

SAFETY DATA SHEET



In accordance with Regulation (EC) no. 1907/2006, Annex II
(amended by Regulation (EU) 2020/878)

Turpentine oil from pulping processes (TOPP)

Version: 8.0/Eng

Revision date: 26 June 2025

Supersedes: 18 December 2024

1 IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY/UNDERTAKING

1.1 Product identifier

Name of substance: **Turpentine oil from pulping processes (TOPP)**
CAS number: 8006-64-2
EC number: 232-350-7
Index number: 650-002-00-6
REACH registration number: 01-2119502456-45

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

Identified uses: Manufacture

ES 2: Manufacture of TOPP with no releases to water

Formulation:

ES 4: Formulation/mixing of fuel

ES 6: Formulation of road construction products

Industrial use:

ES 3: Fractionation of TOPP

ES 5: Use as fuel

Professional use:

ES 7: Professional use as an additive in road construction

Uses advised against:

Not approved for use as a plant protection product.

1.3 Details of the supplier of the safety data sheet

Name: SunPine AB
Address: Box 76
941 22 Piteå
Sweden
Telephone number: +46 (0)911-23 28 00
E-mail of publisher
responsible for the SDS: sds@sunpine.se

1.4 Emergency telephone number

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Emergency telephone number in Sweden: 112, ask for poison information
On duty off hours: Yes

2 HAZARD IDENTIFICATION

2.1 Classification of the substance or mixture

Classified in accordance with Regulation (EC) no. 1272/2008:

Flam. Liq. 3; H226
Acute Tox. 4; H302, H312; H332
Skin Irrit. 2; H315
Eye Irrit. 2; H319
Skin Sens. 1B; H317
Asp. Tox. 1; H304
Aquatic Chronic 1; H410

See section 16 for full description of hazard classes and hazard statements.

2.2 Label elements

Labelling in accordance with Regulation (EC) no. 1272/2008

Hazard pictogram:



Signal word: Hazard

Hazard statements:

H226: Flammable liquid and vapour
H302: Harmful if swallowed
H304: May be fatal if swallowed and enters airways
H312: Harmful in contact with skin
H315: Causes skin irritation
H317: May cause an allergic skin reaction
H319: Causes serious eye irritation
H332: Harmful if inhaled

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H410: Very toxic to aquatic life with long lasting effects

Precautionary statements:

P210: Keep away from heat/sparks/open flames/hot surfaces. Smoking is prohibited.

P243: Take action to prevent static discharges

P261: Avoid inhaling dust/fumes/gases/mist/vapour/spray.

P273: Avoid emission to the environment.

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

P403 + P235: Store in a well-ventilated area. Store in a cool place.

Contains: Turpentine oil from pulping processes

2.3 Other hazards

The substance can contain small amounts of extremely flammable and very toxic hydrogen sulphide (H₂S). The gas can accumulate over time in the headspace of storage containers or tanks or similar enclosed equipment.

TOPP is a volatile organic compound (VOC). Vapours can be explosive in mixture with air.

Strong odour of sulfuric constituents.

Neither the substance and none of the constituents of the product fulfils the criteria of PBT or vPvB.

Existing information is not conclusive but current data indicate no endocrine disrupting properties.

3 COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Classification of components in accordance with the CLP Regulation (1272/2008/EC):

Hazardous substance	Conc. (w/w %)	CAS no./ EC no./ Index no.	Hazard class and category codes	Hazard statements
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Turpentine oil from pulping processes (TOPP)*	100	8006-64-2/ 232-350-7/ 650-002-00-6	Flam. Liq. 3 Acute Tox. 4 Acute Tox. 4 Acute Tox. 4 Skin Irrit. 2 Eye Irrit. 2 Skin Sens. 1B Asp. Tox. 1, Aquatic Chronic 1 M-factor (chronic): 1 ATE values: Oral > 4000 mg/kg Dermal > 2000 mg/kg Inhalation 13,7 mg/l	H226 H302 H312 H332 H315 H319 H317 H304 H410
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* Note: The product is a UVCB substance¹ and a volatile oil extracted from various wood species. It is composed mainly of bicyclic terpene hydrocarbons (C₁₀H₁₆) with small proportions of other terpenes. See section 16 for the constituents blocked according to similar properties. DMDS content is < 1 %. Sulfur content varies between 0.1-0.4 %.

See section 16 for full wording of hazard phrases.

4 FIRST AID MEASURES

4.1 Description of first aid measures

If inhalation occurs: Move exposed person to fresh air and keep person at rest to facilitate breathing. Seek medical attention in case of persisting adverse health effects.

If skin contact occurs: Remove contaminated clothing and shoes and dispose of them safely. Wash contaminated skin with plenty of water and soap. Seek medical attention if irritation or symptoms persist.

If eye contact occurs: Immediately rinse with plenty of lukewarm water for several minutes holding the eyelids open. Seek medical attention if irritation or symptoms persist.

If ingestion occurs: Do NOT induce vomiting. Wash out mouth carefully with plenty of water. Seek medical attention immediately if vomiting or serious coughing occurs, or if more than an insignificant amount has been swallowed. Show this safety data sheet or label on container.

4.2 Most important symptoms and effects, both acute and delayed

Inhalation: Harmful by inhalation. Inhalation may cause coughing, tightness of the chest and irritation of the respiratory system, increased respiratory rate and convulsions.

Skin contact: Irritating to skin. May cause allergic reaction. May cause redness and pain. Dermatitis. Rash.

