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Risk characterisation for the terrestrial compartment

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<tr>
<td>Grassland</td>
<td>0.00005</td>
</tr>
</tbody>
</table>

Assessment method:
Consumer: ECETOC TRAM Consumer (May 2010 release), ConsExpo 4.1, and AISE REACT
Man via Environment: ECETOC TRAM Environment (May 2010 release)
Environment: ECETOC TRAM Environment (May 2010 release)

Release factors:
Air: spERC ESVOC 22 (refinement of ERC 8a): release to air is 100%, max release rate of 8220 kg/day (regional release)
Wastewater: No release to wastewater as 100% goes to air
Soil: no direct release to soil as 100% goes to air

4. Guidance to DU to evaluate whether he works inside the boundaries set by the ES

If conditions differ significantly from those listed in Section 2, downstream user (DU) should check whether they are still within the boundaries of the ES. This evaluation may be based on expert judgement or on the risk assessment tools that are recommended by ECHA.