



## FWT-XJ1 N&A XJ-13 Terpenes

Flavor West MFG LLC

Version No: 1.1

Safety Data Sheet according to OSHA HazCom Standard (2012) requirements

Chemwatch Hazard Alert Code: 2

Issue Date: 04/13/2018

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L.GHS.USA.EN

### SECTION 1 IDENTIFICATION

#### Product Identifier

Product name	FWT-XJ1 N&A XJ-13 Terpenes
Synonyms	Not Available
Proper shipping name	Extracts, flavoring, liquid
Other means of identification	Not Available

#### Recommended use of the chemical and restrictions on use

Relevant identified uses	Use according to manufacturer's directions.
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#### Name, address, and telephone number of the chemical manufacturer, importer, or other responsible party

Registered company name	Flavor West MFG LLC
Address	29400 Hunco Way, Lake Elsinore, CA 92530
Telephone	(951) 893-5120
Fax	(714) 276-1621
Website	www.flavorwest.com
Email	flavor@flavorwest.com

#### Emergency phone number

Association / Organisation	Chemwatch
Emergency telephone numbers	see below
Other emergency telephone numbers	see below

#### CHEMWATCH EMERGENCY RESPONSE

Primary Number	Alternative Number 1	Alternative Number 2
877 715 9305	877 715 9305	+612 9186 1132

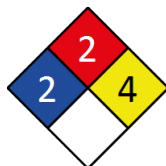
Once connected and if the message is not in your preferred language then please dial 01

Una vez conectado y si el mensaje no está en su idioma preferido, por favor marque 02

### SECTION 2 HAZARD(S) IDENTIFICATION

#### Classification of the substance or mixture

Continued...



Note: The hazard category numbers found in GHS classification in section 2 of this SDSs are NOT to be used to fill in the NFPA 704 diamond. Blue = Health Red = Fire Yellow = Reactivity White = Special (Oxidizer or water reactive substances)

<b>Classification</b>	Flammable Liquid Category 3, Skin Corrosion/Irritation Category 2, Eye Irritation Category 2A, Skin Sensitizer Category 1, Specific target organ toxicity - single exposure Category 3 (respiratory tract irritation), Specific target organ toxicity - single exposure Category 3 (narcotic effects), Aspiration Hazard Category 1, Acute Aquatic Hazard Category 1, Chronic Aquatic Hazard Category 1
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### Label elements

<b>Hazard pictogram(s)</b>	
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<b>SIGNAL WORD</b>	<b>DANGER</b>
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### Hazard statement(s)

<b>H226</b>	Flammable liquid and vapour.
<b>H315</b>	Causes skin irritation.
<b>H319</b>	Causes serious eye irritation.
<b>H317</b>	May cause an allergic skin reaction.
<b>H335</b>	May cause respiratory irritation.
<b>H336</b>	May cause drowsiness or dizziness.
<b>H304</b>	May be fatal if swallowed and enters airways.
<b>H410</b>	Very toxic to aquatic life with long lasting effects.

### Hazard(s) not otherwise specified

Not Applicable

### Precautionary statement(s) General

<b>P101</b>	If medical advice is needed, have product container or label at hand.
<b>P102</b>	Keep out of reach of children.
<b>P103</b>	Read label before use.

### Precautionary statement(s) Prevention

<b>P210</b>	Keep away from heat/sparks/open flames/hot surfaces. - No smoking.
<b>P271</b>	Use in a well-ventilated area.
<b>P280</b>	Wear protective gloves/protective clothing/eye protection/face protection.
<b>P240</b>	Ground/bond container and receiving equipment.
<b>P241</b>	Use explosion-proof electrical/ventilating/lighting/intrinsically safe equipment.
<b>P242</b>	Use only non-sparking tools.
<b>P243</b>	Take precautionary measures against static discharge.
<b>P261</b>	Avoid breathing mist/vapours/spray.
<b>P273</b>	Avoid release to the environment.
<b>P272</b>	Contaminated work clothing should not be allowed out of the workplace.

### Precautionary statement(s) Response

<b>P301+P310</b>	IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician.
<b>P331</b>	Do NOT induce vomiting.
<b>P362</b>	Take off contaminated clothing and wash before reuse.
<b>P370+P378</b>	In case of fire: Use alcohol resistant foam or normal protein foam for extinction.

P302+P352	IF ON SKIN: Wash with plenty of soap and water.
P305+P351+P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P312	Call a POISON CENTER or doctor/physician if you feel unwell.
P333+P313	If skin irritation or rash occurs: Get medical advice/attention.
P337+P313	If eye irritation persists: Get medical advice/attention.
P391	Collect spillage.
P303+P361+P353	IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower.
P304+P340	IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.

### Precautionary statement(s) Storage

P403+P235	Store in a well-ventilated place. Keep cool.
P405	Store locked up.

### Precautionary statement(s) Disposal

P501	Dispose of contents/container in accordance with local regulations.
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## SECTION 3 COMPOSITION / INFORMATION ON INGREDIENTS

### Substances

See section below for composition of Mixtures

### Mixtures

CAS No	%[weight]	Name
80-56-8	1-5	<u>alpha-pinene</u>
6753-98-6	5-10	<u>alpha-humulene</u>
1139-30-6	1-5	<u>beta-caryophyllene oxide</u>
13466-78-9	1-5	<u>3-carene</u>
5989-27-5	5-10	<u>d-limonene</u>
78-70-6	1-5	<u>linalool</u>
123-35-3	1-5	<u>myrcene</u>
586-62-9	10-20	<u>terpinolene</u>
127-91-3*	5-10	<u>beta pinene</u>
87-44-5	30-40	<u>beta-caryophyllene</u>
99-85-4	1-5	<u>gamma-terpinene</u>

The specific chemical identity and/or exact percentage (concentration) of composition has been withheld as a trade secret.