¹ Substances with unknown or varying compositions, complex reaction products or biological material.

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Contact with eyes: Causes serious eye irritation.

Ingestion: May be fatal if swallowed and enters airways. Ingestion may cause nausea and vomiting and slight ataxia and lethargy. Ingestion is irritating to the respiratory tract and may cause damage to the central nervous system.

4.3 Indication of any immediate medical attention and special treatment needed

Treat symptomatically. Seek medical attention if unsure or in case of persisting adverse health effects. Never give anything by mouth to an unconscious person. Keep exposed person under observation. Symptoms may be delayed.

5 FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable media:

Use extinguishing media appropriate to the surrounding fire conditions.
Use as appropriate: carbon dioxide (CO₂), dry chemical, foam.

Unsuitable media:

Do not use powerful water jet as this can cause the fire to spread.

5.2 Special hazards arising from the substance or mixture

Fire hazards: Highly flammable. Burning produces irritating, toxic and obnoxious fumes. Upon decomposition, carbon monoxide, carbon dioxide and low molecular weight hydrocarbons can be emitted. Vapours can be explosive in mixture with air. Vapours may travel considerable distance to a source of ignition and flash back. This product is a poor conductor of electricity and can become electrostatically charged. If sufficient charge is accumulated, ignition of flammable mixtures can occur.

5.3 Advice for firefighters

Wear full-body protective clothing and self-contained breathing apparatus when fighting fires. Do NOT breathe fumes. Move containers from area of fire IF this can be done safe. Consider hazards of other involved materials.

Other

Eliminate all fire/ignition sources. Containers in the vicinity of fires should be moved immediately or cooled with water. Ensure the water does not come into contact with the seat of the fire.

6 ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency measures

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Ensure adequate ventilation. Eliminate all fire/ignition sources. Do not get on skin or in the eyes. Keep combustibles, like wood, paper, oil, away from spilled product. Take precautionary measures against static discharge. Use only non-sparking tools. Prevent entry into waterways, sewer, basements or confined areas. Use protective gloves and other necessary protective equipment (see section 8). Do NOT touch damaged containers or spilled product unless wearing appropriate protective clothing. Do NOT touch or walk through spilled product.

6.2 Environmental precautions

Prevent emissions from coming into contact with waterways, sewage and soil. Contact the emergency services in the case of larger spills. Local authorities must be informed if significant spills cannot be contained.

6.3 Methods and materials for containment and cleaning up

Large spills: Stop the flow of product, if safe. Dike the spilled product, where possible. Absorb with inert, absorbent material, like vermiculite, sand, earth. Transfer to suitable, labelled containers for disposal. Clean spillage area thoroughly with plenty of water.

Small spills: Absorb with inert, absorbent material, like sand, earth. Transfer to suitable, labelled containers for disposal. Wipe up with absorbent material, like cloth.

Never return spills to original containers for re-use.

6.4 Reference to other sections

See section 7 and 8 on risk management measures. See section 13 for disposal information.

7 HANDLING AND STORAGE

7.1 Precautions for safe handling

The product can contain small amounts of hydrogen sulphide (H₂S). The gas can accumulate over time in the headspace of storage tanks and truck tanks. Its presence can pose a significant hazard to humans and the risk has to be recognised and managed. The product may accumulate static electricity when filling properly grounded containers. Handling operations promoting accumulation of static charges includes for example mixing, filling, pumping at high flow rates, splash filling, creation of mists or sprays, tank cleaning, sampling, gauging, switch loading, vacuum truck operations. Static electricity accumulation may be significantly increased by the presence of small quantities of water or other contaminants. The product will float and may ignite on the surface of water. Appropriate risk management measures include explosion-proof general and local mechanical exhaust ventilation to remove flammable vapours, the setting of standard protocols for proper venting of the tank before entrance, use of workspace and personal gas detectors/alarms, documented safe working procedure/restricted working areas, clearly placed placards and use of appropriate respiratory protective equipment. Purging and inerting of equipment and containers with for example dry nitrogen.

7.1.1 Protective measures

Avoid contact with eyes, skin and clothing. Avoid prolonged exposure. Avoid breathing mist or vapours. Do NOT taste or swallow. Measures to avoid contact with contaminated tools and objects. Regular cleaning of equipment and work area. Ensure adequate ventilation of the working area. Use explosion

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proof equipment. Control of static electricity. To reduce potential for static discharge, use proper bounding and grounding procedures of all equipment. Workers must be provided with appropriated working clothes consisting of materials which do not give rise to electrostatic discharges that can ignite explosive atmospheres. Keep away from heat and direct sunlight. Control of cutting, welding, and other "hot work". Keep away from sources of ignition - No smoking. Provide adequate drainage and collection facilities to isolate any spilled liquids. Adopt best manual handling considerations when handling, carrying, and dispensing. Contaminated work clothing should not be allowed out of the workplace. Observe good industrial hygiene practices.

7.1.2 Advice on general occupational hygiene

Do not eat, drink or smoke in work area. Remove personal protective equipment before entering eating areas. Wash hands, forearms, and face thoroughly after handling chemical products, before eating, smoking, and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.

7.2 Conditions for safe storage, including any incompatibilities

Storage: Keep in a cool, dry, well-ventilated area equipped with sprinklers. Keep containers tightly closed. Store in correctly labelled containers. Keep away from heat, sparks and open flames and direct sunlight. Avoid temperatures over 30°C due to risk for ignition and explosion of vapours. Prevent electrostatic charge build-up by using common bounding and grounding techniques. Only authorised personnel shall handle product.

