

SAFETY DATA SHEET

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

1.1. Product identifier

Topanol* CA-SF

Synonyms:

1,1,3-Tris(2-methyl-4-hydroxy-5-*t*-butylphenyl)butane, 4,4',4''-(1-methylpropanyl-3-ylidene)tris[6-*tert*-butyl-*m*-cresol], 4,4',4''-butane-1,1,3-triyltris(2-*tert*-butyl-5-methylphenol)

Chemical Abstracts Registry No:

1843-03-4

REACH Registration Number:

01-2119955265-33-0001

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

Antioxidant
 Stabilizer

1.3. Details of the supplier of the safety data sheet

Vertellus Specialties UK Ltd.
 Seal Sands Road, Seal Sands
 Middlesbrough, TS2 1UB
 England
 +44 1642-546546

e-mail Address:

sds@vertellus.com

1.4. Emergency telephone number

Vertellus: +44 1642-546546

CHEMTREC (USA): 1-800-424-9300 (collect calls accepted)

CHEMTREC (International): 1-703-527-3887 (collect calls accepted)

NRCC (China): +86 532 83889090

SECTION 2: Hazards identification

2.1. Classification of the substance or mixture

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

Skin Sensitization Category 1B

(According to Directive 67/548/EEC)

Symbol: Xi; Irritant

Risk Phrases: R43: May cause sensitisation by skin contact.

Safety Phrases: S24: Avoid contact with the skin.

S37: Wear suitable gloves.

2.2. Label elements

Hazard Symbols
 (Pictogram):



Signal Word:

Warning

Hazard Precautions:

H317 - May cause an allergic skin reaction.

Prevention Precautionary
 Statements:

P280 - Wear protective gloves/protective clothing/eye protection/face protection.

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First Aid Precautionary Statements: P333+P313 - If skin irritation or rash occurs: Get medical advice/attention.
P302+P352 - IF ON SKIN: Wash with plenty of soap and water.
P363 - Wash contaminated clothing before reuse.

Storage Precautionary Statements: Not required.

Disposal Precautionary Statements: Not required.

2.3. Other hazards

Other Hazards: WARNING! MAY FORM COMBUSTIBLE DUST CONCENTRATIONS IN AIR (DURING PROCESSING).

SECTION 3: Composition/information on ingredients

3.1. Substances or 3.2. Mixtures

Ingredient	CAS Number	Concentration (weight %)	EC Number	CLP Inventory/ Annex VI	EU DSD Classification (67/548/EEC)	EU CLP Classification (1272/2008)
1,1,3-Tris(2-methyl-4-hydroxy-5-t-butylphenyl)butane	1843-03-4	~ 100	217-420-7	Not listed.	Xi R43	H317 - May cause an allergic skin reaction.

NOTE: See Section 8 for exposure limit data for these ingredients. See Section 15 for trade secret information (where applicable). See Section 16 for the full text of the R-phrases above.

SECTION 4: First aid measures

4.1. Description of first aid measures

Skin Contact: Immediately flush with water for 15 minutes. Wash the contaminated skin with soap and water. If irritation develops, call a physician.

Eye Contact: Flush eyes with water for at least 15 minutes; if irritation occurs seek medical attention.

Inhalation: If exposed to excessive levels remove to fresh air and get medical attention if cough or other symptoms develop.

Ingestion: If swallowed, contact physician or poison control center immediately.

4.2 Most important symptoms and effects, both acute and delayed

Acute: May cause sensitization by skin contact.

Delayed Effects: None known.

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

Note to Physician: No specific indications. Treatment should be based on the judgment of the physician in response to the reactions of the patient.