## SECTION 4 FIRST-AID MEASURES

### Description of first aid measures

Eye Contact	<p>If this product comes in contact with the eyes:</p> <ul style="list-style-type: none"> <li>▶ Wash out immediately with fresh running water.</li> <li>▶ Ensure complete irrigation of the eye by keeping eyelids apart and away from eye and moving the eyelids by occasionally lifting the upper and lower lids.</li> <li>▶ Seek medical attention without delay; if pain persists or recurs seek medical attention.</li> <li>▶ Removal of contact lenses after an eye injury should only be undertaken by skilled personnel.</li> </ul>
Skin Contact	<p>If skin contact occurs:</p> <ul style="list-style-type: none"> <li>▶ Immediately remove all contaminated clothing, including footwear.</li> <li>▶ Flush skin and hair with running water (and soap if available).</li> <li>▶ Seek medical attention in event of irritation.</li> </ul>
Inhalation	<ul style="list-style-type: none"> <li>▶ If fumes or combustion products are inhaled remove from contaminated area.</li> <li>▶ Lay patient down. Keep warm and rested.</li> <li>▶ Prostheses such as false teeth, which may block airway, should be removed, where possible, prior to initiating first aid procedures.</li> <li>▶ Apply artificial respiration if not breathing, preferably with a demand valve resuscitator, bag-valve mask device, or pocket mask as trained. Perform CPR if necessary.</li> </ul>

	<ul style="list-style-type: none"> <li>▶ Transport to hospital, or doctor, without delay.</li> </ul>
<b>Ingestion</b>	<ul style="list-style-type: none"> <li>▶ <b>If swallowed do NOT induce vomiting.</b></li> <li>▶ If vomiting occurs, lean patient forward or place on left side (head-down position, if possible) to maintain open airway and prevent aspiration.</li> <li>▶ Observe the patient carefully.</li> <li>▶ Never give liquid to a person showing signs of being sleepy or with reduced awareness; i.e. becoming unconscious.</li> <li>▶ Give water to rinse out mouth, then provide liquid slowly and as much as casualty can comfortably drink.</li> <li>▶ Seek medical advice.</li> <li>▶ Avoid giving milk or oils.</li> <li>▶ Avoid giving alcohol.</li> <li>▶ If spontaneous vomiting appears imminent or occurs, hold patient's head down, lower than their hips to help avoid possible aspiration of vomitus.</li> </ul>

### Most important symptoms and effects, both acute and delayed

See Section 11

### Indication of any immediate medical attention and special treatment needed

For acute or short term repeated exposures to petroleum distillates or related hydrocarbons:

- ▶ Primary threat to life, from pure petroleum distillate ingestion and/or inhalation, is respiratory failure.
- ▶ Patients should be quickly evaluated for signs of respiratory distress (e.g. cyanosis, tachypnoea, intercostal retraction, obtundation) and given oxygen. Patients with inadequate tidal volumes or poor arterial blood gases (pO<sub>2</sub> 50 mm Hg) should be intubated.
- ▶ Arrhythmias complicate some hydrocarbon ingestion and/or inhalation and electrocardiographic evidence of myocardial injury has been reported; intravenous lines and cardiac monitors should be established in obviously symptomatic patients. The lungs excrete inhaled solvents, so that hyperventilation improves clearance.
- ▶ A chest x-ray should be taken immediately after stabilisation of breathing and circulation to document aspiration and detect the presence of pneumothorax.
- ▶ Epinephrine (adrenalin) is not recommended for treatment of bronchospasm because of potential myocardial sensitisation to catecholamines. Inhaled cardioselective bronchodilators (e.g. Alupent, Salbutamol) are the preferred agents, with aminophylline a second choice.
- ▶ Lavage is indicated in patients who require decontamination; ensure use of cuffed endotracheal tube in adult patients. [Ellenhorn and Barceloux: Medical Toxicology]

Any material aspirated during vomiting may produce lung injury. Therefore emesis should not be induced mechanically or pharmacologically. Mechanical means should be used if it is considered necessary to evacuate the stomach contents; these include gastric lavage after endotracheal intubation. If spontaneous vomiting has occurred after ingestion, the patient should be monitored for difficult breathing, as adverse effects of aspiration into the lungs may be delayed up to 48 hours.

Treat symptomatically.

In acute poisonings by essential oils the stomach should be emptied by aspiration and lavage. Give a saline purgative such as sodium sulfate (30 g in 250 ml water) unless catharsis is already present. Demulcent drinks may also be given. Large volumes of fluid should be given provided renal function is adequate. [MARTINDALE: The Extra Pharmacopoeia, 28th Ed.]

## SECTION 5 FIRE-FIGHTING MEASURES

### Extinguishing media

- ▶ Foam.
- ▶ Dry chemical powder.
- ▶ BCF (where regulations permit).
- ▶ Carbon dioxide.

### Special hazards arising from the substrate or mixture

<b>Fire Incompatibility</b>	<ul style="list-style-type: none"> <li>▶ Avoid contamination with oxidising agents i.e. nitrates, oxidising acids, chlorine bleaches, pool chlorine etc. as ignition may result</li> </ul>
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### Special protective equipment and precautions for fire-fighters

<b>Fire Fighting</b>	<ul style="list-style-type: none"> <li>▶ Alert Fire Brigade and tell them location and nature of hazard.</li> <li>▶ May be violently or explosively reactive.</li> <li>▶ Wear breathing apparatus plus protective gloves.</li> <li>▶ Prevent, by any means available, spillage from entering drains or water course.</li> </ul>
<b>Fire/Explosion Hazard</b>	<ul style="list-style-type: none"> <li>▶ Liquid and vapour are flammable.</li> <li>▶ Moderate fire hazard when exposed to heat or flame.</li> <li>▶ Vapour forms an explosive mixture with air.</li> <li>▶ Moderate explosion hazard when exposed to heat or flame.</li> </ul> <p>Combustion products include: carbon monoxide (CO) carbon dioxide (CO<sub>2</sub>) other pyrolysis products typical of burning organic material.</p>

**CARE:** Water in contact with hot liquid may cause foaming and a steam explosion with wide scattering of hot oil and possible severe burns. Foaming may cause overflow of containers and may result in possible fire.

