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: 7.0/Eng

Revision date: 18 December 2024 Supersedes: 11 March 2020

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 (and on-site uses) with no releases to water

Formulation:

ES 4: Formulation/mixing of fuel in energy generation

ES 6: Formulation of road construction products

Industrial use:

ES 3: Fractionation of TOPP

ES 5:Use as fuel in energy generation

Professional use:

ES 7: Use as 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

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

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 (H_2S). 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.
The product does not fulfil the PBT and vPvB criteria in accordance with Annex XIII to REACH.
No information on endocrine-disrupting properties is available.

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

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 > 2000 mg/kg Dermal > 2000 mg/kg Inhalation 13,7 mg/l	H226 H302 H312 H332 H315 H319 H317 H304 H410

* Note: The product is defined as a UVCB substance[1] and is composed primarily of bicyclic terpenes ($C_{10}H_{16}$) with a small amount of other turpentines and sulphur compounds. 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: If heated, the resulting fumes and vapours can easily irritate the upper respiratory tracts and the lungs, causing coughing and discomfort to the throat, increased respiratory rate and convulsions.

Skin contact: Causes skin irritation. May cause allergic skin reaction.

Contact with eyes: Causes serious eye irritation.

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

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.

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. Vapours can be explosive in mixture with air.

5.3 Advice for firefighters

Wear full-body protective clothing and self-contained breathing apparatus when fighting fires.

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

Ensure adequate ventilation. Eliminate all fire/ignition sources. Do not get on skin or in the eyes. Use protective gloves and other necessary protective equipment (see section 8).

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

Absorb spills with a suitable inert absorbent (e.g. sand, active clay, multisorb). Collect in suitable labelled waste containers. Clean the spill area with large amounts of water and cleaning agent.

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

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 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 and skin. 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 proof equipment. Control of static electricity. 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. 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.

7.1.2 Advice on general occupational hygiene

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

Store in tightly closed containers in a dry, cool and well-ventilated area. Store in containers that are correctly labelled. Avoid temperatures above 30°C due to risk for ignition and explosion of vapours. Store in separate container away from heat and ignition sources. Take precautionary measures against electrostatic discharges.

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	9.51 mg/kg/day	Repeat-dose toxicity (by inhalation)
	Inhalation	DNEL	67.2 mg/m$^{3.}$	Repeat-dose toxicity
Acute - local effects	Dermal	Medium hazard	-	Sensitisation
	Inhalation	No hazard	-	-
Long-term - systemic effects	Dermal	DNEL	3.17 mg/kg/day	Repeat-dose toxicity (by inhalation)
	Inhalation	DNEL	22.4 mg/m^3	Repeat-dose toxicity
Long-term – local effects	Dermal	Medium hazard	-	Repeat-dose toxicity
	Inhalation	No hazard	-	-
Local effects	Eyes	Low hazard	-	-

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	DNEL	0.5 mg/kg bw/day	Repeat-dose toxicity (oral)
	Dermal	No hazard	-	-
	Inhalation	DNEL	0.84 mg/m^3	Repeat-dose toxicity (oral)
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	Year

	mg/m3	*ppm*	*mg/m3*	*ppm*	**Source**	
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.

Block	**PNEC freshwater [mg/l]**	**PNEC sediment (fresh water) [mg/kg dw]**	**PNEC marine water [mg/l]**	**PNEC sediment (marine water) [mg/kg dw]**
1	0.007 (AF 10)	0.73	0.0007 (AF 100)	0.073
2	0.004 (AF 10)	0.41	0.0004 (AF 100)	0.041
3	0.002 (AF 10)	0.23	0.0002 (AF 100)	0.023
4	1.0 (AF 10)	5.8	0.1 (AF 100)	0.58
5	1.0 (AF 10)	4.1	0.1 (AF 100)	0.41
6	0.0002 (AF 10)	4.8	0.00002 (AF 100)	0.48
7	0.04 (AF 10)	0.66	0.004 (AF 100)	0.066
8	0.006 (AF 10)	0.62	0.0006 (AF 100)	0.062
9	0.003 (AF 1000)	0.023	0.0003 (AF 10 000)	0.0023