SECTION 5: Firefighting measures

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5.1. Extinguishing media

Appropriate Extinguishing Media: Water spray, Carbon dioxide, Alcohol foam

5.2. Special hazards arising from the substance or mixture

Hazardous Products of Combustion: None Known

Potential for Dust Explosion: Topanol CA was tested for dust explosion characteristics and the following results were obtained:
- minimum ignition energy: < 3 mJ
- Minimum ignition temperature of dust cloud: 360 - 380 °C

Topanol CA-SF was tested for dust explosion characteristics and the following results were obtained:
- minimum ignition energy: 3-5 mJ
- Minimum ignition temperature of dust cloud: 380 - 400°C

Topanol presents a significant dust explosion hazard unless properly handled:

Maximum Explosion Pressure: 9.2 bar

Maximum Rate of Pressure Rise: 1172 bar/s

Kst: 318 bar.m/s [St class : 3]

Limiting Oxygen Concentration: 8%

Minimum Explosible Concentration: 25g/m³

Charge Relaxation time: ~120hrs

Powder Volume Resistivity: 3.6 x10¹⁵ Ohm.m (@<10% RH)

Refer to NFPA 654, Standard for the Prevention of Fire and Dust Explosions from the Manufacturing, Processing, and Handling of Combustible Particulate Solids, for safe handling.

Refer to European standards: EN1127-1, EN14491, EN14797, EN14373, and EN15089 for safe handling of and controlling explosive atmospheres in the workplace.

Special Flammability Hazards: This product is an organic solid. As such, in its finely divided form, this product has the potential to present a dust explosion hazard under certain conditions. Please review the dust explosion data enclosed in this section. Handle this product in a manner that prevents dust generation and accumulation, and refer to National Fire Protection Association (NFPA) Standard 654 for further information on prevention of dust explosions.

5.3. Advice for firefighters

Basic Fire Fighting Guidance: As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

Evacuation Procedures: Isolate the hazard area and deny entry to unnecessary and unprotected personnel.

Special Instructions: See Section 8 for personal protective equipment recommendations. Remove all contaminated clothing to prevent further absorption. Decontaminate affected personnel using the first aid procedures in Section 4. Leather shoes that have been saturated must be discarded. Dust deposits should not be allowed to accumulate on surfaces, as these may form an explosive mixture if they are released into the atmosphere in sufficient concentration. Avoid dispersal of dust in the air (i.e., clearing dust surfaces with compressed air). Nonsparking tools should be used.

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6.2. Environmental precautions

Prevent releases to soils, drains, sewers and waterways.

6.3. Methods and material for containment and cleaning up

Remove all ignition sources. Ventilate the area of spill or leak. Wear protective equipment during clean-up. Carefully scoop up and place into appropriate disposal container. Avoid generation of dust clouds during clean-up. After collection of material, flush area with water. Dispose of contents & container in accordance with local, regional, national or international regulations.

6.4. Reference to other sections

Refer to section 8 for information on selecting personal protective equipment. Refer to section 13 for information on spilled product, absorbent and clean up material disposal instructions.

SECTION 7: Handling and storage

7.1. Precautions for safe handling

Precautions for Unique Hazards: Not applicable.

Practices to Minimize Risk: Wear appropriate protective equipment when performing maintenance on contaminated equipment. Wash hands thoroughly before eating or smoking after handling this material. Do not eat, drink or smoke in work areas. Prevent contact with incompatible materials. Avoid spills and keep away from drains. Handle in a manner to prevent generation of aerosols, vapors or dust clouds.

Special Handling Equipment: Not applicable.

7.2. Conditions for safe storage, including any incompatibilities

Storage Precautions & Recommendations: Minimize dust generation and accumulation. Routine housekeeping should be instituted to ensure that dusts do not accumulate on surfaces. Dry powders can build static electricity charges when subjected to friction of transfer and mixing operations. Provide adequate precautions, such as electrical grounding and bonding, or inert atmospheres.

Dangerous Incompatibility Reactions: No data available.

Incompatibilities with Materials of Construction: None known

7.3. Specific end use(s)

If a chemical safety assessment has been completed an exposure scenario is attached as an annex to this Safety Data Sheet. Refer to this annex for the specific exposure scenario control parameters for uses identified in subsection 1.2.

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

Country

Occupational Exposure Limit

Not established

Not established

Air Monitoring Method: Gravimetric analysis for total particulate and respirable fraction (<10 microns).

