SAFETY DATA SHEET

CYCLOTETRASILOXANE

1. IDENTIFICATION OF THE SUBSTANCE/PREPARATION AND OF THE COMPANY

1.1 Product name : CYCLOTETRASILOXANE

1.2 Identified uses : Cosmetics
Solvents
Intermediates

Uses advised against : None known.

1.3 Company : CHANJAO LONGEVITY CO., LTD.

50 RAMINDRA 14
BANGKOK 10230 THAILAND

E-mail address (Safety Data Sheet) : care@myskinrecipes.com

Customer Service : English Tel: +66 02 002 7 002

1.4 Emergency Phone Number : 8.30-17.00 M-F Tel: +66 02 002 7 002

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

According to Regulation (EC) No. 1272/2008:

Flammable liquid: Category 3
Reproductive toxicity: Category 2
Chronic aquatic hazard: Category 4

According to EU Directives 67/548/EEC or 1999/45/EC:

R53 May cause long-term adverse effects in the aquatic environment.
R62 Possible risk of impaired fertility.

2.2 Label elements

Signal word:
Warning

Hazard statements:
Flammable liquid and vapour.
Suspected of damaging fertility.
May cause long lasting harmful effects to aquatic life.

Precautionary statements:
Keep away from heat/sparks/open flames/hot surfaces. - No smoking.
Take precautionary measures against static discharge.
Store in a well-ventilated place. Keep cool.
Avoid release to the environment.
Do not breathe vapour.
Avoid contact with eyes.

2.3 Other hazards
Vapours may form explosive mixtures with air.

3. COMPOSITION / INFORMATION ON INGREDIENTS

Chemical characterization: Silicone

According to EU Directives 67/548/EEC or 1999/45/EC:

Name	CAS-No.	EINECS/ ELINCS No.	REACH Registration Number	Conc. (% w/w)	Classification
Octamethylcyclotetrasiloxane	556-67-2	209-136-7	01-2119529238-36	100.0	Xn, Toxic for reproduction - category 3. R62 R53

According to Regulation (EC) No. 1272/2008:

Name	CAS-No.	EINECS/ ELINCS No.	REACH Registration Number	Conc. (% w/w)	Classification
Octamethylcyclotetrasiloxane	556-67-2	209-136-7	01-2119529238-36	100.0	Flammable liquid: Category 3 - H226 Reproductive toxicity (Inhalation - vapour): Category 2 - H361f Chronic aquatic hazard: Category 4 - H413

For the full text of the R-phrases mentioned in this Section, see Section 16.
For the full text of the H-Statements mentioned in this Section, see Section 16.
CLP classifications are based on all current available data including from known international organizations. These classifications are subject to revision as more information becomes available.

CYCLOTETRASILOXANE

4. FIRST AID MEASURES

4.1 Description of First Aid Measures:

On contact with eyes	:	No first aid should be needed.
On skin contact	:	No first aid should be needed.
If inhaled	:	Remove to fresh air. Obtain medical attention.
On ingestion	:	Obtain medical attention.
4.2 Most important symptoms/effects, acute and delayed	:	Suspected of damaging fertility.

5. FIRE-FIGHTING MEASURES

5.1 Suitable extinguishing media	:	On large fires use AFFF alcohol compatible foam or water spray (fog). On small fires use AFFF alcohol compatible foam, CO2 or water spray (fog). Water can be used to cool fire exposed containers.
Unsuitable extinguishing media	:	None known.
5.2 Hazards during fire fighting	:	Fire burns more vigorously than would be expected. Vapours are heavier than air and can travel along ground to remote ignition sources. Electrostatic charges may be generated during transfer of product from its container. Ensure that all equipment is electrically earthed. Vapours may form explosive mixtures with air.
Hazardous Combustion Products	:	Thermal breakdown of this product during fire or very high heat conditions may evolve the following decomposition products: Silica. Carbon oxides and traces of incompletely burned carbon compounds. Formaldehyde.
5.3 Special protective equipment/procedures	:	A self-contained respirator and protective clothing should be worn. Determine the need to evacuate or isolate the area according to your local emergency plan. Use water spray to keep fire exposed containers cool.

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures	:	A self-contained respirator and protective clothing should be worn. Determine the need to evacuate or isolate the area according to your local emergency plan. Eliminate all possible sources of ignition.
6.2 Environmental precautions	:	Do not empty into drains. Prevent from spreading or entering into drains, ditches or rivers by using sand, earth or other appropriate barriers.
6.3 Methods and materials for containment and cleaning up	:	Determine the need to evacuate or isolate the area according to your local emergency plan. Eliminate all possible sources of ignition. Very large spills should be contained by bunding, etc... procedures. Mop, wipe or soak up with absorbent material and place in a

container with a lid. The spilled product produces an extremely slippery surface.

7. HANDLING AND STORAGE

7.1 Advice on safe handling : General ventilation is required. Local ventilation is required. Avoid eye contact. Do not breathe vapour. Do not empty into drains.

7.2 Advice on storage : Store in a flameproof, well ventilated area. Electrostatic charges may be generated during transfer of product from its container. Ensure that all equipment is electrically earthed.
Keep container tightly closed.
Vapours may form explosive mixtures with air.
Storage temperature: minimum -40 °C, maximum 54 °C

7.3 Specific uses : Refer to technical data sheet available on request.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

8.1 Control parameters

Name	CAS-No.	Exposure Limits
Octamethylcyclotetrasiloxane	556-67-2	10 ppm TWA

8.2 Exposure controls

Engineering Controls : Ventilation : Refer to Section 7.1

Personal protection equipment

Respiratory protection : Suitable respiratory protection should be worn if the product is used in large quantities, confined spaces or in other circumstances where the OEL may be approached or exceeded.
Depending on the working conditions, wear a respiratory mask with filter(s) A or use a self-contained respirator.
The choice of a filter type depends on the amount and type of chemical being handled in the workplace. Regarding filter characteristics, contact your respiratory protection supplier.

Hand protection : Gloves are not normally required.

Eye/face protection : Safety glasses should be worn.

Skin protection : Protective equipment is not normally necessary.

Hygiene measures : Exercise good industrial hygiene practice. Wash after handling, especially before eating, drinking or smoking.

Additional information	:	These precautions are for room temperature handling. Use at elevated temperature or aerosol/spray applications may require added precautions. For further information regarding the use of silicones / organic oils in consumer aerosol applications, please refer to the guidance document regarding the use of these types of materials in consumer aerosol applications that has been developed by the silicone industry (www.SEHSC.com).
Environmental exposure controls	:	Refer to section 6 and 12.

9. PHYSICAL AND CHEMICAL PROPERTIES

Form	:	Liquid
Colour	:	Colorless
Odour	:	None
Boiling point/range	:	175 °C
Melting point/range	:	17.5 °C
Flash point	:	55 °C (Cleveland Open Cup) 57 °C (Tag Closed Cup)
Lower flammable limits	:	0.75 %
Upper flammable limits	:	7.4 %
Autoignition temperature	:	400 °C
Explosive properties	:	No Vapours may form explosive mixtures with air.
Vapour pressure	:	0.12 kPa at 20°C.
Specific Gravity	:	0.95
Partition coefficient (n-octanol/water)	:	5.1
Molecular weight	:	296.62
Viscosity	:	2.2 mm2/s at 25°C.
Evaporation rate (ethyl ether = 1)	:	< 1
Oxidizing properties	:	No

The above information is not intended for use in preparing product specifications.

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10. STABILITY AND REACTIVITY

10.1 Reactivity	:	None known.
10.2 Stability	:	Stable under normal usage conditions.
10.3 Possibility of hazardous reactions	:	None known.
10.4 Conditions to avoid	:	Eliminate all possible sources of ignition.
10.5 Materials to avoid	:	Can react with strong oxidising agents.
10.6 Hazardous decomposition products	:	Thermal breakdown of this product during fire or very high heat conditions may evolve the following decomposition products: Silica. Carbon oxides and traces of incompletely burned carbon compounds. Formaldehyde.