Block	**WWTP**	**Soil [mg/kg dw]**	**Air**	**Secondary poisoning**
1	No data (toxicity unlikely)	0.14	No hazard identified	No potential to cause toxic effects if accumulated (in higher organisms) via the food chain
2	No data (toxicity unlikely)	0.082	No hazard identified	No potential to cause toxic effects if accumulated (in higher organisms) via the food chain
3	No data (toxicity unlikely)	0.045	No hazard identified	No potential to cause toxic effects if accumulated (in higher organisms) via the food chain
4	No data (toxicity unlikely)	0.58	No hazard identified	No potential to cause toxic effects if accumulated (in higher organisms) via the food chain
5	No data (toxicity unlikely)	0.24	No hazard identified	No potential to cause toxic effects if accumulated (in higher organisms) via the food chain

6	No data (toxicity unlikely)	1.0	No hazard identified	No potential to cause toxic effects if accumulated (in higher organisms) via the food chain
7	No data (toxicity unlikely)	0.11	No hazard identified	No potential to cause toxic effects if accumulated (in higher organisms) via the food chain
8	No data (toxicity unlikely)	0.12	No hazard identified	No potential to cause toxic effects if accumulated (in higher organisms) via the food chain
9	No data (toxicity unlikely)	0.0028	No hazard identified	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 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.

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.

8.2.3 Environmental exposure controls

Procedural and technological control using Best Available Technique (BAT) shall apply. Effluents (ES1, ES3, ES4, ES5, ES6, ES7) shall be treated in wastewater treatment plant. 1000 times dilution into receiving marine water, 40 times dilution into receiving river (if river flow 400 000 m3/day) with a wastewater treatment plant of 10 000 m3/day (ES1, ES2). 100 times dilution into receiving marine water, 40 times dilution into receiving surface water (ES3) with a wastewater treatment plant of 2000 m3/day. Receiving surface water flow > 18 000 m3/day, 100 times dilution into marine water (ES4, ES5, ES6). Dilution factor into fresh water >10 and to marine water > 100 (ES7). Waste (ES1, ES2) shall be incinerated.

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
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 Encyklopedia 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

Avoid overheating, heat and ignition sources.

10.5 Incompatible materials

May react violently with:

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

10.6 Hazardous decomposition products

Contact with air can result in the formation of allergenic oxidising products. Contact with acid can result in the formation of sulphur compounds.

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).

LD_{50} Oral: 4.6 ml/kg (rat) (OECD 401) – equivalent to ca. 4000 mg/kg bw

LD_{50} Dermal: >2,000 mg/kg (rabbit) (OECD 402)
LD_{50} 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 apprpriate 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 sensitiser.
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).

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

TOPP is not considered to cause cancer. 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.

g) Reproductive toxicity

TOPP is not classified for reproductive toxicity.

No fertility or developmental toxicity data are available for the whole substance as such. However, data on constituents are available and is thus representative of five of the nine blocks, i.e. approximately 82%

of the whole substance. None of the repeated dose toxicity study results meet the criteria for fertility or developmental toxicity.

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

NOAEL(fertility), oil of nutmeg, rat: ≥ 260 mg/kg bw/day
NOAEL(fertility), oil of nutmeg, mouse: ≥ 560 mg/kg bw/day
NOAEL(fertility), oil of nutmeg, hamster: ≥ 260 mg/kg bw/day
NOAEL(fertility), terpinolene, rat, OECD 422: 250 mg/kg bw/day
NOAEL(developmental toxicity), camphene, rat, OECD 414: ≥ 1000 mg/kg bw/day
NOAEL(developmental toxicity), oil of nutmeg, rat: ≥ 260 mg/kg bw/day
NOAEL(developmental toxicity), oil of nutmeg, mouse: ≥ 560 mg/kg bw/day
NOAEL(developmental toxicity), oil of nutmeg, hamster: ≥ 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 (single exposure)
TOPP does not fulfil the criteria to be classified as STOT SE.

i) Specific target organ toxicity (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.