## SECTION 6 ACCIDENTAL RELEASE MEASURES

### Personal precautions, protective equipment and emergency procedures

See section 8

### Environmental precautions

See section 12

### Methods and material for containment and cleaning up

<b>Minor Spills</b>	<ul style="list-style-type: none"> <li>▶ Remove all ignition sources.</li> <li>▶ Clean up all spills immediately.</li> <li>▶ Avoid breathing vapours and contact with skin and eyes.</li> <li>▶ Control personal contact with the substance, by using protective equipment.</li> </ul>
<b>Major Spills</b>	<p><b>CARE:</b> Absorbent materials wetted with occluded oil must be moistened with water as they may auto-oxidize, become self heating and ignite.</p> <p>Some oils slowly oxidise when spread in a film and oil on cloths, mops, absorbents may autoxidise and generate heat, smoulder, ignite and burn. In the workplace oily rags should be collected and immersed in water.</p> <ul style="list-style-type: none"> <li>▶ Clear area of personnel and move upwind.</li> <li>▶ Alert Fire Brigade and tell them location and nature of hazard.</li> <li>▶ May be violently or explosively reactive.</li> <li>▶ Wear breathing apparatus plus protective gloves.</li> </ul>

Personal Protective Equipment advice is contained in Section 8 of the SDS.

## SECTION 7 HANDLING AND STORAGE

### Precautions for safe handling

<b>Safe handling</b>	<p>The conductivity of this material may make it a static accumulator., A liquid is typically considered nonconductive if its conductivity is below 100 pS/m and is considered semi-conductive if its conductivity is below 10 000 pS/m., Whether a liquid is nonconductive or semi-conductive, the precautions are the same., A number of factors, for example liquid temperature, presence of contaminants, and anti-static additives can greatly influence the conductivity of a liquid. Even with proper grounding and bonding, this material can still accumulate an electrostatic charge. If sufficient charge is allowed to accumulate, electrostatic discharge and ignition of flammable air-vapour mixtures can occur.</p> <ul style="list-style-type: none"> <li>▶ Containers, even those that have been emptied, may contain explosive vapours.</li> <li>▶ Do NOT cut, drill, grind, weld or perform similar operations on or near containers.</li> <li>▶ Electrostatic discharge may be generated during pumping - this may result in fire.</li> <li>▶ Ensure electrical continuity by bonding and grounding (earthing) all equipment.</li> <li>▶ Restrict line velocity during pumping in order to avoid generation of electrostatic discharge (<math>\leq 1</math> m/sec until fill pipe submerged to twice its diameter, then <math>\leq 7</math> m/sec).</li> <li>▶ Avoid splash filling.</li> <li>▶ Avoid all personal contact, including inhalation.</li> <li>▶ Wear protective clothing when risk of overexposure occurs.</li> <li>▶ Use in a well-ventilated area.</li> <li>▶ Prevent concentration in hollows and sumps.</li> <li>▶ <b>DO NOT allow clothing wet with material to stay in contact with skin</b></li> </ul>
<b>Other information</b>	<p>Consider storage under inert gas.</p> <ul style="list-style-type: none"> <li>▶ Store in original containers in approved flammable liquid storage area.</li> <li>▶ Store away from incompatible materials in a cool, dry, well-ventilated area.</li> <li>▶ <b>DO NOT store in pits, depressions, basements or areas where vapours may be trapped.</b></li> <li>▶ No smoking, naked lights, heat or ignition sources.</li> </ul> <p>Essential oil oxidation accelerates with the concentration of dissolved oxygen, which in turn depends largely on oxygen partial pressure in the head-space as well as ambient temperature. Depending on the particular essential oil and the ambient temperature, oxidation will not necessarily be prevented by avoidance of container head-space. Instead essential oils should be treated with inert gas such as argon, cautiously flushed through to displace remaining air, to prevent the formation of peroxides efficiently.</p>