11. TOXICOLOGICAL INFORMATION

Acute toxicity:

On contact with eyes	:	May cause temporary discomfort.
On skin contact	:	No adverse effects are normally expected.
If inhaled	:	No significant effects expected from a single short-term exposure.
On ingestion	:	Small amounts transferred to the mouth by fingers during use should not injure.
Inhalation LC50 (Rat)	:	36 mg/l - 4hr vapor

Chronic toxicity:

On skin contact	:	No adverse effects are normally expected.
If inhaled	:	Suspected of damaging fertility.
On ingestion	:	Small amounts transferred to the mouth by fingers during use should not injure.
Toxicokinetics, metabolism and distribution	:	No specific information is available.

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Other Health Hazard Information : Octamethylcyclotetrasiloxane administered to rats by inhalation at concentrations of 500 and 700 ppm resulted in statistically significant decreases in the number of pups born and the live litter size in both the first and second generations. Prolonged estrous cycles, and decreased mating and fertility indices were observed following 700 ppm exposure in the second generation only. There were also increases in the incidence of deliveries of offspring extending over an unusually long time period (dystocia). Results from a 2 year repeated vapor inhalation exposure study to rats of octamethylcyclotetrasiloxane (D4) indicate effects (benign uterine adenomas) in the uterus of female animals. This finding occurred at the highest exposure dose (700 ppm) only. Studies to date have not demonstrated if these effects occur through pathways that are relevant to humans. Based on the available information on its potential to cause harm to human health, Health Canada, in a 2008 screening assessment, has concluded that octamethylcyclotetrasiloxane is not entering the environment in a quantity or concentration or under conditions that constitute or may constitute a danger in Canada to human life or health (http://www.ec.gc.ca/substances/ese/eng/challenge/batch2/batch2_556-67-2.cfm). Repeated exposure in rats to D4 resulted in what appears to be protoporphyrin accumulation in the liver. Without knowledge of the specific mechanism leading to the protoporphyrin accumulation the relevance of this finding to humans is unknown.

[1] Based on product test data.
[2] Based on test data from similar products.

12. ECOLOGICAL INFORMATION

12.1 Ecotoxicity effects

May cause long-term adverse effects in the aquatic environment. Adverse effects have only been observed in closed test systems.

12.2 Persistence and degradability

Low molecular weight volatile siloxanes have very low water solubility and evaporate to air. Low molecular weight volatile siloxanes in air are degraded by reaction with hydroxyl radicals, which is the dominant degradation process for most chemicals in the atmosphere. Low molecular weight volatile siloxanes in soil are removed by several simultaneously occurring processes including volatilisation, hydrolysis, and clay-catalysed degradation.

12.3 Bioaccumulation

Low molecular weight volatile siloxanes bioconcentrate in fish exposed under controlled laboratory conditions that are not representative of conditions found in the environment.

12.4 Release to waters / Mobility in soil

Fate and effects in waste water treatment plants:

No adverse effects on bacteria. The siloxanes in this product do not contribute to the BOD. Low molecular weight volatile siloxanes are efficiently removed (>90%) during wastewater treatment with approximately equal amounts going to the atmosphere and the sludge. Low molecular weight volatile siloxanes in treated wastewater effluent will be bound to particulate matter because of very low water solubility.

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13. DISPOSAL CONSIDERATIONS

Product and packaging disposal : Dispose of in accordance with local regulations. According to the European Waste Catalogue, Waste Codes are not product specific, but application specific. Waste codes should be assigned by the user, preferably in discussion with the waste disposal authorities.

14. TRANSPORT INFORMATION

Road / Rail (ADR/RID)

UN No. : UN 1993

Proper Shipping Name : FLAMMABLE LIQUID, N.O.S.(Cyclopolydimethylsiloxane)

Class : 3

Packing group : III

Labels : 3

Sea transport (IMDG)

UN No. : UN 1993

Proper Shipping Name : FLAMMABLE LIQUID, N.O.S.(Cyclopolydimethylsiloxane)

Class : 3

Packing group : III

Emergency Schedule (EmS) : F-E
S-E

Labels : flammable liquid

Air transport (IATA)

UN No. : UN 1993

Proper Shipping Name : Flammable liquid, n.o.s.(Cyclopolydimethylsiloxane)

Class : 3

Packing group : III

Labels : Flammable Liquid

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15. REGULATORY INFORMATION

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture

Status

EINECS	:	All ingredients listed, exempt or notified (ELINCS).
TSCA	:	All chemical substances in this material are included on or exempted from listing on the TSCA Inventory of Chemical Substances.
AICS	:	All ingredients listed, exempt or notified.
IECSC	:	All ingredients listed or exempt.
KECL	:	All ingredients listed, exempt or notified.
PICCS	:	All ingredients listed, exempt or notified.
DSL	:	All ingredients listed or exempt.

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16. OTHER INFORMATION

This product safety data sheet was prepared in compliance with article 31 and Annex II of the EU REACH Regulation as well as its relevant amendments, on the approximation of laws, regulations and administrative provisions relative to the classification, packaging and labelling of dangerous substances and preparations.

It is the responsibility of persons in receipt of this Product Safety Data Sheet to ensure that the information contained herein is properly read and understood by all people who may use, handle, dispose or in any way come in contact with the product. If the recipient subsequently produces a formulation containing the product, it is the recipient's sole responsibility to ensure the transfer of all relevant information from the Product Safety Data Sheet to their own Product Safety Data Sheet in compliance with article 31 and Annex II of the EU REACH Regulation.

All information and instructions provided in this Safety Data Sheet (SDS) are based on the current state of scientific and technical knowledge at the date indicated on the present SDS.

As stated above, this Safety Data Sheet has been prepared in compliance with applicable European law. If you purchase this material outside Europe, where compliance laws may differ, you should receive from your local supplier a SDS applicable to the country in which the product is sold and intended to be used. Please note that the appearance and content of the SDS may vary - even for the same product - between different countries, reflecting the different compliance requirements.

Source of information: Internal data and publically available information

R53 May cause long-term adverse effects in the aquatic environment., **R62** Possible risk of impaired fertility.

H226 Flammable liquid and vapour., **H361f** Suspected of damaging fertility., **H413** May cause long lasting harmful effects to aquatic life.

CYCLOTETRASILOXANE

Exposure scenario

1. Short title of Exposure Scenario: Manufacturing of Octamethylcyclotetrasiloxane (D4) (CAS 556-67-2).

Main User Groups	:	SU3
Sector of use	:	
Product category	:	
Process category	:	PROC2, PROC8b
Article category	:	
Environmental release category	:	ERC1
Further information	:	

2.1 ERC1

Remarks

Product characteristics

Concentration of the Substance in Mixture/Article	:	100%
Viscosity, kinematic	:	
Viscosity, dynamic	:	2.4-2.6 mm^2/s at 20°C

Amount used

Annual amount used per site	:	80,000 tpa
Remarks	:	
(Msafe)	:	
Remarks	:	

Frequency and duration of use

Single exposure	:	
Continuous exposure	:	

Environment factors not influenced by risk management

Flow rate	:	
Dilution Factor (River)	:	
Dilution Factor (Coastal Areas)	:	
Other data - Other information	:	
Remarks	:	

Other given operational conditions affecting environmental exposure

Exposure Type		
Number of emission days per year	:	300/site
Emission or Release Factor: Air	:	9.5E-06
Emission or Release Factor: Water	:	3.75E-08
Emission or Release Factor: Soil	:	
Remarks	:	
Parameter	:	
Remarks	:	

Technical conditions and measures / Organizational measures

Exposure time	:	
Compartment	:	
Air	:	Use of air emission abatement equipments such as incinerators and scrubbers are applicable as a 'best practice'.
Water	:	Treatment of effluent in biological waste water treatment plant.
Soil	:	
Sediment	:	
Remarks	:	

Conditions and measures related to municipal sewage treatment plant

Type of Sewage Treatment Plant	:	
Flow rate of sewage treatment plant effluent	:	1,300 m^3/d (fresh water) 3,100 m^3/d (marine water)
Effectiveness (of a measure)	:	
Percentage removed from waste eater	:	
Sludge Treatment	:	Sludge may be sent to landfill or incinerated. Spreading of sludge is assumed as a worst-case scenario.
Procedures to limit air emissions from Sewage Treatment Plant	:	Incineration and scrubbing to remove any wastes.
Remarks	:	