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.

j) Aspiration hazard
TOPP is classified as presenting an aspiration hazard and may be fatal if swallowed and it enters the airways.

11.2 Information on other hazards

11.2.1 Endocrine disrupting properties

No information available

11.2.2 Other information

No 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 nine blocks.

LL_{50} and EL_{50} are very similar to LC_{50} and EC_{50} but test the water phases using incomplete mixtures. Reliable short-term data has been defined through WAF (Water-Accommodated Fraction) tests.

TOPP with sulphur content of 3.6%:

Acute toxicity for fish:

LL50, 96h, *Danio rerio* (OECD 203): 45.1 mg/l

NOELR, *Danio rerio*: 5 mg/l

Acute toxicity for algae:

EL_{50}, 72 h, *Desmodesmus subspicatus* (OECD 201): 22.5 mg/l
NOELR, *Desmodesmus subspicatus*: 5 mg/l

Acute toxicity for shellfish:

EL_{50}, 48 h, *Daphnia magna* (water flea) (OECD 202): 8.8 mg/l
NOELR, *Daphnia magna*: 2.5 mg/l

No measured data are available for long-term toxicity of TOPP to fish or aquatic invertebrates.

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 35 of the constituents of TOPP. The estimated half-lives for hydroxyl radicals varied between less than two hours (iso-terpinolene) to approximately 4.2 days (dimethyl sulphide). It was concluded that photochemically initiated oxidation is the major loss process for dimethyl sulphide.

Biodegradation:

Although TOPP is readily biodegradable it cannot be stated with complete certainty that it does not contain non-readily-biodegradable constituents.

Two ready biodegradation studies are available for samples of TOPP (OECD 301F). Ready biodegradation of 72% (measured as percentage of theoretical oxygen demand, TOD) was achieved in 28 days using a method consistent with OECD Guideline 301 F (manometric respirometer). The '10-day window' criterion was, however, not met. Five supporting studies (OECD 301D, 28 d) on individual constituents (β-pinene, δ-3-carene, dipentene, myrcene and terpinolene respectively) confirmed the readily biodegradable test results (72-81% degradation of test substance). The following biodegradation rating in water and sediment was used for the CSA taking into account available measured data on constituents and using predicted data (BIOWIN program) for block 5 lacking measured data. Block 1,2,3,4,7 was readily biodegradable. Block 6,9 were inherently biodegradable. Block 5 was readily biodegradable not meeting the 10-day window. Block 8 was not biodegradable.

Dimethyl sulphide (block 4) and dimethyl disulphide (block 9) 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 compartmets/soil, respectively, are as follows at 12°C:

15/30/30 days for block 1,2,3,4,7;
50/90/90 days for block 5;
150/300/300 days for block 6,9;
300/300/300 days for block 8.

The constituents of TOPP are naturally occurring terpenes in trees and shrubs. It is therefore expected that biodegradation will be a significant removal process in the environment.

See also section 12.4 for further information on degradation in WWTP.

12.3 Bioaccumulative potential

Some of the constituents in TOPP (like terpinolene, myrcene, terpinene, iso-terpinolene, γ-terpinene, dipentene and β-phellandrene in block 3 and sequiterpenes, δ-cadinene and α-cadinene in block 6) meet the criteria for a bioaccumulative substance (in block 3) and very bioaccumulative substance (in block 6). These constituents do not meet the criteria for persistence (P, vP) and toxic (T) substances.

The predicted BCFs in block 3 vary between 1700 and 2800 and the logKow between 4.6 and 4.9.