### Conditions for safe storage, including any incompatibilities

<b>Suitable container</b>	<ul style="list-style-type: none"> <li>▶ Packing as supplied by manufacturer.</li> <li>▶ Plastic containers may only be used if approved for flammable liquid.</li> <li>▶ Check that containers are clearly labelled and free from leaks.</li> </ul>
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	<ul style="list-style-type: none"> <li>▶ For low viscosity materials (i) : Drums and jerry cans must be of the non-removable head type. (ii) : Where a can is to be used as an inner package, the can must have a screwed enclosure.</li> <li>▶ For materials with a viscosity of at least 2680 cSt. (23 deg. C)</li> <li>▶ For manufactured product having a viscosity of at least 250 cSt.</li> </ul>
Storage incompatibility	<p>d-Limonene:</p> <ul style="list-style-type: none"> <li>▶ forms unstable peroxides in storage, unless inhibited; may polymerise</li> <li>▶ reacts with strong oxidisers and may explode or combust</li> <li>▶ is incompatible with strong acids, including acidic clays, peroxides, halogens, vinyl chloride and iodine pentafluoride</li> <li>▶ flow or agitation may generate electrostatic charges due to low conductivity</li> </ul> <p>Due to their structural relationship within the same chemical group, essential oil components are known to easily convert into each other by oxidation, isomerisation, cyclisation, or dehydrogenation reactions, triggered either enzymatically or chemically.</p> <p>Temperature, light, and oxygen availability are recognised to have a crucial impact on essential oil integrity.</p> <p>Susceptibility of essential oils to degradation largely depends on compound spectra as components' molecular structures have a substantial effect on the degree of oxidation.</p> <p>Constituting an array of many lipophilic and highly volatile components derived from a great range of different chemical classes, essential oils are known to be susceptible to conversion and degradation reactions.</p> <p>Terpenoids and terpenes, are generally unsaturated, are thermolabile, are often volatile and may be easily oxidised or hydrolysed depending on their respective structure.</p> <p>Terpenoids are subject to autoxidation. Autoxidation is any oxidation that occurs in open air or in presence of oxygen (and sometimes UV radiation) and forms peroxides and hydroperoxides.</p> <p>Though autoxidation has been particularly investigated in the field of fatty oils, it also plays a most crucial part for terpenoid deterioration.</p> <p>Unsaturated mono- and sesquiterpenes, typically found in essential oils such as those from pine and turpentine, are readily altered upon storage. Moreover, electron-donating groups and increasing alkyl substitution contribute to a stronger carbon-peroxide bond through a hyperconjugative effect, thus leading to more stable and subsequently built-up hydroperoxides</p> <ul style="list-style-type: none"> <li>▶ The various oxides of nitrogen and peroxyacids may be dangerously reactive in the presence of alkenes. BREATHERICK L.: Handbook of Reactive Chemical Hazards</li> <li>▶ Avoid reaction with strong Lewis or mineral acids.</li> <li>▶ Reaction with halogens requires carefully controlled conditions.</li> <li>▶ Free radical initiators should be avoided.</li> </ul> <p><b>HAZARD:</b></p> <ul style="list-style-type: none"> <li>▶ Although anti-oxidants may be present, in the original formulation, these may deplete over time as they come into contact with air.</li> <li>▶ Rags wet / soaked with unsaturated hydrocarbons / drying oils may auto-oxidise; generate heat and, in-time, smoulder and ignite. This is especially the case where oil-soaked materials are folded, bunched, compressed, or piled together - this allows the heat to accumulate or even accelerate the reaction</li> <li>▶ Oily cleaning rags should be collected regularly and immersed in water, or spread to dry in safe-place away from direct sunlight, or stored, immersed, in solvents in suitably closed containers.</li> </ul> <p>Epoxides:</p> <ul style="list-style-type: none"> <li>▶ are highly reactive with acids, bases, and oxidising and reducing agents.</li> <li>▶ react, possibly violently, with anhydrous metal chlorides, ammonia, amines and group 1 metals.</li> <li>▶ may polymerise in the presence of peroxides or heat - polymerisation may be violent</li> <li>▶ may react, possibly violently, with water in the presence of acids and other catalysts.</li> </ul> <ul style="list-style-type: none"> <li>· The interaction of alkenes and alkynes with nitrogen oxides and oxygen may produce explosive addition products; these may form at very low temperatures and explode on heating to higher temperatures (the addition products from 1,3-butadiene and cyclopentadiene form rapidly at -150 C and ignite or explode on warming to -35 to -15 C). These derivatives ("pseudo- nitrosites") were formerly used to characterise terpene hydrocarbons.</li> <li>· Exposure to air must be kept to a minimum so as to limit the build-up of peroxides which will concentrate in bottoms if the product is distilled. The product must not be distilled to dryness if the peroxide concentration is substantially above 10 ppm (as active oxygen) since explosive decomposition may occur.</li> </ul> <ul style="list-style-type: none"> <li>▶ Avoid reaction with oxidising agents</li> </ul>

## SECTION 8 EXPOSURE CONTROLS / PERSONAL PROTECTION

### Control parameters

#### OCCUPATIONAL EXPOSURE LIMITS (OEL)

#### INGREDIENT DATA

Source	Ingredient	Material name	TWA	STEL	Peak	Notes
US ACGIH Threshold Limit Values (TLV)	alpha-pinene	Turpentine and selected monoterpenes	20 ppm	Not Available	Not Available	TLV® Basis: Lung irr
US ACGIH Threshold Limit Values (TLV)	3-carene	Turpentine and selected monoterpenes	20 ppm	Not Available	Not Available	TLV® Basis: Lung irr
US ACGIH Threshold Limit Values (TLV)	beta pinene	Turpentine and selected monoterpenes	20 ppm	Not Available	Not Available	TLV® Basis: Lung irr

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**EMERGENCY LIMITS**

Ingredient	Material name	TEEL-1	TEEL-2	TEEL-3
d-limonene	Limonene, d-	15 ppm	67 ppm	170 ppm

Ingredient	Original IDLH	Revised IDLH
alpha-pinene	Not Available	Not Available
alpha-humulene	Not Available	Not Available
beta-caryophyllene oxide	Not Available	Not Available
3-carene	Not Available	Not Available
d-limonene	Not Available	Not Available
linalool	Not Available	Not Available
myrcene	Not Available	Not Available
terpinolene	Not Available	Not Available
beta pinene	Not Available	Not Available
beta-caryophyllene	Not Available	Not Available
gamma-terpinene	Not Available	Not Available

**MATERIAL DATA**

Fragrance substance with is an established contact allergen in humans.

Scientific Committee on Consumer Safety SCCS OPINION on Fragrance allergens in cosmetic products 2012

for d-Limonene:


CEL TWA: 30 ppm, 165.6 mg/m<sup>3</sup> (compare WEEL-TWA\*)

(CEL = Chemwatch Exposure Limit)

A Workplace Environmental Exposure Level\* has been established by AIHA (American Industrial Hygiene Association) who have produced the following rationale:

d-Limonene is not acutely toxic. In its pure form it is not a sensitiser but is irritating to the skin. Although there is clear evidence of carcinogenicity in male rats, the effect has been attributed to an alpha-2u-globin (a2u-G) renal toxicity which is both species and gender specific. Humans do not synthesise a2u-G, and metabolism studies indicate that 75% to 95% of d-limonene is excreted in 2-3 days with different metabolites identified between humans and rats.