Conditions and measures related to external treatment of waste for disposal

Waste treatment	:	Solid wastes from production are ultimately disposed of via landfill or incineration, or are recycled outside of the process. Landfill is the most common disposal route. Details of the treatment of aqueous waste vary at different production sites but as a minimum the effluent is treated in on-site secondary biological treatment plants prior to discharge. Non-aqueous waste may be disposed off site as hazardous waste.
Disposal methods	:	
Remarks	:	

Conditions and measures related to external recovery of waste

Recovery Methods	:	Recovery of sludge for agriculture or horticulture.
Remarks	:	

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice	:	

2.2 Contributing scenario controlling worker exposure for: PROC2, PROC8b

Product characteristics

Concentration of the Substance in Mixture/Article		100%
Physical Form (at time of use)	:	Liquid
Vapour pressure	:	132 Pa at 25°C
Process Temperature	:	
Remarks	:	

Amount used

	:	267/day
	:	

Frequency and duration of use

Duration	:	<15 minutes
Frequency of use	:	1/day (PROC2) 2-5/day (PROC8b)
Remarks	:	

Human factors not influenced by risk management

Exposed skin area	:	480 cm^2 (PROC2, PROC8b)
Other Factors:	:	
Remarks	:	

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	
Room size	:	N/A for tier one exposure tool
Temperature	:	
Ventilation rate per hour	:	N/A for tier one exposure tool
Remarks	:	
Parameter	:	

Technical conditions and measures

Local exhaust ventilation required plus good work practice.

Organisational measures to prevent /limit releases, dispersion and exposure

D4 is a moderately volatile, flammable liquid. Measures should therefore be taken to prevent the build-up of electrostatic charge and other sources of ignition. Containers should be kept tightly closed in a dry, cool and well-ventilated place.

In addition, sites producing and using the registered substance also handle large volumes of highly corrosive and flammable chlorosilanes, including as starting materials in the production process.

All aspects of chlorosilane handling, including on-site storage and transfer, are subject to highly controlled conditions. The Centre Européen des Silicones (CES) manual on Safe Handling of Chlorosilanes, which these sites subscribe to, recommends that on-site storage vessels are located outside, remote from other buildings, overhead utilities or piping. Build-up of static electricity must be prevented. Equipment such as transfer lines, pumps, valves and vessels must be thoroughly dried, and should be fully enclosed to prevent contact with atmospheric moisture. Carbon steel vessels and piping are suitable in the absence of water, and leak tight systems are employed.

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

Safety glassess

Suitable respiratory protection should be worn if the product is handled in large quantities, confined spaces.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice :

2.3 Contributing scenario controlling consumer exposure for:

Exposure to consumers is not relevant for this scenario.

3. Exposure estimation and reference to its source

Environment

Contributing Scenario	Exposure Assessment Method	Specific conditions	Compartment	Value type	Level of Exposure	Risk characterisation ratio
ERC1	Calculated using EUSES 2.1.1		Freshwater	PEC	3.26E-06 mg/l	7.41E-03
ERC1	Calculated using EUSES 2.1.1		Marine water	PEC	1.43E-06 mg/l	0.0326
ERC1	Calculated using EUSES 2.1.1		Sediments (fresh water)	PEC	1.21E-03 mg/kg ww	9.40E-03
ERC1	Calculated using EUSES 2.1.1		Sediments (marine water)	PEC	5.31E-04 mg/kg ww	0.0413
ERC1	Calculated using EUSES 2.1.1		Agricultural soil	PEC	9.01E-05 mg/kg ww	5.68E-03
ERC1	Calculated using EUSES 2.1.1		Sewage Treatment Plant	PEC	4.33E-05 mg/l	<2.17E-06

Workers

Contributing Scenario	Exposure Assessment Method	Specific conditions	Value type	Level of Exposure	Risk characterisation ratio
PROC8b	ECETOC TRA predictions	With LEV	Dermal local exposure	0.1 mg/cm^2	N/A
PROC8b	ECETOC TRA predictions	With LEV	Dermal systemic exposure	0.69 mg/kg bw/d	N/A
PROC2	ECETOC TRA predictions	With LEV, including modification for exposure duration.	Inhalation local exposure	0.18 mg/m^3/8h	N/A
PROC2	ECETOC TRA predictions	With LEV, including modification for exposure duration.	Inhalation systemic exposure	0.18 mg/m^3/8h	2.95E-03

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

This exposure scenario covers production of D4 in the EU. For the environment, the scenario also covers on-site formulation, and on-site use as a monomer, chemical intermediate or non-metal surface treatment agent. In addition, the scenario also covers formulation and use at sites either importing from non-EU manufacturers, or purchasing material from EU manufacturers, where D4 itself is not produced, but other silanes are manufactured. These additional sites are included because high levels of control and emission abatement are employed at such locations due to the highly reactive nature of other materials produced and used there.

1. Short title of Exposure Scenario: Use of Octamethylcyclotetrasiloxane (D4) (CAS 556-67-2) as a monomer at sites other than production sites.

Main User Groups	:	SU3
Sector of use	:	SU8, SU9
Product category	:	PC19
Process category	:	PROC1, PROC3, PROC8b, PROC9
Article category	:	
Environmental release category	:	ERC6a, ERC6c
Further information	:	

2.1 ERC6a, ERC6c

Remarks

Product characteristics

Concentration of the Substance in Mixture/Article	:	100%
Viscosity, kinematic	:	
Viscosity, dynamic	:	2.4-2.6 mm^2/s at 20°C

Amount used

Annual amount used per site	:	
Remarks	:	
(Msafe)	:	
Remarks	:	

Frequency and duration of use

Single exposure	:	
Continuous exposure	:	

Environment factors not influenced by risk management

Flow rate	:	
Dilution Factor (River)	:	
Dilution Factor (Coastal Areas)	:	
Other data - Other information	:	
Remarks	:	

Other given operational conditions affecting environmental exposure

Exposure Type		
Number of emission days per year	:	
Emission or Release Factor: Air	:	9.49E-04
Emission or Release Factor: Water	:	3.75E-06
Emission or Release Factor: Soil	:	

Remarks	:	
Parameter	:	
Remarks	:	

Technical conditions and measures / Organizational measures

Exposure time	:	
Compartment	:	
Air	:	
Water	:	Treatment of effluent in waste water treatment plant.
Soil	:	
Sediment	:	
Remarks	:	

Conditions and measures related to municipal sewage treatment plant

Type of Sewage Treatment Plant	:	
Flow rate of sewage treatment plant effluent	:	10,000 m^3/d
Effectiveness (of a measure)	:	
Percentage removed from waste eater	:	
Sludge Treatment	:	Sludge may be sent to landfill or incinerated. Spreading of sludge is assumed as a worst-case scenario.
Procedures to limit air emissions from Sewage Treatment Plant	:	
Remarks	:	

Conditions and measures related to external treatment of waste for disposal

Waste treatment	:	Solid wastes from use as a monomer are ultimately disposed of via landfill or incineration, or are recycled outside of the process. Details of the treatment of aqueous waste vary at different sites but as a minimum the effluent treated in either in on-site or municipal secondary biological treatment plants prior to discharge. Non-aqueous waste may be disposed off site as hazardous waste.
Disposal methods	:	
Remarks	:	

Conditions and measures related to external recovery of waste

Recovery Methods	:	Recovery of sludge for agriculture or horticulture.
Remarks	:	

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice	:	

2.2 Contributing scenario controlling worker exposure for: PROC1, PROC3, PROC8b, PROC9

Product characteristics

Concentration of the Substance in Mixture/Article		100%
Physical Form (at time of use)	:	Liquid
Vapour pressure	:	132 Pa at 25°C
Process Temperature	:	
Remarks	:	

Amount used

	:
	:

Frequency and duration of use

Duration	:	15-60 minutes (PROC1, PROC3) <15 minutes (PROC8b) >4 hours (PROC9)
Frequency of use	:	1/day
Remarks	:	

Human factors not influenced by risk management

Exposed skin area	:	240 cm^2 (PROC1, PROC3) 480 cm^2 (PROC8b)
Other Factors:	:	
Remarks	:	

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	
Room size	:	N/A for tier one exposure tool
Temperature	:	
Ventilation rate per hour	:	N/A for tier one exposure tool
Remarks	:	
Parameter	:	

Technical conditions and measures

Local exhaust ventilation required plus good work practice.