7.3 Specific end use(s)

See exposure scenarios attached to this Safety Data Sheet.

8 EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Exposure limits:

There is no EC occupational exposure limit value established for TOPP.

Derived no effect level (DNEL) – Worker:

Exposure pattern	Route	Descriptors	DNEL	Most sensitive endpoint
Acute - systemic effects	Dermal	DNEL	6 mg/kg bw/day	Repeat-dose toxicity (oral)
	Inhalation	DNEL	21 mg/m ³	Repeat-dose toxicity (oral)
Acute - local effects	Dermal	High hazard	-	Sensitisation (skin)
	Inhalation	No hazard	-	-
Long-term - systemic effects	Dermal	DNEL	1 mg/kg bw/day	Repeat-dose toxicity (oral)
	Inhalation	DNEL	3.5 mg/m ³	Repeat-dose toxicity
Long-term – local effects	Dermal	High hazard	-	Sensitisation (skin)
	Inhalation	No hazard	-	-

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Local effects	Eyes	Low hazard	-	-
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DNELs for the general population:

Exposure pattern	Route	Descriptors	DNEL	Most sensitive endpoint
Acute - systemic effects	Oral	No hazard	-	-
	Dermal	No hazard	-	-
	Inhalation	No hazard	-	-
Acute - local effects	Dermal	No hazard	-	-
	Inhalation	No hazard	-	-
Long-term - systemic effects	Oral	No hazard	-	-
	Dermal	No hazard	-	-
	Inhalation	No hazard	-	-
Long-term – local effects	Dermal	No hazard	-	-
	Inhalation	No hazard	-	-
Local effects	Eyes	No hazard	-	-

Hygienic limit value, Sweden

Substance	Level limit value		Short-time value		Note Source	Year
	mg/m3	ppm	mg/m3	ppm		
Turpentine (8006-64-2)	150	25	300	50	AFS 2023:14 Remark: H, S ^H , V	1990

H: The substance is easily absorbed through the skin. The limit value is considered to provide adequate protection if the skin is protected.

S^H: Sensitizing substances that may cause allergies or other hypersensitivity reactions in the skin.

V: Indicative short-term limit value to be used as a recommended maximum value that should not be exceeded.

Aquatic PNECs:

As TOPP is a UVCB (Substance is of unknown or variable composition, Complex reaction product or Biological origin) derivation of a single, representative PNEC value for this substance using conventional methods is not possible. PNECs for the aquatic compartment should therefore be based on data for the blocks of constituents rather than on data for the whole substance.

Aquatic PNECs for constituent blocks of the product (see section 16)

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Block	PNEC freshwater [mg/l]	PNEC sediment (fresh water) [mg/kg dw]	PNEC marine water [mg/l]	PNEC sediment (marine water) [mg/kg dw]	PNEC soil [mg/kg dw]
A	0.00577 (AF 10)	0.615	0.000577 (AF 100)	0.0615	0.122
B	0.000288 (AF 10)	0.548	0.0000288 (AF 100)	0.0548	0.11
C	0.000018 (AF 10)	0.569	0.0000018 (AF 100)	0.0569	0.114
D	0.0753 (AF 10)	5.82	0.00753 (AF 100)	0.582	1.12
E	0.00723 (AF 1000)	0.0566	0.000723 (AF 10000)	0.00566	0.0071
F1	0.0578 (AF 10)	0.707	0.00578 (AF 100)	0.0707	0.108
F2	0.00301 (AF 10)	0.744	0.000301 (AF 100)	0.0744	0.147
F3&F4	0.000227 (AF 10)	0.472	0.0000227 (AF 100)	0.0472	0.0943
G1	0.00506 (AF 10)	5.42	0.000506 (AF 100)	0.542	1.08
G2	0.000114 (AF 10)	1.01	0.0000114 (AF 100)	0.101	0.202
H	6.28 (AF 10)	23.3*	0.682 (AF 100)	2.33*	0.965*

*A PNEC value below the natural background concentration is actually unrealistic.

No PNEC values have been derived for emissions to wastewater treatment plants (toxicity unlikely and no data available), or emissions to air (no hazard identified), or for secondary poisoning (no potential to cause toxic effects if accumulated in higher organisms via the food chain).

8.2 Exposure controls

8.2.1 Appropriate engineering controls

TOPP can contain small amounts of hydrogen sulphide (H₂S). The gas can accumulate over time in the headspace of TOPP storage tanks and truck tanks. Its presence can pose a significant hazard to humans and the risk has to be recognised and managed. Appropriate risk management measures include local exhaust ventilation (1-3 air changes per hour as basic general ventilation), the setting of standard protocols for proper venting of the tank before entrance, use of workspace and personal gas detectors/alarms, documented safe working procedure/restricted working areas, clearly placed placards and use of appropriate respiratory protective equipment.

Immediately remove all soiled and contaminated clothing.

Avoid contact with the eyes and skin.

Do not inhale vapours.

8.2.2 Individual protection measures, such as personal protective equipment

a) Eye/face protection

Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes or vapours.

b) Skin protection

Protective clothing including chemical-resistant, impervious gloves complying with EN 374 should be worn at all times when handling chemical products if a risk assessment indicates a potential for dermal exposure. Recommended glove materials are PVA, PE and nitrile (thickness 0.15/0.38 mm) that has a

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minimum breakthrough time of 15 minutes/4 hours. Warranties regarding breakthrough times of the glove material may vary substantially between glove type and manufactures, therefore always follow provided recommendations from your supplier. It is important that skin does not come into contact with the product and special attention shall be paid during putting on and taking off the gloves.