Derived No Effect Levels (DNELs) – Workers:

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Route	DNEL
Long-term - systemic effects (dermal)	0.5 mg/kg bw/day
Long-term - systemic effects (inhalation)	3.53 mg/m ³
Long term - local effects (dermal)	0.25 mg/cm ²

Derived No Effect Levels (DNELs) – General Population:

Route	DNEL
Long-term - systemic effects (inhalation)	0.87 mg/m ³
Long-term - systemic effects (dermal)	0.25 mg/kg bw/day
Long term - local effects (dermal)	0.125 mg/cm ²
Long-term - systemic effects (oral)	0.250 mg/kg bw/day

Predicted No Effect Concentrations (PNECs):

Route	PNEC
PNEC aqua (freshwater)	1 mg/L
PNEC aqua (marine water)	0.1 mg/L
PNEC aqua (intermittent releases)	1.0 mg/L
PNEC aqua (STP)	100 mg/L
PNEC sediment (freshwater)	827,696 mg/kg sediment dw
PNEC sediment (marine water)	8,270 mg/kg sediment dw
PNEC soil	99,130 mg/kg soil dw
PNEC oral (wildlife exposures)	5.56 mg/kg food

8.2. Exposure controls

Also see the annex to this SDS (if applicable) for specific exposure scenario controls.

Other Engineering Controls:	All operations should be conducted in well-ventilated conditions. Local exhaust ventilation should be provided. It is recommended that all dust control equipment such as local exhaust ventilation and material transport systems involved in handling of this product contain explosion relief vents or an explosion suppression system or an oxygen-deficient environment. Ensure that dust-handling systems (such as exhaust ducts, dust collectors, vessels, and processing equipment) are designed in a manner to prevent the escape of dust into the work area (i.e., there is no leakage from the equipment).
Personal Protective Equipment:	Neoprene, nitrile, or PVC-coated gloves (Standard EN 374). Safety glasses or chemical goggles (Standard EN 166). Chemical resistant clothing (Standard EN 368)
Respirator Caution:	Observe OSHA regulations for respirator use (29 CFR 1910.134). Air-purifying respirators must not be used in oxygen-deficient atmospheres.
Thermal Hazards:	Not applicable.
Environmental Exposure Controls:	The level of protection and types of controls necessary will vary depending upon potential exposure conditions. Select controls based on a risk assessment of local circumstances. If user operations generate dust, fumes, gas, vapor or mist, use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits.

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

Appearance, State & Odor (ambient temperature): White to off-white powder without any odor.

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Molecular Formula:	C37H52O3	Molecular Weight:	544.80 g/mol
Vapor Pressure:	0.0000029 Pa	Evaporation Rate:	Not applicable.
Specific Gravity or Density:	0.5 g/mL @ 20°C	Vapor Density (air = 1):	No data available.
Boiling Point:	Not applicable	Freezing / Melting Point:	184 °C
Solubility in Water:	< 0.04 mg/L @ 20°C	Octanol / Water Coefficient:	12.7 @ 25°C
pH:	No data available.	Odor Threshold:	No data available.
Viscosity:	No data available.	Autoignition Temperature:	Not self-ignitable
Flash Point and Method:	Non-flammable	Flammable Limits:	Non-flammable
Flammability (solid, gas):	Non-flammable	Decomposition Temperature:	> 275 °C
Explosive Properties:	Not explosive	Oxidizing Properties:	Not oxidizing

9.2. Other information

SECTION 10: Stability and reactivity

<u>10.1. Reactivity</u>	Not classified as dangerously reactive.
<u>10.2. Chemical stability</u>	Stable
<u>10.3. Possibility of hazardous reactions</u>	Will not occur.
<u>10.4. Conditions to avoid</u>	Electrostatic discharge Formation of dust clouds
<u>10.5. Incompatible materials</u>	No data available.
<u>10.6. Hazardous decomposition products</u>	Oxides of carbon

SECTION 11: Toxicological information

11.1. Information on toxicological effects

Acute Oral LD ₅₀ :	> 5000 mg/kg (rat) > 5000 mg/kg (guinea pig) > 3000 mg/kg (dog)	Swan 1963
Acute Dermal LD ₅₀ :	> 7940 mg/kg (rabbit)	Birch 1974
Acute Inhalation LC ₅₀ :	No data available.	
Skin Irritation:	Non-irritating to skin.	
Eye Irritation:	Non-irritating to eyes.	
Skin Sensitization:	Positive for skin sensitization potential in Local Lymph Node Assay (OECD 429).	
Mutagenicity:	This product has been shown not to be mutagenic based on a battery of assays.	
Reproductive / Developmental Toxicity:	In a OECD 421 assay (oral gavage, rats), parental, reproductive and developmental results showed no toxicity observed up to the highest dose level tested (1000 mg/kg). (Zmarowski 2012)	