Organisational measures to prevent /limit releases, dispersion and exposure

D4 is a moderately volatile, flammable liquid. Measures should therefore be taken to prevent the build-up of electrostatic charge and other sources of ignition. Containers should be kept tightly closed in a dry, cool and well-ventilated place.

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

Safety glassess

Suitable respiratory protection should be worn if the product is handled in large quantities, confined spaces.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice	:	

2.3 Contributing scenario controlling consumer exposure for:

Exposure to consumers is not relevant for this scenario.

3. Exposure estimation and reference to its source

Environment

It can be seen from the table that the RCR for marine sediment is nominally above 1 (having applied EUSES default), indicating that direct discharge of waste water containing D4 from this exposure scenario is not safe. Treatment of waste water in a waste water treatment plant before discharge into the marine water is required to determine safe use.

Therefore, downstream users are required to apply risk management measures of treating waste water to maintain this use. Applying this risk management measure would give marine RCR similar to the fresh water value.

Contributing Scenario	Exposure Assessment Method	Specific conditions	Compartment	Value type	Level of Exposure	Risk characterisation ratio
ERC6a, ERC6c	Calculated using EUSES 2.1.1		Freshwater	PEC	4.65E-05 mg/l	0.106
ERC6a, ERC6c	Calculated using EUSES 2.1.1		Marine water	PEC	4.88E-04 mg/l	11.1
ERC6a, ERC6c	Calculated using EUSES 2.1.1		Sediments (fresh water)	PEC	0.0172 mg/kg ww	0.134
ERC6a, ERC6c	Calculated using EUSES 2.1.1		Sediments (marine water)	PEC	0.181 mg/kg ww	14.1
ERC6a, ERC6c	Calculated using EUSES 2.1.1		Agricultural soil	PEC	3.61E-03 mg/kg ww	0.228
ERC6a, ERC6c	Calculated using EUSES 2.1.1		Sewage Treatment Plant	PEC	1.78E-03 mg/l	<8.89E-05

Workers

Contributing Scenario	Exposure Assessment Method	Specific conditions	Value type	Level of Exposure	Risk characterisation ratio
PROC8b	ECETOC TRA predictions	With LEV, including modification for exposure duration.	Dermal local exposure	0.1 mg/cm^2	N/A
PROC8b	ECETOC TRA predictions	With LEV, including modification for exposure duration.	Dermal systemic exposure	0.69 mg/kg bw/d	N/A
PROC9	ECETOC TRA predictions	With LEV	Inhalation local exposure	6.1 mg/m^3/8h	N/A
PROC9	ECETOC TRA predictions	With LEV	Inhalation systemic exposure	6.1 mg/m^3/8h	0.1

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

This exposure scenario covers the use of D4 as a monomer in the production of siloxane polymers and resins, use as an intermediate (environment) and use in emulsion polymerisation (environment). This is in effect use as a monomer. The tonnages described here cover the amounts of D4 although it will frequently be the case that higher tonnages of the mixed product (and therefore higher levels of control) will be in place.

1. Short title of Exposure Scenario: Use of Octamethylcyclotetrasiloxane (D4) (CAS 556-67-2) as an intermediate at sites other than production sites.

Main User Groups	:	SU3
Sector of use	:	SU8, SU9
Product category	:	PC19
Process category	:	PROC1, PROC2, PROC3, PROC4, PROC8b, PROC9
Article category	:	
Environmental release category	:	ERC6a
Further information	:	

2.1 ERC6a

Remarks

Product characteristics

Concentration of the Substance in Mixture/Article	:	100%
Viscosity, kinematic	:	
Viscosity, dynamic	:	2.4-2.6 mm^2/s at 20°C

Amount used

Annual amount used per site	:	
Remarks	:	
(Msafe)	:	
Remarks	:	

Frequency and duration of use

Single exposure	:	
Continuous exposure	:	

Environment factors not influenced by risk management

Flow rate	:	
Dilution Factor (River)	:	
Dilution Factor (Coastal Areas)	:	
Other data - Other information	:	
Remarks	:	

Other given operational conditions affecting environmental exposure

Exposure Type		
Number of emission days per year	:	

Emission or Release Factor: Air	:	9.49E-04
Emission or Release Factor: Water	:	3.75E-06
Emission or Release Factor: Soil	:	
Remarks	:	
Parameter	:	
Remarks	:	

Technical conditions and measures / Organizational measures

Exposure time	:	
Compartment	:	
Air	:	
Water	:	Treatment of effluent in waste water treatment plant.
Soil	:	
Sediment	:	
Remarks	:	

Conditions and measures related to municipal sewage treatment plant

Type of Sewage Treatment Plant	:	
Flow rate of sewage treatment plant effluent	:	10,000 m^3/d
Effectiveness (of a measure)	:	
Percentage removed from waste eater	:	
Sludge Treatment	:	Sludge may be sent to landfill or incinerated. Spreading of sludge is assumed as a worst-case scenario.
Procedures to limit air emissions from Sewage Treatment Plant	:	
Remarks	:	

Conditions and measures related to external treatment of waste for disposal

Waste treatment	:	Solid wastes from use as an intermediate are ultimately disposed of via landfill or incineration, or are recycled outside of the process. Details of the treatment of aqueous waste vary at different sites but as a minimum the effluent is treated either in on-site or municipal secondary biological treatment plants prior to discharge. Non-aqueous waste may be disposed off site as hazardous waste.
Disposal methods	:	
Remarks	:	

Conditions and measures related to external recovery of waste

Recovery Methods	:	Recovery of sludge for agriculture or horticulture.
Remarks	:	

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice	:	

2.2 Contributing scenario controlling worker exposure for: PROC1, PROC2, PROC3, PROC4, PROC8b, PROC9

Product characteristics

Concentration of the Substance in Mixture/Article		100%
Physical Form (at time of use)	:	Liquid
Vapour pressure	:	132 Pa at 25°C
Process Temperature	:	
Remarks	:	

Amount used

:
:

Frequency and duration of use

Duration : 15-60 minutes (PROC1, PROC2, PROC3, PROC4)
<15 minutes (PROC8b)
>4 hours (PROC9)

Frequency of use : 1/day

Remarks :

Human factors not influenced by risk management

Exposed skin area : 240 cm^2 (PROC1, PROC3)
480 cm^2 (PROC2, PROC4, PROC8b, PROC9)

Other Factors: :
Remarks :

Other operational conditions affecting workers exposure

Outdoor / Indoor :
Room size : N/A for tier one exposure tool
Temperature :
Ventilation rate per hour : N/A for tier one exposure tool
Remarks :
Parameter :

Technical conditions and measures

Local exhaust ventilation required plus good work practice.

Organisational measures to prevent /limit releases, dispersion and exposure

D4 is a moderately volatile, flammable liquid. Measures should therefore be taken to prevent the build-up of electrostatic charge and other sources of ignition. Containers should be kept tightly closed in a dry, cool and well-ventilated place.

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

Safety glassess
Suitable respiratory protection should be worn if the product is handled in large quantities, confined spaces.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice :

2.3 Contributing scenario controlling consumer exposure for:

Exposure to consumers is not relevant for this scenario.

3. Exposure estimation and reference to its source

Environment

It can be seen from the table that the RCR for marine sediment is nominally above 1 (having applied EUSES default), indicating that direct discharge of waste water containing D4 from this exposure scenario is not safe. Treatment of waste water in a waste water treatment plant before discharge into the marine water is required to determine safe use.

Therefore, downstream users are required to apply risk management measures of treating waste water to maintain this use. Applying this risk management measure would give marine RCR similar to the fresh water value.