Wear chemical resistant clothing and for example an impervious apron where a risk assessment indicates potential exposure.

c) Respiratory protection

Suitable respiratory protective device complying with European standard EN14387, APF of 10, at least 90% exposure reduction, for example full-face respirator with ABEK-type filter. The mask should use a type A/Brown (organic gases and vapour, boiling point above 65°C) filter. Closely follow the recommendations from the filter manufacturer regarding time and exposure concentration limits in order to have the filters working properly.

d) Thermal hazards

No thermal hazards identified under normal conditions. Thermal protective clothing should be worn when risk assessment indicates such potential need.

8.2.3 Environmental exposure controls

Procedural and technological control using Best Available Technique (BAT) shall apply. Effluents (ES1, ES3, ES4, ES5, ES6, ES7, ES8, ES9) shall be treated in wastewater treatment plant. 100 times dilution into receiving marine water, 40 times dilution into receiving freshwater with a wastewater treatment plant of 10 000 m³/day (ES1, ES3). 100 times dilution into receiving marine water, 10 times dilution into receiving surface water (ES4, ES6) with a wastewater treatment plant of 2000 m³/day. 1000 times dilution into receiving marine, 40 times dilution into receiving freshwater (ES5). Waste and malodorous gases (ES1, ES2) shall be incinerated. Wastewater sludge must not be spread on agricultural soil from sites manufacturing $\geq$ 13 tonnes/day of turpentine oil.

See section 13.

9 PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

Appearance:		
Physical state:	Fluid	
Colour:	Uncoloured, amber colour, yellow	
Odour:	Sulphur compounds	
Odour threshold:	Not determined	
pH:	Not determined	
Melting point/freezing point:	-60 to -50°C	Publicly obtained data source
Initial boiling point and boiling range:	154 to 170°C	Peer reviewed public domain source
Flash point:	36 °C	IP 170

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Evaporation rate:	Not applicable	
Flammability:	Flammable	
Lower and upper explosive (flammable) limits:	Ca 0.8-6 vol-%; 45-340 g/m ³ of air (at 101.3 kPa)	*
Vapour pressure:	2600 Pa (25°C)	Obtained by prediction
Vapour density:	Not determined	
Relative density:	864 kg/m ³ (20°C)	ASTM D4052
Solubility:	0.351 g/l (20°C, pH 6.4-6.5) (in water)	OECD TG 105
Partition coefficient: n-octanol/ water:	Not applicable to UVCB substances	
Auto-ignition temperature:	270°C (19-20°C, 1013 hPa)	EU method A.15
Decomposition temperature:	Not determined	
Viscosity:	2.03548 cP (50°C)	Not specified
Explosive properties:	**	
Oxidising properties:	Not oxidising***	

9.2 Other information

Surface tension: 54.8 mN/m (20°C) (OECD TG 115).

TOPP is a volatile organic compound (VOC) since the boiling point is below 250°C.

* Ullman's Encyclopedia of Industrial Chemistry, 5th edition 1996, volume A27. Might vary due to local conditions.

** Even in warm air the vapours can be explosive. Low points are of extra concern as volatile vapours are 4.7 times heavier than air.

*** Based upon chemical structure of the constituents of TOPP, and experience in use and handling, the substance is considered non-oxidising.

10 STABILITY AND REACTIVITY

10.1 Reactivity

The substance is not reactive under recommended storage and handling conditions (see section 7).

10.2 Chemical stability

The substance is stable under recommended storage and handling conditions (see section 7).

10.3 Possibility of hazardous reactions

The product can self-oxidise on contact with air and then generate heat which can lead to spontaneous combustions in enclosed spaces. Materials such as rags, containers and insulation immersed with the product may self-ignite in enclosed spaces.

10.4 Conditions to avoid

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Avoid sources of ignition. Avoid oxidising agents. Avoid temperatures exceeding the flash point (see section 9.1).

10.5 Incompatible materials

May react violently with:

- oxidising products, strong mineral acids, halogens (especially chlorine)
- $\text{Ca}(\text{OCl})_2$, CrO_3 , $\text{Cr}(\text{OCl})_3$, SnCl_4
- hexachloromelamine and trichloromelamine

10.6 Hazardous decomposition products

In contact with air oxidation products with sensitizing properties may be formed. Contact with acid may release toxic sulphur compounds. Upon decomposition, acrid dense smoke with carbon dioxide, carbon monoxide and water is emitted.

11 TOXICOLOGICAL INFORMATION

11.1 Information on hazard classes as defined in Regulation (EC) No 1272/2008

a) Acute toxicity

TOPP is classified for acute toxicity (harmful by inhalation, in contact with skin and if swallowed).

LD₅₀ Oral: 4.6 ml/kg (rat) (OECD 401) – equivalent to ca. 4000 mg/kg bw

LD₅₀ Dermal: >2,000 mg/kg (rabbit) (OECD 402)

LC₅₀ Inhalation: 13.7 mg/l (rat) (OECD 403)

Clinical signs were slight ataxia and lethargy in the oral study. Local irritant effects were noted in the dermal study. Clinical signs reported from the inhalation study were convulsions and apnea; increase in respiratory rate and decrease in tidal volume.

b) Skin corrosion/irritation

TOPP is irritating to skin.