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Carcinogenicity:	This material is not listed by IARC, NTP or OSHA as a carcinogen. No test data is available that indicates this material is a carcinogen.
Target Organs:	No data available.
Aspiration Hazard:	Not applicable.
Primary Route(s) of Exposure:	Skin contact and absorption, eye contact, and inhalation. Ingestion is not likely to be a primary route of exposure.
Most important symptoms and effects, both acute and delayed	May cause sensitization by skin contact. Delayed Effects: None known.
Additive or Synergistic effects:	None known.

SECTION 12: Ecological information

<u>12.1. Toxicity</u>	Aquatic LC50 (96h) <i>Brachdanio rerio</i> (Zebra fish) > 100 mg/L Scheerbaum 1995a Aquatic EC50 (48h) <i>Daphnia magna</i> > 1000 mg/L Noack 1995a Aquatic EC50 (72h) <i>Scenedesmus subspicatus</i> > 1000 mg/L Scheerbaum 1995b
<u>12.2. Persistence and degradability</u>	OECD 301B (modified Sturm test): 12% degradation in 28 days; not ready biodegradable. (Noack 1995b)
<u>12.3. Bioaccumulative potential</u>	Bioaccumulation potential is low. BCF is estimated to be 1.064 L/kg wet-wt (EPIWIN). In vivo toxicokinetics study in rats showed substance was not absorbed to any appreciable extent (less than 0.2% of the administered doses). (Stoltz 1982)
<u>12.4. Mobility in soil</u>	This material is expected to have essentially no mobility in soil. It absorbs strongly to most soil types.
<u>12.5. Results of PBT and vPvB assessment</u>	This substance is not a PBT or vPvB.
<u>12.6. Other adverse effects</u>	log Koc @ 20°C = 7.53

SECTION 13: Disposal considerations

<u>13.1. Waste treatment methods</u>	Non-Hazardous
US EPA Waste Number:	
Waste Disposal:	NOTE: Generator is responsible for proper waste characterization. State hazardous waste regulations may differ substantially from federal regulations. Dispose of this material responsibly, and in accordance with standard practice for disposal of potentially hazardous materials as required by applicable international, national, regional, state or local laws, and environmental protection duty of care principles. Do NOT dump into any sewers, on the ground, or into any body of water. For disposal within the EC, the appropriate classification code according to the European Community List of Wastes should be used. Note that disposal regulations may also apply to empty containers and equipment rinsates.

SECTION 14: Transport information

The following information applies to all shipping modes (DOT/IATA/ICAO/IMDG/ADR/RID/ADN), unless otherwise indicated:

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14.1. UN number	Not applicable.	14.2. UN proper shipping name	Chemicals, n.o.s. (1,1,3-Tris(2-methyl-4-hydroxy-5-tert-butylphenyl)butane)
14.3. Transport hazard class(es)	Not applicable.	14.4. Packing group	Not applicable.
14.5. Environmental hazards	Not applicable.		
14.6. Special precautions for user	Not applicable. Not applicable.		
NA Emergency Guidebook Numbers:	Not applicable.	IMDG EMS:	Not applicable.
14.7. Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code			Not applicable.

SECTION 15: Regulatory information

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

Chemical Inventory Lists:	Status:		
USA TSCA:	Listed	EINECS:	Listed (217-420-7)
Canada(DSL/NDSL):	Listed (DSL)	Japan:	Listed (9-1871)
Korea:	Listed (KE-24898)	Australia:	Listed
China:	Listed	Philippines:	Listed
Taiwan:	Listed	New Zealand:	Listed
WHMIS Classification:	Class D, Division 2: Skin Sensitizer (potential)		
German Water Hazard Classification:	ID Number 5240, hazard class 1 - low hazard to waters (1,1,3-Tris(2-methyl-4-hydroxy-5-tert-butylphenyl)butan)		
SARA 313:	Not applicable.		
Reportable Quantities:	Not applicable.		
State Regulations:	Prop 65: Please be advised that only Class 2 solvents are likely to be present (specifically toluene). Toluene content by GLC is maximum 1.0% w/w.		