Contributing Scenario	Exposure Assessment Method	Specific conditions	Compartment	Value type	Level of Exposure	Risk characterisation ratio
ERC6a	Calculated using EUSES 2.1.1		Freshwater	PEC	4.65E-05 mg/l	0.106
ERC6a	Calculated using EUSES 2.1.1		Marine water	PEC	4.88E-04 mg/l	11.1
ERC6a	Calculated using EUSES 2.1.1		Sediments (fresh water)	PEC	0.0172 mg/kg ww	0.134
ERC6a	Calculated using EUSES 2.1.1		Sediments (marine water)	PEC	0.181 mg/kg ww	14.1
ERC6a	Calculated using EUSES 2.1.1		Agricultural soil	PEC	3.61E-03 mg/kg ww	0.228
ERC6a	Calculated using EUSES 2.1.1		Sewage Treatment Plant	PEC	1.78E-03 mg/l	<8.89E-05

Workers

Contributing Scenario	Exposure Assessment Method	Specific conditions	Value type	Level of Exposure	Risk characterisation ratio
PROC4, PROC8b, PROC9	ECETOC TRA predictions	With LEV	Dermal local exposure	0.1 mg/cm^2	N/A
PROC4, PROC8b, PROC9	ECETOC TRA predictions	With LEV	Dermal systemic exposure	0.69 mg/kg bw/d	N/A
PROC9	ECETOC TRA predictions	With LEV	Inhalation local exposure	6.1 mg/m^3/8h	N/A
PROC9	ECETOC TRA predictions	With LEV	Inhalation systemic exposure	6.1 mg/m^3/8h	0.1

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

CYCLOTETRASILOXANE

This exposure scenario covers the use of D4 as chemical intermediate. Use as an intermediate may be carried out in continuous or batch processes.

1. Short title of Exposure Scenario: Use of Octamethylcyclotetrasiloxane (D4) (CAS 556-67-2) in electronics.

Main User Groups	:	SU3
Sector of use	:	SU16
Product category	:	PC33
Process category	:	PROC1, PROC7, PROC8b, PROC9, PROC10, PROC13, PROC14
Article category	:	
Environmental release category	:	ERC6d
Further information	:	

2.1 ERC6d

Remarks

Product characteristics

Concentration of the Substance in Mixture/Article	:	1-5% (Conformal coatings) 100% (Vapor deposition and cleaning solvent)
Viscosity, kinematic	:	
Viscosity, dynamic	:	2.4-2.6 mm^2/s at 20°C

Amount used

Annual amount used per site	:	
Remarks	:	
(Msafe)	:	
Remarks	:	

Frequency and duration of use

Single exposure	:	
Continuous exposure	:	

Environment factors not influenced by risk management

Flow rate	:	
Dilution Factor (River)	:	N/A
Dilution Factor (Coastal Areas)	:	N/A
Other data - Other information	:	
Remarks	:	

Other given operational conditions affecting environmental exposure

Exposure Type		
Number of emission days per year	:	N/A
Emission or Release Factor: Air	:	N/A
Emission or Release Factor: Water	:	N/A
Emission or Release Factor: Soil	:	
Remarks	:	
Parameter	:	
Remarks	:	

Technical conditions and measures / Organizational measures

Exposure time	:	
Compartment	:	
Air	:	
Water	:	Treatment of effluent in waste water treatment plant.
Soil	:	
Sediment	:	
Remarks	:	

Conditions and measures related to municipal sewage treatment plant

Type of Sewage Treatment Plant	:	
Flow rate of sewage treatment plant effluent	:	N/A
Effectiveness (of a measure)	:	
Percentage removed from waste eater	:	
Sludge Treatment	:	N/A
Procedures to limit air emissions from Sewage Treatment Plant	:	
Remarks	:	

Conditions and measures related to external treatment of waste for disposal

Waste treatment	:	N/A
Disposal methods	:	
Remarks	:	

Conditions and measures related to external recovery of waste

Recovery Methods	:	N/A
Remarks	:	

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice	:	

2.2 Contributing scenario controlling worker exposure for: PROC1, PROC7, PROC8b, PROC9, PROC10, PROC13, PROC14

Product characteristics

Concentration of the Substance in Mixture/Article		1-5% (Conformal coatings) 100% (Vapor deposition and cleaning solvent)
Physical Form (at time of use)	:	Liquid
Vapour pressure	:	132 Pa at 25°C
Process Temperature	:	
Remarks	:	

Amount used

:

:

Frequency and duration of use

Duration : >4 hours
Frequency of use : 1/day

Remarks :

Human factors not influenced by risk management

Exposed skin area : 480 cm^2 (PROC8b, PROC9, PROC13, PROC14)
960 cm^2 (PROC10)

Other Factors: :
Remarks :

Other operational conditions affecting workers exposure

Outdoor / Indoor :
Room size : N/A for tier one exposure tool
Temperature :
Ventilation rate per hour : N/A for tier one exposure tool
Remarks :
Parameter :

Technical conditions and measures

Local Exhaust ventilation.

Organisational measures to prevent /limit releases, dispersion and exposure

Vapor deposition processes take place in closed systems.
Any spraying processes carried out in the electronics industry are automated and enclosed.

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

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice :

2.3 Contributing scenario controlling consumer exposure for:

Exposure to consumers is not relevant for this scenario.

3. Exposure estimation and reference to its source

Environment

Given the very small scale use, it is not appropriate to assess environmental exposure for this scenario. There is no intentional release of D4 to waste water and any fugitive releases to air will be of negligible volume.

Workers

Contributing Scenario	Exposure Assessment Method	Specific conditions	Value type	Level of Exposure	Risk characterisation ratio
PROC8b, PROC9, PROC13	ECETOC TRA predictions	With LEV	Dermal local exposure	0.1 mg/cm^2	N/A

PROC8b, PROC9, PROC13	ECETOC TRA predictions	With LEV	Dermal systemic exposure	0.69 mg/kg bw/d	N/A
PROC13	ECETOC TRA predictions	With LEV	Inhalation local exposure	12 mg/m^3/8h	N/A
PROC13	ECETOC TRA predictions	With LEV	Inhalation systemic exposure	12 mg/m^3/8h	1.97E-01

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

This scenario covers the use of D4 in the electronics and semiconductor industries, as a precursor material for Chemical Vapour Deposition (CVD), as an ingredient of conformal coatings, and for cleaning of electronic components. Any spraying processes carried out in the electronics industry are automated and enclosed and are therefore not considered in the exposure assessment.

1. Short title of Exposure Scenario: Use of Octamethylcyclotetrasiloxane (D4) (CAS 556-67-2) in textiles.

Main User Groups : SU3
Sector of use : SU5
Product category : PC23, PC24, PC34
Process category : PROC5, PROC7, PROC8a, PROC8b, PROC9, PROC10, PROC13
Article category :
Environmental release category : ERC4, ERC6b, ERC8a, ERC8b
Further information :

2.1 ERC4, ERC6b, ERC8a, ERC8b

Remarks

Product characteristics

Concentration of the Substance in Mixture/Article : 1-5%
Viscosity, kinematic :
Viscosity, dynamic : 2.4-2.6 mm^2/s at 20°C

Amount used

Annual amount used per site :
Remarks :
(Msafe) :
Remarks :

Frequency and duration of use

Single exposure :
Continuous exposure :

Environment factors not influenced by risk management

Flow rate :

Dilution Factor (River)	:	N/A
Dilution Factor (Coastal Areas)	:	N/A
Other data - Other information	:	
Remarks	:	

Other given operational conditions affecting environmental exposure

Exposure Type		
Number of emission days per year	:	N/A
Emission or Release Factor: Air	:	N/A
Emission or Release Factor: Water	:	N/A
Emission or Release Factor: Soil	:	
Remarks	:	
Parameter	:	
Remarks	:	

Technical conditions and measures / Organizational measures

Exposure time	:	
Compartment	:	
Air	:	
Water	:	
Soil	:	
Sediment	:	
Remarks	:	

Conditions and measures related to municipal sewage treatment plant

Type of Sewage Treatment Plant	:	
Flow rate of sewage treatment plant effluent	:	N/A
Effectiveness (of a measure)	:	
Percentage removed from waste eater	:	
Sludge Treatment	:	N/A
Procedures to limit air emissions from Sewage Treatment Plant	:	
Remarks	:	

Conditions and measures related to external treatment of waste for disposal

Waste treatment	:	N/A
Disposal methods	:	
Remarks	:	

Conditions and measures related to external recovery of waste

Recovery Methods	:	N/A
Remarks	:	

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice	:	

2.2 Contributing scenario controlling worker exposure for: PROC5, PROC7, PROC8a, PROC8b, PROC9, PROC10, PROC13

Product characteristics

Concentration of the Substance in Mixture/Article		1-5%
Physical Form (at time of use)	:	Liquid
Vapour pressure	:	132 Pa at 25°C

Process Temperature :
Remarks :

Amount used

:
:

Frequency and duration of use

Duration : 15-60 minutes (PROC5, PROC8a, PROC8b, PROC9)
>4 hours (PROC7, PROC10, PROC13)
Frequency of use : 1/day

Remarks :

Human factors not influenced by risk management

Exposed skin area : 480 cm^2 (PROC5, PROC8b, PROC9, PROC13)
960 cm^2 (PROC8a, PROC10)
1500 cm^2 (PROC7)

Other Factors: :
Remarks :

Other operational conditions affecting workers exposure

Outdoor / Indoor :
Room size : N/A for tier one exposure tool
Temperature :
Ventilation rate per hour : N/A for tier one exposure tool
Remarks :
Parameter :

Technical conditions and measures

Local Exhaust ventilation durin spraying.