**Exposure controls**

<b>Appropriate engineering controls</b>	<p><b>Care:</b> Atmospheres in bulk storages and even apparently empty tanks may be hazardous by oxygen depletion. Atmosphere must be checked before entry.</p> <p>Requirements of State Authorities concerning conditions for tank entry must be met. Particularly with regard to training of crews for tank entry; work permits; sampling of atmosphere; provision of rescue harness and protective gear as needed</p> <p>Engineering controls are used to remove a hazard or place a barrier between the worker and the hazard. Well-designed engineering controls can be highly effective in protecting workers and will typically be independent of worker interactions to provide this high level of protection.</p> <p>The basic types of engineering controls are:</p> <p>Process controls which involve changing the way a job activity or process is done to reduce the risk.</p> <p>Enclosure and/or isolation of emission source which keeps a selected hazard "physically" away from the worker and ventilation that strategically "adds" and "removes" air in the work environment.</p>
<b>Personal protection</b>	
<b>Eye and face protection</b>	<ul style="list-style-type: none"> <li>▶ Safety glasses with side shields.</li> <li>▶ Chemical goggles.</li> <li>▶ Contact lenses may pose a special hazard; soft contact lenses may absorb and concentrate irritants. A written policy document, describing the wearing of lenses or restrictions on use, should be created for each workplace or task.</li> </ul>
<b>Skin protection</b>	See Hand protection below
<b>Hands/feet protection</b>	<ul style="list-style-type: none"> <li>▶ Wear chemical protective gloves, e.g. PVC.</li> <li>▶ Wear safety footwear or safety gumboots, e.g. Rubber</li> </ul> <p><b>NOTE:</b></p> <ul style="list-style-type: none"> <li>▶ The material may produce skin sensitisation in predisposed individuals. Care must be taken, when removing gloves and other protective equipment, to avoid all possible skin contact.</li> <li>▶ Contaminated leather items, such as shoes, belts and watch-bands should be removed and destroyed.</li> </ul> <p>Personal hygiene is a key element of effective hand care.</p>
<b>Body protection</b>	See Other protection below

<b>Other protection</b>	<ul style="list-style-type: none"> <li>▶ Overalls.</li> <li>▶ PVC Apron.</li> <li>▶ PVC protective suit may be required if exposure severe.</li> <li>▶ Eyewash unit.</li> </ul> <p>Some plastic personal protective equipment (PPE) (e.g. gloves, aprons, overshoes) are not recommended as they may produce static electricity.</p> <p>For large scale or continuous use wear tight-weave non-static clothing (no metallic fasteners, cuffs or pockets).</p> <p>Non sparking safety or conductive footwear should be considered. Conductive footwear describes a boot or shoe with a sole made from a conductive compound chemically bound to the bottom components, for permanent control to electrically ground the foot and shall dissipate static electricity from the body to reduce the possibility of ignition of volatile compounds.</p>
<b>Thermal hazards</b>	Not Available

## Recommended material(s)

### GLOVE SELECTION INDEX

Glove selection is based on a modified presentation of the:

**"Forsberg Clothing Performance Index".**

The effect(s) of the following substance(s) are taken into account in the **computer-generated** selection:

FWT-XJ1 N&A XJ-13 Terpenes

Material	CPI
NITRILE	A
PVA	A
VITON	A

\* CPI - Chemwatch Performance Index

A: Best Selection

B: Satisfactory; may degrade after 4 hours continuous immersion

C: Poor to Dangerous Choice for other than short term immersion

**NOTE:** As a series of factors will influence the actual performance of the glove, a final selection must be based on detailed observation. -

\* Where the glove is to be used on a short term, casual or infrequent basis, factors such as "feel" or convenience (e.g. disposability), may dictate a choice of gloves which might otherwise be unsuitable following long-term or frequent use. A qualified practitioner should be consulted.

## Respiratory protection

**Cartridge respirators should never be used for emergency ingress or in areas of unknown vapour concentrations or oxygen content. The wearer must be warned to leave the contaminated area immediately on detecting any odours through the respirator. The odour may indicate that the mask is not functioning properly, that the vapour concentration is too high, or that the mask is not properly fitted. Because of these limitations, only restricted use of cartridge respirators is considered appropriate.**

## SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES

### Information on basic physical and chemical properties

<b>Appearance</b>	Colourless		
<b>Physical state</b>	Liquid	<b>Relative density (Water = 1)</b>	0.87
<b>Odour</b>	Characteristic	<b>Partition coefficient n-octanol / water</b>	Not Available
<b>Odour threshold</b>	Not Available	<b>Auto-ignition temperature (°C)</b>	Not Available
<b>pH (as supplied)</b>	Not Available	<b>Decomposition temperature</b>	Not Available
<b>Melting point / freezing point (°C)</b>	Not Available	<b>Viscosity (cSt)</b>	Not Available
<b>Initial boiling point and boiling range (°C)</b>	Not Available	<b>Molecular weight (g/mol)</b>	Not Available
<b>Flash point (°C)</b>	60.4	<b>Taste</b>	Terpenes
<b>Evaporation rate</b>	Not Available	<b>Explosive properties</b>	Not Available
<b>Flammability</b>	Combustible.	<b>Oxidising properties</b>	Not Available
<b>Upper Explosive Limit (%)</b>	Not Available	<b>Surface Tension (dyn/cm or mN/m)</b>	Not Available
<b>Lower Explosive Limit (%)</b>	Not Available	<b>Volatile Component (%vol)</b>	Not Available
<b>Vapour pressure (kPa)</b>	Not Available	<b>Gas group</b>	Not Available



<b>Solubility in water (g/L)</b>	Miscible	<b>pH as a solution (1%)</b>	Not Available
<b>Vapour density (Air = 1)</b>	Not Available	<b>VOC g/L</b>	Not Available

## SECTION 10 STABILITY AND REACTIVITY

<b>Reactivity</b>	See section 7
<b>Chemical stability</b>	<ul style="list-style-type: none"> <li>▶ Unstable in the presence of incompatible materials.</li> <li>▶ Product is considered stable.</li> <li>▶ Hazardous polymerisation will not occur.</li> </ul>
<b>Possibility of hazardous reactions</b>	See section 7
<b>Conditions to avoid</b>	See section 7
<b>Incompatible materials</b>	See section 7
<b>Hazardous decomposition products</b>	See section 5