HMIS:

HEALTH	2
FLAMMABILITY	0
REACTIVITY	0

NFPA:



15.2. Chemical safety assessment

A chemical safety assessment has been prepared for this product.

SECTION 16: Other information

Full text of R phrases in Section 3:	R43: May cause sensitisation by skin contact.
Key Data Sources:	[Birch 1974] Birch, M (1974). Acute Dermal Toxicity. Testing laboratory: Younger Laboratories Incorporated, Report no.: Y-73-289. Report date: 1974-02-14, unpublished report.

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[Noack 1995a] Noack, M and Scheerbaum, D (1995). Lowinox CA 22 Daphnia magna STRAUS Acute Immobilisation Test, 48 h. Testing laboratory: Dr. U. Noack-Laboratorium For Angewandte Biologie. Report no.: Project-No. 950529LK. Report date: 1995-08-27, unpublished report.

[Noack 1995b] Noack, M (1995). Lowinox CA 22 Ready Biodegradability, Modified Sturm Test. Testing laboratory: Dr. U. Noack-Laboratorium For Angewandte Biologie. Report no.: Project-No. 950529LK. Report date: 1995-08-28, unpublished report.

[Scheerbaum 1995a] Scheerbaum, D. (1995). Lowinox CA 22 Fish (Zebra Fish), Acute Toxicity Test (Limit Test), 96 h, acc. To OECD-Guideline No. 203 for Testing of Chemicals (adopted July 17, 1992). Testing laboratory: Dr. U. Noack-Laboratorium fur Angewandte Biologie. Report no.: Project-No. 950529LK. Report date: 1995-08-22, unpublished report.

[Scheerbaum 1995b] Scheerbaum, D. (1995). Lowinox CA 22 Alga, Growth Inhibition Test acc. To OECD-Guideline No. 201 for Testing of Chemicals (adopted June 7, 1984). Testing laboratory: Dr. U. Noack-Laboratorium fur Angewandte Biologie. Report no.: Project-No. 950529LK. Report date: 1995-08-27, unpublished report.

[Stoltz 1982] Stoltz, M (1982). Bioavailability of 14C-Labeled Ethanox® 330 Following Oral Administration to Rats. Testing Laboratory: Midwest Research institute (MRI), Missouri, USA. Report no.: 7480-B. Report date: 1982-11-23, unpublished report.

[Swan 1963] Swan, A.A.B. (1963). Toxicological Report: Topanol CA. Testing laboratory: Imperial Chemical Industries Limited. Report no.: TR/384. Report date: 1963-05-27, unpublished report.

[Zmarowski 2012] Zmarowski, A. (2012). Reproduction/Developmental Toxicity Screening Test Of 6,6'-Di-tert-butyl-4,4'-butylidenedi-m-cresol In Rats By Oral Gavage. Testing laboratory: WIL Research Europe B. V., The Netherlands. Report no.: Project 499460. Report date: 2012-11-09, unpublished report.

Classification Method: On basis of test data

Training Advice: Not applicable.

Legend of Abbreviations:

ACGIH = American Conference on Governmental Industrial Hygienists.

CAS = Chemical Abstracts Service.

CFR = Code of Federal Regulations.

DSL/NDL = Domestic Substances List/Non-Domestic Substances List.

EC = European Community.

EINECS = European Inventory of Existing Commercial Chemical Substances.

ELINCS = European List of Notified Chemical Substances.

EU = European Union.

GHS = Globally Harmonized System.

LC = Lethal Concentration.

LD = Lethal Dose.

NFPA = National Fire Protection Association.

NIOSH = National Institute of Occupational Safety and Health.

NTP = National Toxicology Program.

OSHA = Occupational Safety and Health Administration

PEL = Permissible Exposure Limit.