Organisational measures to prevent /limit releases, dispersion and exposure

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

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice :

2.3 Contributing scenario controlling consumer exposure for:

Exposure to consumers is not relevant for this scenario.

3. Exposure estimation and reference to its source

Environment

Given the very small scale use, it is not appropriate to assess environmental exposure for this scenario. There is no intentional release of D4 to waste water and any fugitive releases to air will be of negligible volume.

Workers

For industrial spraying (PROC7), inhalation exposure is quantified using the Stoffenmanager model, with the following input parameters:

- Products contain 5% D4
- Products are sprayed generating mist or haze
- Use takes places indoors in a location where room volume is <100 m3
- Local exhaust ventilation is available
- Mechanical/natural ventilation is available
- No respiratory protection is used
- Exposure is in the breathing zone of the worker
- Exposure is for 4-8 hours per day and 4-5 days per week

Contributing Scenario	Exposure Assessment Method	Specific conditions	Value type	Level of Exposure	Risk characterisation ratio
PROC10	ECETOC TRA predictions	Without LEV, 5% in product	Dermal local exposure	0.1 mg/cm^2	N/A
PROC10	ECETOC TRA predictions	Without LEV, 5% in product	Dermal systemic exposure	0.69 mg/kg bw/d	N/A
PROC7	Stoffenmanager prediction	With LEV, 5% in product	Inhalation local exposure	52 mg/m^3/8h	N/A
PROC7	Stoffenmanager prediction	With LEV, 5% in product	Inhalation systemic exposure	52 mg/m^3/8h	0.85

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

This scenario covers the use of D4 as an ingredient of a variety of silicone polymer based products in the textiles industry, including formulation. At most, the concentration of D4 is at the lower end of the 1-5% range.

1. Short title of Exposure Scenario: Formulation of Octamethylcyclotetrasiloxane (CAS 556-67-2).

Main User Groups	:	SU3
Sector of use	:	SU10
Product category	:	PC1, PC9a, PC23, PC24, PC31, PC33, PC34, PC35, PC39
Process category	:	PROC1, PROC2, PROC3, PROC5, PROC8a, PROC8b, PROC9, PROC14
Article category	:	
Environmental release category	:	ERC2
Further information	:	

2.1 ERC2

Remarks

Product characteristics

Concentration of the Substance in Mixture/Article	:	100%
Viscosity, kinematic	:	
Viscosity, dynamic	:	2.4-2.6 mm^2/s at 20°C

Amount used

Annual amount used per site	:	7 tpa
Remarks	:	
(Msafe)	:	
Remarks	:	

Frequency and duration of use

Single exposure	:	

Continuous exposure	:	

Environment factors not influenced by risk management

Flow rate	:	
Dilution Factor (River)	:	
Dilution Factor (Coastal Areas)	:	
Other data - Other information	:	
Remarks	:	

Other given operational conditions affecting environmental exposure

Exposure Type		
Number of emission days per year	:	300/site
Emission or Release Factor: Air	:	0.0002
Emission or Release Factor: Water	:	0.0009
Emission or Release Factor: Soil	:	
Remarks	:	
Parameter	:	
Remarks	:	

Technical conditions and measures / Organizational measures

Exposure time	:	
Compartment	:	
Air	:	
Water	:	Treatment of effluent in waste water treatment plant.
Soil	:	
Sediment	:	
Remarks	:	

Conditions and measures related to municipal sewage treatment plant

Type of Sewage Treatment Plant	:	
Flow rate of sewage treatment plant effluent	:	2,000 m^3/d
Effectiveness (of a measure)	:	
Percentage removed from waste eater	:	
Sludge Treatment	:	Sludge may be sent to landfill or incinerated. Spreading of sludge is assumed as a worst-case scenario.
Procedures to limit air emissions from Sewage Treatment Plant	:	
Remarks	:	

Conditions and measures related to external treatment of waste for disposal

Waste treatment	:	Solid wastes are ultimately disposed of via landfill or incineration. Details of the treatment of aqueous waste vary at different sites but as a minimum the effluent treated in either in on-site or municipal secondary biological treatment plants prior to discharge. Non-aqueous waste may be disposed off site as hazardous waste or sent for incineration or energy recovery.
Disposal methods	:	
Remarks	:	

Conditions and measures related to external recovery of waste

Recovery Methods	:	Recovery of sludge for agriculture or horticulture.
Remarks	:	

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice	:	

2.2 Contributing scenario controlling worker exposure for: PROC1, PROC2, PROC3, PROC5, PROC8a, PROC8b, PROC9, PROC14

Product characteristics

Concentration of the Substance in Mixture/Article		100%
Physical Form (at time of use)	:	Liquid
Vapour pressure	:	132 Pa at 25°C
Process Temperature	:	
Remarks	:	

Amount used

	:	20 kg/day
	:	

Frequency and duration of use

Duration	:	>4 hours
Frequency of use	:	1/day
Remarks	:	

Human factors not influenced by risk management

Exposed skin area	:	240 cm^2 (PROC1, PROC3) 480 cm^2 (PROC2, PROC5, PROC8b, PROC9, PROC14) 960 cm^2 (PROC8a)
Other Factors:	:	
Remarks	:	

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	
Room size	:	N/A for tier one exposure tool
Temperature	:	
Ventilation rate per hour	:	N/A for tier one exposure tool
Remarks	:	
Parameter	:	

Technical conditions and measures

Organisational measures to prevent /limit releases, dispersion and exposure

Limit duration of exposure of 4 hours for PROCs 5, 8b, 9 and 14 without LEV. LEV or Respiratory Protective Equipment (RPE) is required for duration of exposure > 4 hours.
Limit duration of exposure of 1 hour for PROC8a without LEV. LEV or RPE is required for duration of exposure > 1.

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

Safety glassess
Suitable respiratory protection should be worn if the product is handled in large quantities, confined spaces.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice :

2.3 Contributing scenario controlling consumer exposure for:

Exposure to consumers is not relevant for this scenario.

3. Exposure estimation and reference to its source

Environment

It can be seen from the table that the RCR for marine sediment is nominally above 1 (having applied EUSES default), indicating that direct discharge of waste water containing D4 from this exposure scenario is not safe. Treatment of waste water in a waste water treatment plant before discharge into the marine water is required to determine safe use.
Therefore, downstream users are required to apply risk management measures of treating waste water to maintain this use. Applying this risk management measure would give marine RCR similar to the fresh water value.

Contributing Scenario	Exposure Assessment Method	Specific conditions	Compartment	Value type	Level of Exposure	Risk characterisation ratio
ERC2	Calculated using EUSES 2.1.1		Freshwater	PEC	3.96E-05 mg/l	0.09
ERC2	Calculated using EUSES 2.1.1		Marine water	PEC	1.03E-04 mg/l	2.33
ERC2	Calculated using EUSES 2.1.1		Sediments (fresh water)	PEC	0.0147 mg/kg ww	0.114
ERC2	Calculated using EUSES 2.1.1		Sediments (marine water)	PEC	0.038 mg/kg ww	2.96
ERC2	Calculated using EUSES 2.1.1		Agricultural soil	PEC	7.57E-04 mg/kg ww	0.0478
ERC2	Calculated using EUSES 2.1.1		Sewage Treatment Plant	PEC	3.73E-04 mg/l	<1.87E-05

Workers

Contributing Scenario	Exposure Assessment Method	Specific conditions	Value type	Level of Exposure	Risk characterisation ratio
PROC8b	ECETOC TRA predictions	Without LEV	Dermal local exposure	0.1 mg/cm^2	N/A
PROC8b	ECETOC TRA predictions	Without LEV	Dermal systemic exposure	0.69 mg/kg bw/d	N/A
PROC8b, PROC9, PRCO14	ECETOC TRA predictions	Without LEV	Inhalation local exposure	36 mg/m^3/8h	N/A

PROC8b, PROC9, PROC14	ECETOC TRA predictions	Without LEV	Inhalation systemic exposure	36 mg/m^3/8h	0.59

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

This scenario covers the worker and environmental exposure assessments for formulation of products containing D4. Although the specific composition of products varies widely depending on the intended application, the processes and handling measures applied will be similar across all product types. The main application area is personal care products .