## SECTION 11 TOXICOLOGICAL INFORMATION

### Information on toxicological effects

<b>Inhaled</b>	<p>Evidence shows, or practical experience predicts, that the material produces irritation of the respiratory system, in a substantial number of individuals, following inhalation. In contrast to most organs, the lung is able to respond to a chemical insult by first removing or neutralising the irritant and then repairing the damage. The repair process, which initially evolved to protect mammalian lungs from foreign matter and antigens, may however, produce further lung damage resulting in the impairment of gas exchange, the primary function of the lungs. Respiratory tract irritation often results in an inflammatory response involving the recruitment and activation of many cell types, mainly derived from the vascular system.</p> <p>Inhalation of vapours may cause drowsiness and dizziness. This may be accompanied by narcosis, reduced alertness, loss of reflexes, lack of coordination and vertigo.</p> <p>Inhalation of vapours or aerosols (mists, fumes), generated by the material during the course of normal handling, may be damaging to the health of the individual.</p> <p>Inhalation hazard is increased at higher temperatures.</p> <p>Acute effects from inhalation of high concentrations of vapour are pulmonary irritation, including coughing, with nausea; central nervous system depression - characterised by headache and dizziness, increased reaction time, fatigue and loss of co-ordination</p> <p>Central nervous system (CNS) depression may include nonspecific discomfort, symptoms of giddiness, headache, dizziness, nausea, anaesthetic effects, slowed reaction time, slurred speech and may progress to unconsciousness.</p> <p>Serious poisonings may result in respiratory depression and may be fatal.</p> <p>Inhalation of essential oil volatiles may produce dizziness, rapid, shallow breathing, tachycardia, bronchial irritation and unconsciousness or convulsions. Complications include anuria, pulmonary oedema and bronchial pneumonia.</p>
<b>Ingestion</b>	<p>Swallowing of the liquid may cause aspiration of vomit into the lungs with the risk of haemorrhaging, pulmonary oedema, progressing to chemical pneumonitis; serious consequences may result.</p> <p>Signs and symptoms of chemical (aspiration) pneumonitis may include coughing, gasping, choking, burning of the mouth, difficult breathing, and bluish coloured skin (cyanosis).</p> <p>Accidental ingestion of the material may be damaging to the health of the individual.</p> <p>Terpenes and their oxygen-containing counterparts, the terpenoids, produce a variety of physiological effects. Pine oil monoterpenes, for example, produce a haemorrhagic gastritis characterised by stomach pain and bleeding and vomiting.</p> <p>Systemic effects of pine oils include weakness and central nervous depression, excitement, loss of balance, headache, with hypothermia and respiratory failure.</p> <p>Taken internally the essential oils exert a mild irritant effect on the mucous membranes of the mouth and digestive tract which induces a feeling of warmth and increases salivation.</p> <p>Taken by mouth, many essential oils can be dangerous in high concentrations. Typical effects begin with a burning feeling, followed by salivation. In the stomach, the effect is carminative (relieve flatulence), relaxing the gastric sphincter and encouraging eructation (belching).</p>
<b>Skin Contact</b>	<p>Evidence exists, or practical experience predicts, that the material either produces inflammation of the skin in a substantial number of individuals following direct contact, and/or produces significant inflammation when applied to the healthy intact skin of animals, for up to four hours, such inflammation being present twenty-four hours or more after the end of the exposure period. Skin irritation may also be present after prolonged or repeated exposure; this may result in a form of contact dermatitis (nonallergic). The dermatitis is often characterised by skin redness (erythema) and swelling (oedema) which may progress to blistering (vesiculation), scaling and thickening of the epidermis. At the microscopic level there may be intercellular oedema of the spongy layer of the skin (spongiosis) and intracellular oedema of the epidermis.</p> <p>The material may accentuate any pre-existing dermatitis condition</p> <p>Skin contact with the material may damage the health of the individual; systemic effects may result following absorption.</p> <p>Many essential oils affect the skin and mucous membranes in ways that are valuable or harmful. When applied to intact skin essential oils have an irritant and rubefacient action (i.e cause redness of the skin by causing dilation of the capillaries and an increase in blood circulation), causing first a sensation of warmth and smarting followed by mild local anesthesia. They have been used as counter-irritants and cutaneous stimulants in the treatment of chronic inflammatory</p>