RQ = Reportable Quantity.

SARA = Superfund Amendments and Reauthorization Act of 1986.

TLV = Threshold Limit Value.

WHMIS = Workplace Hazardous Materials Information System.

Important Note: Please note that the information contained herein is furnished without warranty of any kind. Users should consider these data only as a supplement to other information gathered by them and must make independent determinations of suitability and completeness of information from all sources to assure proper use and disposal of these materials and the safety and health of employees and customers. Recipients are advised to confirm in advance of need that the information is current, applicable, and suitable to their circumstances. The information contained herein may change without prior notice. THIS SAFETY DATA SHEET SUPERSEDES ALL PREVIOUS EDITIONS.

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Annex Topanol CA-SF - Summary of Uses

ES Number	Name	SU	ERC	PROC	PC
1	Formulation: Blending into non dust products	3/8	2	5,8b,9,14,21,24	0: General Products
2	Use at industrial sites: converting	10/12	4,5	4,6,7,8a,8b,9,10,13,14,21	32: polymer preparations and compounds

Topanol CA-SF Exposure Scenarios

Note: Guidance below is in addition to that indicated in sections 1-16 of the SDS. Additional Exposure Scenarios are available upon request.

ES 1

Title: Formulation

Technical Function of the substances during the formulation: Stabilizers

Exposure scenario covering the following

Main Sector of Use Group

SU3: Industrial uses: Uses of substances as such or in preparations-at industrial sites

- SU8: Manufacture of bulk, large scale chemicals

Process Categories

PROC 5: Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact)

- PROC 8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities
- PROC 9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing)
- PROC 14: Production of preparations or articles by tableting, compression, extrusion, pelletisation
- PROC 21: Low energy manipulation of substances bound in materials and/or articles
- PROC 24: High (mechanical) energy work-up of substances bound in materials and/or articles

Environmental Release Categories

ERC 2: Formulation

ES 2

Title: Use at Industrial Sites: Converting

Technical Function of the substance during use: Stabilizers

Exposure scenario covering the following

Main Sector of Use Group

SU 10: Formulation [mixing] of preparations and/or re-packaging (excluding alloys)

- SU 12: Manufacture of plastics products, including compounding and conversion

Process Categories

PROC 4: Use in batch and other process (synthesis) where opportunity for exposure arises

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- PROC 6: Calendaring operations
- PROC 7: Industrial spraying
- PROC 8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities
- PROC 8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities
- PROC 9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing)
- PROC 10: Roller application or brushing
- PROC 13: Treatment of articles by dipping and pouring
- PROC 14: Production of preparations or articles by tableting, compression, extrusion, palletisation
- PROC 21: Low energy manipulation of substances bound in materials and/or articles

Environmental Release Categories

ERC 4: Industrial use of processing aids in processes and products, not becoming part of articles

- ERC 5: Industrial use resulting in inclusion into or onto a matrix

Control of Worker Exposure

Product Characteristic

The material exists as solid

- Substance is used as such in ES 1
- Substance is used as a concentration in mixture: 1-5% in ES 2

Amounts used

Not relevant for human risk assessment

Frequency and duration of use/exposure - Worker exposure per shift:

PROC	Hours / shift		PROC	Hours / shift
4	< 8 hours		9	< 8 hours
5	< 8 hours		10	< 8 hours
6	< 8 hours		13	< 8 hours
7	< 8 hours		14	< 8 hours
8a	< 8 hours		21	< 8 hours
8b	< 8 hours		24	< 8 hours

Other given operational conditions affecting workers exposure

The work is performed indoors

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

See Section 7 of SDS

Technical conditions and measures to control dispersion from source towards the worker:

See Section 7 and 8 of SDS

- Ventilation:

PROC	General Ventilation	Local Ventilation	Dermal Protection: effectiveness (%)		Respiratory Protection
4	Basic: 1-3 air changes per hour	No	Not applicable	None	No
5	Good: 3-5 air changes per hour	No	90	Not applicable	No
6	Basic: 1-3 air changes per hour	No	Not applicable	80	No
7	Basic: 1-3 air changes per hour	No	Not applicable	80	No