1. Short title of Exposure Scenario: Use of Octamethylcyclotetrasiloxane (CAS 556-67-2) for personal care products.

Main User Groups : SU21, SU22
Sector of use :
Product category : PC39
Process category : PROC10, PROC11, PROC19
Article category :
Environmental release category : ERC8a
Further information :

2.1 ERC8a

Remarks

Product characteristics

Concentration of the Substance in Mixture/Article :
Viscosity, kinematic :
Viscosity, dynamic : 2.4-2.6 mm^2/s at 20°C

Amount used

Annual amount used per site : 1000tpa
Remarks :
(Msafe) :
Remarks :

Frequency and duration of use

Single exposure :

Continuous exposure :

Environment factors not influenced by risk management

Flow rate :
Dilution Factor (River) : N/A
Dilution Factor (Coastal Areas) : N/A
Other data - Other information :
Remarks :

Other given operational conditions affecting environmental exposure

Exposure Type
Number of emission days per year : N/A
Emission or Release Factor: Air : 0.9
Emission or Release Factor: Water : 0.1
Emission or Release Factor: Soil :
Remarks :
Parameter :
Remarks :

Technical conditions and measures / Organizational measures

Exposure time :
Compartment :
Air :
Water : Treatment of effluent in waste water treatment plant.
Soil :
Sediment :
Remarks :

Conditions and measures related to municipal sewage treatment plant

Type of Sewage Treatment Plant :
Flow rate of sewage treatment plant effluent : N/A
Effectiveness (of a measure) :
Percentage removed from waste eater :
Sludge Treatment : N/A
Procedures to limit air emissions from Sewage Treatment Plant :
Remarks :

Conditions and measures related to external treatment of waste for disposal

Waste treatment : Solid wastes are ultimately disposed of via landfill or incineration. Aqueous waste is discharged to municipal waste water treatment.
Disposal methods :
Remarks :

Conditions and measures related to external recovery of waste

Recovery Methods : N/A
Remarks :

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice :

2.2 Contributing scenario controlling worker exposure for: PROC10, PROC11, PROC19

Product characteristics

Concentration of the Substance in

Mixture/Article
Physical Form (at time of use) : Liquid
Vapour pressure : 132 Pa at 25°C

Process Temperature :
Remarks :

Amount used
: N/A
:

Frequency and duration of use
Duration : N/A
Frequency of use : N/A

Remarks :

Human factors not influenced by risk management
Exposed skin area : N/A
Other Factors: :
Remarks :

Other operational conditions affecting workers exposure
Outdoor / Indoor :
Room size : Not applicable for tier one exposure
Temperature :
Ventilation rate per hour : Not applicable for tier one exposure
Remarks :
Parameter :

Technical conditions and measures
No specific risk management measures are indicated for end use of personal care products containing D4.

Organisational measures to prevent /limit releases, dispersion and exposure

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

Additional good practice advice beyond the REACH Chemical Safety Assessment
Additional good practice advice :

2.3 Contributing scenario controlling consumer exposure for:
Consumer end use of personal care products is outside the scope of REACH.

3. Exposure estimation and reference to its source

Environment

Contributing Scenario	Exposure Assessment Method	Specific conditions	Compartment	Value type	Level of Exposure	Risk characterisation ratio
ERC8a	Calculated using		Freshwater	PEC	1.75E-05	0.0397

	EUSES 2.1.1				mg/l	
ERC8a	Calculated using EUSES 2.1.1		Marine water	PEC	1.67E-06 mg/l	0.0379
ERC8a	Calculated using EUSES 2.1.1		Sediments (fresh water)	PEC	6.47E-03 mg/kg ww	0.0503
ERC8a	Calculated using EUSES 2.1.1		Sediments (marine water)	PEC	6.18E-04 mg/kg ww	0.0481
ERC8a	Calculated using EUSES 2.1.1		Agricultural soil	PEC	2.96E-04 mg/kg ww	0.0187

Workers

Professional end use of personal care products is outside the scope of REACH.

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

This exposure scenario covers the end use of personal care products. The environmental exposure assessment covers use of such products by both professionals and consumers. The human health assessment considers man exposed via the environment only (all RCRs well below 1), as professional and consumer end use of personal care products is outside the scope of REACH.

1. Short title of Exposure Scenario: Use of Octamethylcyclotetrasiloxane (CAS 556-67-2) for professional and consumer use of care products-polishes and waxes.

Main User Groups : SU21, SU22
Sector of use :
Product category : PC31
Process category : PROC7, PROC10, PROC11, PROC19
Article category :
Environmental release category : ERC8a, ERC8d
Further information :

2.1 ERC8a, ERC8d

Remarks

Product characteristics

Concentration of the Substance in Mixture/Article : 10% (maximum for safe use except spray products)
4% (maximum for safe use of sprays)
5% (Consumer products)
Viscosity, kinematic :
Viscosity, dynamic : 2.4-2.6 mm^2/s at 20°C

Amount used

Annual amount used per site	:	N/A
Remarks	:	
(Msafe)	:	
Remarks	:	

Frequency and duration of use

Single exposure	:	
Continuous exposure	:	

Environment factors not influenced by risk management

Flow rate	:	
Dilution Factor (River)	:	
Dilution Factor (Coastal Areas)	:	
Other data - Other information	:	
Remarks	:	

Other given operational conditions affecting environmental exposure

Exposure Type		
Number of emission days per year	:	N/A
Emission or Release Factor: Air	:	N/A
Emission or Release Factor: Water	:	N/A
Emission or Release Factor: Soil	:	
Remarks	:	
Parameter	:	
Remarks	:	

Technical conditions and measures / Organizational measures

Exposure time	:	
Compartment	:	
Air	:	
Water	:	
Soil	:	
Sediment	:	
Remarks	:	

Conditions and measures related to municipal sewage treatment plant

Type of Sewage Treatment Plant	:	
Flow rate of sewage treatment plant effluent	:	N/A
Effectiveness (of a measure)	:	
Percentage removed from waste eater	:	
Sludge Treatment	:	N/A
Procedures to limit air emissions from Sewage Treatment Plant	:	
Remarks	:	

Conditions and measures related to external treatment of waste for disposal

Waste treatment	:	Solid wastes are ultimately disposed of via landfill. Aqueous waste is discharged to municipal waste water treatment.
Disposal methods	:	
Remarks	:	

Conditions and measures related to external recovery of waste

Recovery Methods	:	N/A
Remarks	:	

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice :

2.2 Contributing scenario controlling worker exposure for: PROC7, PROC10, PROC11, PROC19

Product characteristics

Concentration of the Substance in Mixture/Article		10% (maximum for safe use except spray products) 4% (maximum for safe use of sprays) 5% (Consumer products)
Physical Form (at time of use)	:	Liquid
Vapour pressure	:	132 Pa at 25°C
Process Temperature	:	
Remarks	:	

Amount used

: N/A
:

Frequency and duration of use

Duration	:	>4 hours
Frequency of use	:	1/day
Remarks	:	

Human factors not influenced by risk management

Exposed skin area	:	480 cm^2 (PROC10) 1500 cm^2 (PROC7, PROC11) 1980 cm^2 (PROC19)
Other Factors:	:	
Remarks	:	

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	
Room size	:	N/A for tier one exposure tool
Temperature	:	
Ventilation rate per hour	:	N/A for tier one exposure tool
Remarks	:	
Parameter	:	

Technical conditions and measures

Mechanical or natural ventilation for industrial and professional use

Organisational measures to prevent /limit releases, dispersion and exposure

Maximum concentration of 4% and 10% for spray products and other products respectively for professionals/workers. LEV, RPE or limit duration of exposure is required for higher product concentration.