	<p>conditions and to relieve neuralgia and rheumatic pain. Care should be taken to avoid blistering.</p> <p>It is likely that older pine oils become irritants from the build up of peroxides of delta- 3-carene and limonene etc.</p> <p>Open cuts, abraded or irritated skin should not be exposed to this material</p> <p>Entry into the blood-stream through, for example, cuts, abrasions, puncture wounds or lesions, may produce systemic injury with harmful effects. Examine the skin prior to the use of the material and ensure that any external damage is suitably protected.</p>
<b>Eye</b>	<p>Evidence exists, or practical experience predicts, that the material may cause eye irritation in a substantial number of individuals and/or may produce significant ocular lesions which are present twenty-four hours or more after instillation into the eye(s) of experimental animals.</p> <p>Repeated or prolonged eye contact may cause inflammation characterised by temporary redness (similar to windburn) of the conjunctiva (conjunctivitis); temporary impairment of vision and/or other transient eye damage/ulceration may occur.</p>
<b>Chronic</b>	<p>Long-term exposure to respiratory irritants may result in disease of the airways involving difficult breathing and related systemic problems.</p> <p>Practical experience shows that skin contact with the material is capable either of inducing a sensitisation reaction in a substantial number of individuals, and/or of producing a positive response in experimental animals.</p> <p>On the basis, primarily, of animal experiments, concern has been expressed by at least one classification body that the material may produce carcinogenic or mutagenic effects; in respect of the available information, however, there presently exists inadequate data for making a satisfactory assessment.</p> <p>Limited evidence suggests that repeated or long-term occupational exposure may produce cumulative health effects involving organs or biochemical systems.</p> <p>In the presence of air, a number of common flavour and fragrance chemicals can form peroxides surprisingly fast. Antioxidants can in most cases minimise the oxidation.</p> <p>Fragrance terpenes are generally easily oxidised in air. Non-oxidised limonene, linalool and caryophyllene turned out to be very weak sensitizers, however after oxidation limonene hydroperoxide and linalool hydroperoxide are strong sensitizers. Some oxidised terpenoids as well as some aged essential oils have revealed skin-sensitising capacities, leading to a hypersensitivity reaction synonymous to allergic contact dermatitis. The allergenic potency in some flavouring could be mainly attributed to terpenoid hydroperoxides intermediately built-up upon autooxidation, while their non-oxidised counterparts as well as most degradation products were proven to be not or only barely irritating</p> <p>Essential oils and isolates derived from the Pinacea family, including Pinus and Abies genera, should only be used when the level of peroxides is kept to the lowest practicable level, for instance by adding antioxidants at the time of production. Such products should have a peroxide value of less than 10 millimoles peroxide per liter. Based on the published literature mentioning sensitising properties when containing peroxides (Food and Chemical Toxicology 11,1053(1973); 16,843(1978); 16,853(1978).</p> <p>Hydroperoxides of d-limonene are potent contact allergens when studied in guinea pigs. They may result when d-limonene is unstabilised against oxidation, or upon prolonged standing at room temperature and/ or upon exposure to light, or when stabiliser levels diminish. The two major hydroperoxides in auto-oxidised d-limonene, are cis- and trans- limonene-2-hydroperoxide (2-hydroperoxy-p-mentha-6,8-diene). In photo-oxidised d-limonene, they represent a minor fraction. Chemicals containing epoxy groups are of concern for cancer effects, though the concern is lower for epoxy groups with di-substituted carbons (US EPA 1994)</p> <p>The epoxide group is an alkylating agent and thus may produce damage to nucleotides found within the cell; such damage is potentially tumourigenic. Alkylating agents may damage the stem cell which acts as the precursor to components of the blood. Loss of the stem cell may result in pancytopenia (a reduction in the number of red and white blood cells and platelets) with a latency period corresponding to the lifetime of the individual blood cells. Granulocytopenia (a reduction in granular leukocytes) develops within days and thrombocytopenia (a disorder involving platelets), within 1-2 weeks, whilst loss of erythrocytes (red blood cells) needs months to become clinically manifest.</p>

<b>FWT-XJ1 N&amp;A XJ-13 Terpenes</b>	<b>TOXICITY</b>	<b>IRRITATION</b>
	Not Available	Not Available
<b>alpha-pinene</b>	<b>TOXICITY</b>	<b>IRRITATION</b>
	Dermal (rabbit) LD50: >5000 mg/kg <sup>[2]</sup>	Skin (man): 100% - SEVERE
	Oral (rat) LD50: 3700 mg/kg <sup>[2]</sup>	Skin (rabbit): 500 mg/24h - mod
<b>alpha-humulene</b>	<b>TOXICITY</b>	<b>IRRITATION</b>
	Not Available	Not Available
<b>beta-caryophyllene oxide</b>	<b>TOXICITY</b>	<b>IRRITATION</b>
	Dermal (rabbit) LD50: >2000 mg/kg <sup>[2]</sup>	Skin (rabbit): 500 mg/24 mod
	Oral (rat) LD50: >5000 mg/kg <sup>[2]</sup>	Skin : Moderate

<b>3-carene</b>	<b>TOXICITY</b>	<b>IRRITATION</b>
	Oral (rat) LD50: 4800 mg/kg <sup>[2]</sup>	Skin (rabbit): 500 mg/24h
<b>d-limonene</b>	<b>TOXICITY</b>	<b>IRRITATION</b>
	Dermal (rabbit) LD50: >5000 mg/kg <sup>[2]</sup>	Skin (rabbit): 500mg/24h moderate
	Oral (rat) LD50: >2000 mg/kg <sup>[1]</sup>	
<b>linalool</b>	<b>TOXICITY</b>	<b>IRRITATION</b>
	dermal (rat) LD50: 5610 mg/kg <sup>[2]</sup>	Skin (guinea pig):100mg/24h-mild
	Oral (rat) LD50: 2790 mg/kg <sup>[2]</sup>	Skin (man): 16 mg/48h-mild
		Skin (rabbit): 100 mg/24h-SEVERE
		Skin (rabbit): 500 mg/24h - mild
<b>myrcene</b>	<b>TOXICITY</b>	<b>IRRITATION</b>
	Dermal (rabbit) LD50: >5000 mg/kg <sup>[2]</sup>	Skin (rabbit): 500 mg/24h - mod
	Oral (rat) LD50: >5000 mg/kg <sup>[2]</sup>	
<b>terpinolene</b>	<b>TOXICITY</b>	<b>IRRITATION</b>
	Oral (rat) LD50: 4390 mg/kg <sup>[2]</sup>	Not Available
<b>beta pinene</b>	<b>TOXICITY</b>	<b>IRRITATION</b>
	Oral (rat) LD50: 4700 mg/kg <sup>[2]</sup>	Not Available
<b>beta-caryophyllene</b>	<b>TOXICITY</b>	<b>IRRITATION</b>
	Not Available	Skin (rabbit): 500 mg/24 h
<b>gamma-terpinene</b>	<b>TOXICITY</b>	<b>IRRITATION</b>
	Oral (rat) LD50: 3650 mg/kg <sup>[2]</sup>	Skin (rabbit): 500 mg/24h mod.
<b>Legend:</b>	1. Value obtained from Europe ECHA Registered Substances - Acute toxicity 2.* Value obtained from manufacturer's SDS. Unless otherwise specified data extracted from RTECS - Register of Toxic Effect of chemical Substances	