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8a	Basic: 1-3 air changes per hour	No	Not applicable	None	No
8b	Basic: 1-3 air changes per hour	No	80	None	No
9	Basic: 1-3 air changes per hour	No	80	None	No
10	Basic: 1-3 air changes per hour	No	Not applicable	80	No
13	Basic: 1-3 air changes per hour	No	Not applicable	80	No
14	Basic: 1-3 air changes per hour	No	Not applicable	None	No
21	Basic: 1-3 air changes per hour	No	None	None	No
24	Basic: 1-3 air changes per hour	No	80	Not applicable	No

Organisational measures to prevent /limit releases, dispersion and exposure:

See SDS

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

See sections 7, 8 and 10 of SDS

2. Control of Environmental Exposure

Product characteristics

The substance used as such (ES1)

- The substance is used in a mixture (ES2)

Amount used, Frequency and duration of use

Continuous and Intermittent release possible

	Daily Use at site	Annual use at site
ES1	8.33 tonnes	83.33 tonnes
ES2	2.5 tonnes	50 tonnes

Other conditions effecting environmental exposure

Waste water treatment prior to discharge from site: 90% effectiveness

Environment factors not influenced by risk management

Default values of 18,000 m³/d for receiving waters are assumed

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

See sections 7 and 8 of the SDS

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

Water

Discharge to STP: Treatment efficiency assumed 94.52%

- STP Discharge rate: 2000 m³ / day
- Compliance with local water discharge regulations

Use	Release Rate %	Basis
1: Formulation (ERC 2)	0.001%	Water is collected on site
2:Use at industrial site: converting (ERC 4)	0.002	Once formulated the substance is bound into polymer matrix and is used within the polymer. ECHA guidance suggests release factors for ERC 4 to be 100%, but once in the polymer matrix the substance is not available for release.
2:Use at industrial site: converting (ERC 5)	0.001	Once formulated the substance is bound into polymer matrix and is used within the polymer. ECHA guidance suggests release factors for ERC 5 to be

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		50%, but once in the polymer matrix the substance is not available for release.
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Air

Use	Release Rate %	Basis
1: Formulation (ERC 2)	2.5	ERC
2: Use at industrial site: converting (ERC 4)	0.01	Once formulated the substance is bound into polymer matrix and is used within the polymer. ECHA guidance suggests release factors for ERC 4 to be 100%, but once in the polymer matrix the substance is not available for release.
2: Use at industrial site: converting (ERC 5)	0.01	Once formulated the substance is bound into polymer matrix and is used within the polymer. ECHA guidance suggests release factors for ERC 5 to be 100%, but once in the polymer matrix the substance is not available for release.

Soil

Use	Release Rate %	Basis
1: Formulation (ERC 2)	0.01	ERC
2: Use at industrial site: converting (ERC 4)	0.01	Once formulated the substance is bound into polymer matrix and is used within the polymer. ECHA guidance suggests release factors for ERC 4 to be 5%, but once in the polymer matrix the substance is not available for release.
2: Use at industrial site: converting (ERC 5)	0.01	Once formulated the substance is bound into polymer matrix and is used within the polymer. ECHA guidance suggests release factors for ERC 5 to be 1%, but once in the polymer matrix the substance is not available for release.

Organizational measures to prevent/limit release from site

See Sections 6 and 7 of the SDS

Conditions and measures related to municipal sewage treatment plant disposal

The default STP value of 2000 m³/d was used.

Conditions and measures related to external treatment of waste for disposal

See section 13 of the SDS

3. Exposure estimation and reference to its source

Tables below summarize the calculated exposures and resulting Risk Characterization Ratios (RCR) at <1.0. Note the worker exposures in ECETOC TRA are calculated by multiplying the full shift calculations by the following factors:

> 4 hours: 1

- 1 - 4 hours: 0.6
- 15 minutes to 1 hour: 0.2
- < 15 minutes: 0.1

4. Guidance to DU - Operational conditions and Risk Management Measures

The activities discussed above result in an acceptable exposure if individually performed by an industrial/professional worker, and considering the operational conditions and the risk management measures (RMM) as defined.