Reliable skin irritation tests in vitro (EpiSkin) are available for three of the main components in TOPP (α -pinene, β -pinene och δ -3-carene). The findings in all three tests showed that the test substances must be classified as skin irritants based on cell survival percentage (< 50%). The studies were conducted in line with an appropriate test protocol (ECVAM).

c) Serious eye damage/irritation

TOPP is classified as an eye irritant (causes serious eye irritation).

Two major constituents of TOPP (α -pinene and δ -3-carene) did not meet CLP criteria for classification as eye irritants (OECD TG 405). Turpentine (unspecified composition) was reported to cause adverse ocular effects in a peer-reviewed publication.

d) Respiratory - skin sensitisation

TOPP is a skin sensitizer.

Positive results for skin sensitisation were obtained in reliable in vivo studies with laboratory animals for TOPP (GPMT, cumulative contact enhancement test, similar to OECD 406), β -pinene (LLNA, OECD 429) and δ -3-carene (GPMT) and DMDS (OECD 429).

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In addition, TOPP was reported to be an extreme sensitiser when tested in humans (18 out of 25).
No data available regarding respiratory sensitisation.

e) Germ cell mutagenicity

TOPP is not genotoxic.

Information is available from reliable studies for all the required in vitro endpoints. The results of all the studies were in agreement.

Gene mutation (Bacterial reverse mutation assay / Ames test): negative with and without activation in all strains tested (OECD TG 471).

Cytogenicity in mammalian cells: negative in cultured human lymphocytes (OECD TG 473).

Mutagenicity in mammalian cells: negative in L5178Y cells (OECD TG 476).

f) Carcinogenicity

No data are available for the carcinogenicity of the substance. However, further testing is not considered necessary because the substance is not classified for mutagenicity and there is no evidence from the repeated dose studies that constituents of TOPP are able to induce hyperplasia or pre-neoplastic lesions. Additional data on constituents do not impact the current findings.

g) Reproductive toxicity

No fertility or developmental toxicity data are available for the whole substance as such. However, based on data for a number of substances relating to constituents of the registered substance, NOAEL values for reproductive toxicity in 1-generation tests with rats, mice and hamsters were in the range 250-600 mg/kg bodyweight/day (oral route), well in excess of DNELs calculated for the repeated dose toxicity endpoints. There is no evidence to suggest that the substance would require classification for fertility effects.

NOAEL(fertility) 260 mg/kg bw/day and NOAEL(developmental toxicity) $\geq$ 1000 mg/kg bw/day were used for CSA based on the following studies among other.

NOAEL(fertility), oil of nutmeg, rat: $\geq$ 260 mg/kg bw/day

NOAEL(fertility), oil of nutmeg, mouse: $\geq$ 560 mg/kg bw/day

NOAEL(fertility), oil of nutmeg, hamster: $\geq$ 260 mg/kg bw/day

NOAEL(fertility), terpinolene, rat, OECD 422: 250 mg/kg bw/day

NOAEL(developmental toxicity), camphene, rat, OECD 414: $\geq$ 1000 mg/kg bw/day

NOAEL(developmental toxicity), oil of nutmeg, rat: $\geq$ 260 mg/kg bw/day

NOAEL(developmental toxicity), oil of nutmeg, mouse: $\geq$ 560 mg/kg bw/day

NOAEL(developmental toxicity), oil of nutmeg, hamster: $\geq$ 600 mg/kg bw/day

NOAEL(developmental toxicity), terpinolene, rat, OECD 422: 371 mg/kg bw/day

NOAEL(developmental toxicity), terpinolene, rat, OECD 422: 250 mg/kg bw/day

No teratogenic effects were reported in a 2-generation reproductive toxicity study with DMDS (OECD 416).

h) Specific target organ toxicity (STOT) - single exposure

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The substance does not fulfil the criteria to be classified as specific target organ toxicity upon single exposure.

i) Specific target organ toxicity (STOT) - repeated exposure

TOPP does not fulfil the criteria to be classified as STOT RE.

Available toxicity data indicate that the toxicological profile for TOPP is similar to that of α -pinene.

In a sub-chronic inhalation toxicity study, equivalent to OECD 413, in rats (and mice) nephropathy is reported which is relevant only in male rats (alpha-2u-globulin nephropathy is a known male rat-specific effect).

LOAEC: 25 ppm (male rat). In humans, this LOAEC will not be relevant.

NOAEC: 200 ppm (female rats) (mortality and a lower body weight gain).

Overall NOAEC relevant for humans: 200 ppm (equivalent to 1114 mg/m³).

In a 90-day inhalation study (in accordance with OECD 413) for the constituent dimethyl disulfide, the NOAEC was 10 ppm (38.5 mg/m³) based on adverse local effects on the respiratory tract. In a second similar study the NOAEC was 5 ppm, 6h/d, for male rats and 25 ppm, 6h/d, for female rats.

A rat neurotoxicity study (OECD 424) showed a NOAEC for systemic toxicity and neurotoxicity was 20 ppm for males and 80 ppm for females. NOAEC, local contact nasal irritation, was 5 ppm for both sexes.

j) Aspiration hazard

TOPP is classified as presenting an aspiration hazard in the CLP regulation, Annex VI and may be fatal if swallowed and it enters the airways.

11.2 Information on other hazards

11.2.1 Endocrine disrupting properties

The product or its constituents do not have endocrine disruption properties for human health based on existing scientific studies and reports.