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

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice :

2.3 Contributing scenario controlling consumer exposure for: floor polish

Other operation conditions affecting workers exposure
Room size : 58 m^3
Ventilation rate per hour : 0.5 h^{-1}

Human factors not influenced by risk management
Exposed skin area : 430 cm^2

Acute exposure

Exposure Assessment Method	Specific conditions	Value type	Level of Exposure	Risk characterisation ratio
ConsExpo output		Dermal local exposure	0.64 mg/cm^2	N/A
ConsExpo output		Dermal systemic exposure	4.23 mg/kg bw/d	N/A
ConsExpo output		Inhalation local exposure	2.62 mg/m^3/8h	N/A
ConsExpo output		Inhalation systemic exposure	2.62 mg/m^3/8h	0.02

Long-term exposure

Exposure Assessment Method	Specific conditions	Value type	Level of Exposure	Risk characterisation ratio
ConsExpo output		Dermal local exposure	0.64 mg/cm^2/d	N/A
ConsExpo output		Dermal systemic exposure	0.0232 mg/kg bw/d	N/A
ConsExpo output		Inhalation local exposure	0.0143 mg/m^3/8h	N/A
ConsExpo output		Inhalation systemic exposure	0.0143 mg/m^3/8h	7.38E-04

3. Exposure estimation and reference to its source

Environment

Environmental exposure is not relevant for this scenario.

Workers

For industrial spraying (PROC7), inhalation exposure is quantified using the Stoffenmanager model, with the following input parameters:

- Products contain 4% D4
- Products are sprayed generating mist or haze
- Use takes places indoors in a location where room volume is <100 m^3
- Local exhaust ventilation is not available
- Mechanical/natural ventilation is available
- No respiratory protection is used
- Exposure is in the breathing zone of the worker
- Exposure is for 4-8 hours per day and 4-5 days per week

Contributing Scenario	Exposure Assessment Method	Specific conditions	Value type	Level of Exposure	Risk characterisation ratio
PROC19	ECETOC TRA predictions	10% concentration	Dermal local exposure	0.5 mg/cm^2	N/A
PROC19	ECETOC TRA predictions	10% concentration	Dermal systemic exposure	14.2 mg/kg bw/d	N/A
PROC7	Stoffenmanager predictions	4% concentration	Inhalation local exposure	58 mg/m^3/8h	N/A
PROC7	Stoffenmanager predictions	4% concentration	Inhalation systemic exposure	58 mg/m^3/8h	9.51E-01

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

This exposure scenario is relevant for professional polish and wax products containing up to 10% by weight of D4 (e.g. institutional cleaning) (with the exception of spray products for which the maximum concentration is 4%), and consumer products containing up to 5% by weight of D4. Activities during professional use of washing and cleaning products vary depending on the application, but as a worst-case, the tasks can be assumed to be carried out >4 hours per day. Use may take place indoors or outdoors, but indoors is considered as the worst case.
The scenario described assumes a maximum concentration of 4% for professional spray-application products, and 10% in other types of products. If higher concentration products are used, suitable operational conditions (e.g. use of local exhaust ventilation) or risk management measures (limit duration of exposure or use respiratory protective equipment offering at least 90% exposure reduction) should be applied to ensure safe use.

1. Short title of Exposure Scenario: Use of Octamethylcyclotetrasiloxane (CAS 556-67-2) as a laboratory reagent.

Main User Groups	:	SU3
Sector of use	:	SU24
Product category	:	PC21
Process category	:	PROC15
Article category	:	
Environmental release category	:	N/A
Further information	:	

2.1 N/A

Remarks

Product characteristics

Concentration of the Substance in Mixture/Article	:	100%

CYCLOTETRASILOXANE

Viscosity, kinematic	:	
Viscosity, dynamic	:	2.4-2.6 mm^2/s at 20°C

Amount used

Annual amount used per site	:	N/A
Remarks	:	
(Msafe)	:	
Remarks	:	

Frequency and duration of use

Single exposure	:	
Continuous exposure	:	

Environment factors not influenced by risk management

Flow rate	:	
Dilution Factor (River)	:	
Dilution Factor (Coastal Areas)	:	
Other data - Other information	:	
Remarks	:	

Other given operational conditions affecting environmental exposure

Exposure Type		
Number of emission days per year	:	N/A
Emission or Release Factor: Air	:	N/A
Emission or Release Factor: Water	:	N/A
Emission or Release Factor: Soil	:	
Remarks	:	
Parameter	:	
Remarks	:	

Technical conditions and measures / Organizational measures

Exposure time	:	
Compartment	:	
Air	:	
Water	:	
Soil	:	
Sediment	:	
Remarks	:	

Conditions and measures related to municipal sewage treatment plant

Type of Sewage Treatment Plant	:	
Flow rate of sewage treatment plant effluent	:	N/A
Effectiveness (of a measure)	:	
Percentage removed from waste eater	:	
Sludge Treatment	:	N/A
Procedures to limit air emissions from Sewage Treatment Plant	:	
Remarks	:	

Conditions and measures related to external treatment of waste for disposal

Waste treatment	:	N/A
Disposal methods	:	
Remarks	:	

Conditions and measures related to external recovery of waste

Recovery Methods : N/A
Remarks :

Additional good practice advice beyond the REACH Chemical Safety Assessment
Additional good practice advice :

2.2 Contributing scenario controlling worker exposure for: PROC15

Product characteristics
Concentration of the Substance in Mixture/Article 100%
Physical Form (at time of use) : Liquid
Vapour pressure : 132 Pa at 25°C

Process Temperature :
Remarks :

Amount used
: <10 grams/day
:

Frequency and duration of use
Duration : <15 minutes
Frequency of use : 1/day

Remarks :

Human factors not influenced by risk management
Exposed skin area : 240 cm^2 (PROC15)
Other Factors: :
Remarks :

Other operational conditions affecting workers exposure
Outdoor / Indoor :
Room size : N/A for tier one exposure tool
Temperature :
Ventilation rate per hour : N/A for tier one exposure tool
Remarks :
Parameter :

Technical conditions and measures
Mechanical or natural ventilation for industrial and professional use

Organisational measures to prevent /limit releases, dispersion and exposure
D4 is a moderately volatile, flammable liquid. Measures should therefore be taken to prevent the build-up of electrostatic charge and other sources of ignition. Containers should be kept tightly closed in a dry, cool and well-ventilated place.

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

Additional good practice advice beyond the REACH Chemical Safety Assessment
Additional good practice advice :

2.3 Contributing scenario controlling consumer exposure for:

Exposure to consumers is not relevant for this scenario.

3. Exposure estimation and reference to its source

Environment

Given the very small scale use, it is not appropriate to assess environmental exposure for this scenario. There is no intentional release of D4 to waste water and any fugitive releases to air will be of negligible volume.

Workers

Contributing Scenario	Exposure Assessment Method	Specific conditions	Value type	Level of Exposure	Risk characterisation ratio
PROC15	ECETOC TRA predictions	With LEV	Dermal local exposure	0.001 mg/cm^2	N/A
PROC15	ECETOC TRA predictions	With LEV	Dermal systemic exposure	0.035 mg/kg bw/d	N/A
PROC15	ECETOC TRA predictions	Assumes LEV, and modification for duration of exposure (<15 minutes)	Inhalation local exposure	0.61 mg/m^3/8h	N/A
PROC15	ECETOC TRA predictions	Assumes LEV, and modification for duration of exposure (<15 minutes)	Inhalation systemic exposure	0.61 mg/m^3/8h	1.00E-02

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

This scenario covers the use of D4 as a laboratory reagent for small-scale synthesis and research. All applications involve the use of very small quantities of material and all procedures are carried out in a fume cupboard. These are considered as PROC15 and the duration of exposure is considered to be <15 minutes, since the only potential for exposure to D4 is during transfer of small quantities of reagent. In most locations, these activities are expected to be carried out infrequently, but as a reasonable worst case it is assumed that a worker may use the substance once per day.