The downstream user may re-calculate the RCR values based on variations in the local operational conditions and application of RMM to confirm that operations are within the control limits.

SAFETY DATA SHEET

Predicted Exposure Concentrations / Risk Characterization – Environmental

Compartment	Local PEC; Use 1 (ERC 2)	RCR*	Local PEC; Use 2 (ERC 4)	RCR*	Local PEC; Use 2 (ERC 5)	RCR*
Water: Fresh; mg/L	1.631E-4	<0.01	7.427 E-5	<0.01	5E-5	<0.01
Water: Fresh Sediment; mg/kg dw	4.491	<0.01	2.046	<0.01	1.379	<0.01
Water: Marine; mg/L	1.647E-5	<0.01	7.591E-6	<0.01	5.169E-6	<0.01
Water; Marine Sediment; mg/kg dw	0.454	<0.01	0.209	<0.01	0.142	<0.01
Predator: freshwater: mg/kg ww	4.072E-6	<0.01	3.837E-6	<0.01	3.131 E-6	<0.01
Predator: marine water mg/kg ww	5.814E-7	<0.01	5.579E-7	<0.01	4.87E-7	<0.01
Top Predator Marine water mg/kg/ww	3.932 E-7	<0.01	3.885E-7	<0.01	3.74E-7	<0.01
Water: STP mg/L	0.002	<0.01	0.001	<0.01	6.844E-4	<0.01
Soil: mg/kg	0.413	<0.01	0.604	<0.01	0.41	<0.01
Man via environment inhalation mg/m3	0.002	<0.01	4.652E-6	<0.01	4.652E-6	<0.01
Man via environment oral mg/kg bw / day	0.716	0.286	1.019	0.408	0.692	0.277

*Risk Characterization Ratio

Predicted Exposure Concentrations – Worker

Route of exposure	PROC 4	PROC 5	PROC 6	PROC 7	PROC 8a	PROC 8b ES 1	PROC 8b ES 2	PROC 9 ES 1	PROC 9 ES 2	PROC 10	PROC 13	PROC 14	PROC 21 ES 1	PROC 21 ES 2	PROC 24
Inhalation: Acute Systemic: mg/m ³															
Inhalation: Long Term Local; mg/m ³															
Inhalation: Long Term Systemic: mg/m ³	0.1	0.7	0.02	0.2	0.1	0.5	0.02	0.5	0.02	0.1	0.02	0.02	3	0.2	20
Dermal: Acute Systemic: mg/kg bw/day															
Dermal: Long Term Local: mg/cm ²	0.2	0.2	0.08	0.08	0.2	0.2	0.2	0.2	0.2	0.08	0.08	0.1	0.1	0.02	0.02
Dermal: Long Term Systemic: mg/kg/bw/day	1.372	1.371	1.097	1.714	2.742	2.742	2.742	1.372	1.372	1.097	0.548	0.686	2.83	0.566	0.566

Risk Characterization Ratio – Worker

Route of exposure	PROC 4	PROC 5	PROC 6	PROC 7	PROC 8a	PROC 8b	PROC 8b ES 2	PROC 9 ES 1	PROC 9 ES 2	PROC 10	PROC 13	PROC 14	PROC 21 ES 1	PROC 21 ES 2	PROC 24
Inhalation: Acute Systemic:															
Inhalation: Long Term Local:															

SAFETY DATA SHEET

Inhalation: Long Term Systemic:	<0.1	0.02	<0.01	<0.01	<0.01	0.014	<0.01	0.014	<0.01	<0.01	<0.01	<0.01	0.085	<0.01	0.567
Dermal: Acute Systemic:															
Dermal: Long Term Local:	0.8	0.8	0.32	0.32	0.8	0.8	0.8	0.8	0.8	0.32	0.32	0.4	0.4	0.08	0.08
Dermal: Long Term Systemic:	0.274	0.274	0.219	0.343	0.548	0.548	0.548	0.274	0.274	0.219	0.11	0.137	0.566	0.113	0.113
Combined: Long Term Systemic:	0.277	0.294	0.22	0.349	0.551	0.563	0.549	0.289	0.275	0.222	0.11	0.166	0.651	0.119	0.68
Combined: acute systemic															

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