11.2.2 Other information

No other information available

12 ECOLOGICAL INFORMATION

12.1 Toxicity

TOPP is classified as Aquatic Chronic 1 because of its content of dimethyl disulphide (DMDS) and sesquiterpenes and the use of the CLP classification rules for mixtures when TOPP is regarded as a mixture consisting of the blocks.

Reliable short-term results have been determined in tests conducted with water-accommodated fractions.

LL_{50/96h}, fish (*Danio rerio*): 29 mg/L

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NOELr, fish (*Danio rerio*): 5 mg/L
EL_{50/48h}, *Daphnia magna*: 8.8 mg/L
NOELr, *Daphnia magna*: 2.5 mg/L
EL_{50/72h}, algae (*Desmodesmus subspicatus*): 17.1 mg/L
NOELr, algae (*Desmodesmus subspicatus*): 10 mg/L

No measured data are available for long-term toxicity to fish or aquatic invertebrates for the whole substance as such. However, the following two studies have been conducted on Germancrene D, representing block B with the sesquiterpenes of this UVCB substance.

NOEC_{28d}, fish (*Danio rerio*): 1.34 µg/L (OECD TG 210)
NOEC_{21d}, invertebrate (*Daphnia magna*): 1.64 µg/L (OECD TG 211)

NOEC values have been predicted (ECOSAR v 2.2) for the long-term aquatic toxicity for all blocks of constituents for the substance and vary between 0.00018 mg/L (block C) and 249 mg/L (block H) for fish and vary between 0.000399 mg/L (block C) and 74.8 mg/L (block H) for *Daphnia magna*.

12.2 Persistence and degradability

Abiotic degradation:

On the basis of structural examination, none of the constituents of TOPP contain functional groups that are susceptible to hydrolysis under conditions relevant to the environment. This fate process will not contribute to a measurable degradative loss of these substances from the environment. The substance constituents can therefore be considered as stable under hydrolytic conditions.

The half-lives for reaction with hydroxyl radicals in air were predicted (AOPWIN program) for 97 of the constituents of TOPP. The estimated half-lives for hydroxyl radicals varied between approximately 1 hour to 26 days. It was concluded that photochemically initiated oxidation is the major loss process for dimethyl sulphide.

Biodegradation:

The constituents of the substance are naturally occurring in trees and shrubs. It is therefore expected that biodegradation will be a significant removal process in the environment. Two samples of the substance were studied (OECD TG 301F) showing ready biodegradation of 72% (measured as percentage of theoretical oxygen demand, achieved in 28 days). 16 supporting studies (OECD TG 301B, 301D, 301F, 310) on individual constituents (β-pinene, δ-3-carene, myrcene, germacrene D, longifolene, β-caryophyllene, α-humulene, elemol natural, β-farnesene, synthetic farnesol, abietal, gum rosin, terpinolene, δ-cadiene, dipentene) confirmed the readily biodegradable test results (≥ 60-81% degradation of the test substance).

Dimethyl sulphide and dimethyl disulphide are ultimately and rapidly biodegraded by methanogens in anaerobic sediments (Kiene et al 1986).

The estimated biodegradation half-lives for the surface water/aerated sediment compartments/soil, respectively, are as follows at 12°C:

15/30/30 days for block A, D, E, F1, H
15/300/300 days for B, C, F3, F4, G1, G2
15/300/30 days for block F2

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12.3 Bioaccumulative potential

Some of the constituents in the substance (like beta-caryophyllene, gamma-cadinene, alpha-muurolene, pimaradiene, pimaral, abietal in the blocks B, C, F3&F4) meet the criteria for a very bioaccumulative substance. None of the constituents meet the criteria for persistence or very persistence substances.

The predicted BCFs in block B vary between 1600 and 19000 and the $\log K_{ow}$ between 3.2 and 7.2.

The predicted BCFs in block C vary between 1100 and 6200 and have a $\log K_{ow}$ of between 7.7 and 9.2.

The predicted BCFs in block F3&F4 vary between 4400 and 18000 and have a $\log K_{ow}$ between 6.2 and 8.0.

The predicted BCFs were 370, 8200, 3700, 140, 2.1, 60, 1100, 7300, 56, 14 000 and 3.2 for the eleven blocks, respectively. (KOWWIN and BCFBAF program v 3.02 were used for these assessments.)

12.4 Mobility in soil

The adsorption/desorption of TOPP as a whole substance is not scientifically necessary or meaningful for the purpose of environmental assessment. It is instead necessary to consider the adsorption properties of the individual constituents. Calculated values for the constituents of TOPP were obtained using KOCWIN v 2.01.

The calculated organic-carbon-water partition coefficients, K_{oc} , were 1000, 19 000, 320 000, 740, 42, 86, 2400, 21 000, 11 000, 88 000, 1 L/kg for the blocks A, B, C, D, E, F1, F2, F3&F4, G1, G2, H, respectively. Many of the constituents of TOPP will, due to their properties, partition into organic matter present in suspended and bottom sediments and soil.

Volatilisation of the constituents of turpentine oil from pulping processes from moist soil is expected to be an important fate process in the environment. Strong adsorption to organic matter, like in soil and sediment, of the constituents may slow the volatilisation. The Henry's Law constant describes the potential for volatilisation from water and has been estimated for 96 constituents and vary between 0.012 and 93 000 Pa m³/mol at 25 °C.

The product does not fulfil the criteria for PMT or vPvM classification.

12.5 Results of PBT and vPvB assessment

Based on available data, the product is not considered to contain the PBT substances or vPvB substances according to REACH (regulation (EC) no. 1907/2006) annex XIII.