The predicted BCFs in block 6 vary between 40 000 and 41 000 and have a logKow of 6.3.

The predicted BCF were 870, 1700, 2500, 1.2, 0.92, 40 000, 120, 990 and 7.8 for the nine blocks, respectively. (KOWWIN and BCF QSAR methods 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 . Calculated values for the constituents of TOPP were obtained using KOCWIN. The calculated organic-carbon-water partition coefficients, KOC, were 1000,

1000, 1100, 22, 4.8, 240 000, 130, 1000, 40 for the nine blocks, respectively. Many of the constituents of TOPP will, due to their properties, partition into organic matter present in suspended and bottom sediments and soil.

The distribution of TOPP in a wastewater treatment plant has been estimated (Simple Treat model in EUSES 2.1.2) 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.

Block	% to air	% to water	% to sludge	% degraded
1	60	3	8	29
2	83	5	8	4
3	60	3	9	28
4	32	20	0.2	48
5	47	15	0.05	38
6	17	5	77	1
7	2	12	1	85
8	86	6	8	0
9	45	54	0.4	0

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

No information available.

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).

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.

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 European Waste List (EWL).

Suitable waste codes:

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

13.1.2 Waste treatment options:

Exposure Scenario 2. Production of TOPP (and on-site uses) 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 in energy generation

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.

Exposure Scenario 5. Industrial use - Use as fuel in energy generation

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 18,000 m3/day after waste water treatment plant. Dilution factor of 100 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.

Exposure Scenario 7. Professional use - 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

14.5 Environmental hazards: Marine Pollutant

14.6 Special precautions for user: Sea (EMS): F-E, S-E

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

AFS: The Swedish Work Environment Authority's provisions.
MSBFS: The Swedish Civil Contingencies Agency's provisions.
SRVFS: The State Rescue Service's provisions.
SÄIFS: The Inspectorate of Explosives's provisions.
PBT: Persistent, Bioaccumulative and Toxic substances. PBT substances comply with the criteria in part 1, annex XIII in Reach.
vPvB: Very persistent and bioaccumulative substances. A vPvB substance complies with the criteria in part 2, annex XIII in REACH.
UVCB: Substances with unknown or varying compositions, complex reaction products or biological material.
dw: dry weight
DNEL: Derived No Effect Level (Derived level not based on observed effects).
PNEC: predicted no effect concentration.
EC_{50}: The concentration of a substance that affects 50 % of a population over a given period of time.
EL_{50}: Effect loading, the loading rate of a test substance resulting in 50 % immobilization of the exposed test species.
LC_{50}: Deadly concentration for 50 % of a test population.
LD_{50}: Leathal dose for 50 % of the test population (leathal median dose).
LL_{50}: Lethal load of test substance resulting in 50 % mortality.
LOAEL: Lowest observed adverse effect level.
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.
DMDS: Dimethyl Disulfide

Turpentine oil from pulping processes (TOPP)

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

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.

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
1	Pinene
2	δ-3-carene
3	Dipentene
4	Dimethyl sulfide
5	Methyl mercaptan
6	Sesquiterpenes
7	Terpene alcohols
8	Camphene
9	Dimethyl disulfide

Document history

Turpentine oil from pulping processes (TOPP)

Version: 7.0/Eng

Revision date: 18 December 2024 Supersedes: 11 March 2020

Version	Date	Comment
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 as a part in the registration dossier for Turpentine in accordance with the REACH regulation are attached:

ES 2: Manuffacture - Manufacture of TOPP (and on-site uses) with no releases to water
ES 3: Industrial Use - Fractionation of TOPP
ES 4: Formulation - Formulation/mixing of fuel in energy generation
ES 5: Industrial Use - Use as fuel in energy generation
ES 6: Formulation - Formulation of road construction products
ES 7: Professional Use - Use as additive in road construction