12.6 Endocrine disrupting properties

Existing scientific studies and reports have not indicated endocrine disruption properties, but they are inconclusive and not sufficient for classification. Hence, the product has no such classification.

12.7 Other adverse effects

The majority of the constituents of TOPP are naturally-occurring and well tolerated by environmental organisms. It does not present a hazard to biological wastewater treatment plants (Gscheidmeier and Fleig, 1996).

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In the atmosphere, pinenes and other monoterpenes reacts rapidly and contributes to the generation of photochemical smog. Anthropogenic sources of release from production and use of TOPP is negligible in comparison to natural sources derived from pine trees.

No other adverse effects are observed.

12.8 Additional information

The distribution of the substance in a waste water treatment plant has been estimated (Simple Treat model in EUSES 2.1.2/CHESAR 3.8) based on the physicochemical and biodegradation properties per block of constituents. The found distribution, as reported below, are also indicative of the distribution in the wider environment.

Distribution modelling in waste water treatment plant

Block	% to air	% to water	% to sludge	% degraded
A	61	3	8	28
B	31	3	50	16
C	7	6	80	7
D	26	8	6	60
E	14	10	0	76
F1	0	13	1	86
F2	3	10	17	70
F3, F4	1	7	54	38
G1	3	7	42	48

13 DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

13.1.1 Product / Packaging disposal:

Product residues and uncleaned empty containers should be packaged, sealed, labelled, and disposed of or recycled according to relevant national and local regulations. Where large quantities are concerned, consult the supplier. When uncleaned empty containers are passed on, the recipient must be warned of any possible hazard that may be caused by residues. For disposal within the EC, the appropriate code according to the European Waste List (EWL) should be used. It is among the tasks of the polluter to assign the waste to waste codes specific to industrial sectors and processes according to the EWL.

Suitable waste codes:

13 07 03* - Other fuels (as well as mixtures)

13.1.2 Waste treatment options:

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Exposure Scenario 2. Manufacture - Manufacture of TOPP with no releases to water

Any releases during handling and spillage are collected and incinerated.

Aqueous wastes are recovered and fed into the evaporation plant and burnt in the recovery boiler in a closed system. Small amount of waste can be disposed off according to national/local legislation as hazardous waste.

Exposure Scenario 3. Industrial use - Fractionation of TOPP

Sources of emission to waste water from TOPP fractionation plants include plant clean-up wastes, cooling water streams, tank cleaning stations and stormwater drains. Releases are treated in a biological waste water treatment plant before discharge to receiving water. A dilution factor of 40 to river water and a dilution factor of 100 to marine water shall apply. Waste sludge from the waste water treatment plant can be spread onto agricultural soil.

Exposure Scenario 4. Formulation – Formulation/mixing of fuel

Releases are expected from minor routine spillages from delivery and handling, cleaning out mixing vessels, filling operations. The operations are well controlled and measures should be taken to limit water contamination e.g. use of oil water separators, oil skimmers, dissolved air flotation or recovery on-site. Sludges shall be treated as hazardous waste. Releases may be treated in biological waste water treatment plant and where discharge rate is $\geq 2000 \text{ m}^3/\text{day}$ then a ≥ 10 -time dilution into freshwater and a dilution factor of ≥ 100 to marine water are required.

Exposure Scenario 5. Industrial use - Use as fuel

Releases, like spills or leaks, are expected from storage and transfer and, where applicable, from blending stages. The operations are well controlled and measures should be taken to limit water contaminations. Storage on sealed surfaces with drainage, drain collection and water treatment for settling out. Oil water separator in place. Receiving surface water flow rate at $10,000 \text{ m}^3/\text{day}$ after waste water treatment plant. Dilution factor of 40 to freshwater and 1000 to marine water. Sludge from waste water treatment plant can be used on agricultural soil.

Exposure Scenario 6. Formulation - Formulation of road construction products

Waste disposal according to national/local legislation as hazardous waste. Releases may be treated in biological waste water treatment plant and where discharge rate is $\geq 2000 \text{ m}^3/\text{day}$ then a 10-time dilution into freshwater and 100-time dilution into marine water are required.

Exposure Scenario 7. Professional use – Professional use as an additive in road construction

Waste disposal according to national/local legislation as hazardous waste.

14 TRANSPORT INFORMATION

14.1 UN number: 1993

14.2 UN proper shipping name: FLAMMABLE LIQUID, N.O.S. (Turpentine oil from pulping processes)

14.3 Transport hazard class(es): 3

14.4 Packing group: III

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14.5 Environmental hazards: Yes (ADR, RID, IMDG)

14.6 Special precautions for user: Sea (EMS): F-E, S-E (IMDG),
Tunnel restriction code: (D/E) (ADR)

14.7 Maritime transport in bulk according to IMO instruments: N/A

15 REGULATORY INFORMATION

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

EU regulations:

European parliament and council's regulation (EC) no. 1907/2006 (REACH).

European parliament and council regulation (EC) no. 1272/2008 about classification, labelling and packing of substances and mixtures (CLP).

Directive 2012/18/EU of the European Parliament and of the Council of 4 July 2012 on the control of major-accident hazards involving dangerous substances, amending and subsequently repealing Council Directive 96/82/EC (Seveso III).

Waste Framework Directive 2008/98/EC.

National regulations:

AFS 2023:10: The Swedish Work Environment Authority's provisions on risks in the work environment

AFS 2023:14: The Swedish Work Environment Authority's provisions on limit values for respiratory exposure

Waste ordinance (2020:614).

MSBFS 2024:10 Regulations on the transport of dangerous goods on road and in terrain (ADR-S).

MSBFS 2018:3 Regulations on cisterns and pipelines for flammable liquids.

MSBFS 2023:2 Regulations on handling of flammable liquids.

SRVFS 2004:7 Regulations on explosive environment when handling flammable gases and liquids.

There are special requirements for allergy-causing chemical products, AFS 2023:10, chapter 8, 4-12 §§.

15.2 Chemical safety assessment

A chemical safety assessment has been conducted for this substance. Relevant exposure scenarios are attached as an annex to this safety data sheet.

16 OTHER INFORMATION

Abbreviations

AF: Assessment factor

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AFS: The Swedish Work Environment Authority's provisions.

APF: Assigned Protection Factor

ATE: Acute Toxicity Estimate (CLP Annex I, Part 3)

BCF: Bioconcentration Factor

Bw: body weight

DNEL: Derived No Effect Level (Derived level not based on observed effects).

DMDS: Dimethyl Disulfide

MSBFS: The Swedish Civil Contingencies Agency's provisions.

PBT: Persistent, Bioaccumulative and Toxic substances. PBT substances comply with the criteria in part 1, annex XIII in Reach.

PMT = Persistent, Mobile and Toxic

dw: dry weight

PNEC: predicted no effect concentration.

EC₅₀: The concentration of a substance that affects 50 % of a population over a given period of time.

EL₅₀: Effect loading, the loading rate of a test substance resulting in 50 % immobilization of the exposed test species.

LC₅₀: Deadly concentration for 50 % of a test population.

LD₅₀: Leathal dose for 50 % of the test population (leathal median dose).

LL₅₀: Lethal load of test substance resulting in 50 % mortality.

LOAEL: Lowest observed adverse effect level.

M factor: Multiplying factor (CLP Annex I, Part 4)

NOEC: No Observed Effect Concentration

NOELR: No observed effect loading rate.

NOEL: No observable effect level.

NOAEL: No observed adverse effect level.

NOAEC: Concentration where no harmful effect is observed.

SRVFS: The State Rescue Service's provisions.

UVCB: Substances with unknown or varying compositions, complex reaction products or biological material.

vPvB: Very persistent and bioaccumulative substances. A vPvB substance complies with the criteria in part 2, annex XIII in REACH.

vPvM = very Persistent and very Mobile

Meaning of phrases

Acute Tox. 4: Acute toxicity, category 4

Asp. Tox. 1: Aspiration hazard, category 1

Skin Sens. 1B: Skin sensitisation, Category 1

Flam. Liq. 2: Flammable liquids, category 2

Skin Irrit. 2: Skin irritation, category 2

Aquatic Chronic 1: Aquatic toxicity, category chronic 1

Eye Irrit. 2: Eye irritation, category 2

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H225: Very flammable liquid and vapour
H302: Harmful if swallowed.
H304: May be fatal if swallowed and it enters the airways.
H312: Harmful in contact with skin.
H315: Causes skin irritation.
H317: May cause an allergic skin reaction.
H319: Causes serious eye irritation.
H332: Harmful if inhaled.
H410: Very toxic to aquatic life with long lasting effects.

Important literature references

Chemical Safety Report for TOPP according to the REACH regulation.

Safety Data Sheet template from REACH-TOPP consortium for a flash point value of 23°C or higher and a concentration of dimethyl disulphide below 1%. (v 5.1) 15/05/2025

Manufacturer's notes

This safety data sheet has been compiled by SunPine AB in Piteå based on the details available to the company at the date of publication. The information should be seen as a guideline by purchasers of goods from SunPine AB and is meant to be used for health, safety and environmental purposes. The information cannot be seen as a specification or as a guarantee for any particular property in the product.

Constituents of TOPP:

Block number	Constituents
A	Terpenes
B	Sesquiterpenes
C	Rosin hydrocarbons
D	C7-C11 aromatics, esters and alcohols
E	Organic sulphur compounds
F	C10-C21 oxygenated compounds
G	Fatty acids and rosin acids
H	Methanol and ethanol
-	Unidentified eluted constituents

Document history

Version	Date	Comment
8	26 June 2025	Updated ATE value in section 3.1 Updated constituent block names Updated DNEL and PNEC values in section 8.1 Revised environmental exposure controls in section 8.2.3 Updated ecological information in section 12 Administrative changes throughout the document

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7	18 December 2024	Changed uses Classification changed from "highly flammable liquid and vapor" (H225) to "flammable liquid and vapor" (H226) and from Skin. Sens 1 to Skin. Sens. 1B. Adjustment of P-phrases. M-factor added. Flash point adjusted. New sections on endocrine-disrupting substances added (11.2 and 12.6). Section 14.7 adjusted. Adjusted DNEL-values and PNEC-values in section 8. Changes are made in all other sections, please read through all sections.
6	11 March 2020	Revisions are made to the following sections: 1-4, 7-9, 11-16

Annexes

The following relevant exposure scenarios (ES), drawn up as a part in the registration dossier for Turpentine in accordance with the REACH regulation are attached:

ES 2: Manufacture - Manufacture of TOPP with no releases to water

ES 3: Industrial Use - Fractionation of TOPP

ES 4: Formulation - Formulation/mixing of fuel

ES 5: Industrial Use - Use as fuel

ES 6: Formulation - Formulation of road construction products

ES 7: Professional Use – Professional use as an additive in road construction