<b>ALPHA-HUMULENE</b>	No significant acute toxicological data identified in literature search.
<b>D-LIMONENE</b>	<p>d-Limonene is readily absorbed by inhalation and ingestion. Dermal absorption is reported to be lower than by the inhalation route. d-Limonene is rapidly distributed to different tissues in the body, readily metabolised and eliminated primarily through the urine.</p> <p>Limonene exhibits low acute toxicity by all three routes in animals.</p> <p>The substance is classified by IARC as Group 3:  <b>NOT</b> classifiable as to its carcinogenicity to humans.  Evidence of carcinogenicity may be inadequate or limited in animal testing.  Tumorigenic by RTECS criteria</p>
<b>LINALOOL</b>	<p>For linalool:</p> <p>Linalool gradually breaks down when in contact with oxygen, forming an oxidized by-product that may cause allergic reactions such as eczema in susceptible individuals. Between 5 and 7% of patients undergoing patch testing in Sweden were found to be allergic to the oxidized form of linalool.[</p> <p>Linalool has an acute oral mammalian LD50 close to 3,000 mg/kg bw; the acute dermal toxicity is ~ 2,000 mg/kg bw. After inhalation exposure of mice and man, slight sedative effects were observed; however a dose response characteristic could not be determined. Linalool is irritating to the skin, based on animal studies, and is a mild irritant from human experience.</p> <p>Opinion holds that there are no safety concerns for linalool and the linalyl esters, as fragrance ingredients, under the present declared levels of use and exposure for the following reasons:</p> <ul style="list-style-type: none"> <li>• Linalool and the linalyl esters have a low order of acute toxicity.</li> <li>• No significant toxicity was observed in subchronic tests; it is concluded that these materials have dermal and oral NOAELS of 50 mg/kg/day or greater.</li> <li>• Based on a critical review of all available mutagenicity and genotoxicity studies, it has been determined</li> </ul>

that these materials are negative in short-term tests and therefore would have no significant potential to produce genotoxic effects.

- The metabolic fate of linalool and the linalyl esters is either known or assumed from analogies with structurally related substances that indicate no production of toxic or persistent metabolites and the structural analogies indicate no concern.

A member or analogue of a group of aliphatic and alicyclic terpenoid tertiary alcohols and structurally related substances generally regarded as safe (GRAS based, in part, on their self-limiting properties as flavouring substances in food; their rapid absorption, metabolic conversion, and excretion in humans and experimental animals; their low level of flavour use; the wide margins of safety between the conservative estimates of intake and the no-observed-adverse effect levels (NOAEL) determined from subchronic and chronic studies and the lack of genotoxic and mutagenic potential. This evidence of safety is supported by the fact that the intake of aliphatic acyclic and alicyclic terpenoid tertiary alcohols and structurally related substances as natural components of traditional foods is greater than their intake as intentionally added flavoring substances.

Oral median lethal dose (LD50) values have been reported for 24 of the 43 substances in this group. LD50 values range from 1300 to greater than 36300 mg/kg bw, demonstrating that the oral acute toxicity of tertiary alcohols and related esters is extremely low.

With few exceptions \* (see below) there are no safety concerns regarding certain cyclic and non-cyclic terpene alcohols \*\*, as fragrance ingredients, under the present declared levels of use and exposure for the following reasons

- The non-cyclic and cyclic terpene alcohols have a low order of acute toxicity
- No significant toxicity was observed in repeated dose toxicity tests; it is concluded that these materials have dermal and oral NOAELs of 50 mg/kg body weight/day or greater.
- These materials were inactive in mutagenicity and genotoxicity tests.
- Based on data on metabolism it is concluded that members of this category exhibit similar chemical and biochemical fate.
- Although there is some indication for the production of reactive metabolites by some materials, these metabolites appear to be efficiently detoxicated and not expected to result in overt toxicity.

For terpenoid tertiary alcohols and their related esters:

Substances assigned to this category, as part of the HPV Challenge Program, possess close structural relationships, similar physicochemical properties and participate in the same pathways of metabolic detoxification and have similar toxicologic potential.

**Acute Toxicity:** Oral and dermal LD50 values for members of this chemical category indicate a low order of both oral and dermal toxicity. All rabbit dermal, and mouse and rat oral LD50 values exceed 2000 mg/kg with the majority of values greater than 5000 mg/kg

**Repeat dose toxicity:** In a safety evaluation study, a 50/50 mixture of linalool and citronellol was fed to male and female rats (number and strain not specified) in the diet. The daily intake was calculated to be 50 mg/kg bw of each. Current opinion holds that there are no safety concerns regarding the branched chain unsaturated non-cyclic alcohols, as fragrance ingredients, under the present declared levels of use and exposure; use of these materials at higher maximum dermal levels or higher systemic exposure levels requires re-evaluation. This opinion was based on the following reasons:

- No evidence or only minimal evidence of skin irritation in humans was associated with current levels of use at 2–30% for individual compounds considered.
- Sensitizing hydroperoxides may be formed by contact with air. It should be ensured that oxidation reactions are prevented in the end product.

For alkyl alcohols C6-13:

This group of products are very similar in terms of physicochemical and toxicological properties. Interpolation of data can be used to assess the alkyl alcohols for which data is not available.

**Acute toxicity:** All of these alcohols have a low order of toxicity in rats via the oral route. The LD50 for C6-branched and linear alcohols were >3700 mg/kg; LD50s for the C6-8, C7-9, C8-10, C9-11 and C11-14 branched alkyl alcohols were all >2000 mg/kg.

<b>MYRCENE</b>	NOTE: beta-Myrcene above 0.25 g/kg was found to be detrimental to the fertility and progeny number and development in the rat when given during pregnancy by gavage
<b>TERPINOLENE</b>	petrolatum for 48 hours under a closed patch in 24 volunteers, and it was not a sensitiser in the maximization test. However, in a case report and was reported that a 49-year old woman developed eczematous lesions of the hands and forearms using a machine cleaner containing terpinolene. Upon patch testing, terpinolene gave a positive reaction. Terpinolene was not irritating in rabbits when applied to intact or abraded skin with an occluded patch for 24 hours
<b>ALPHA-PINENE &amp; ALPHA-HUMULENE &amp; 3-CARENE &amp; D-LIMONENE &amp; LINALOOL &amp; MYRCENE &amp; TERPINOLENE &amp; beta pinene &amp; BETA-CARYOPHYLLENE &amp; GAMMA-TERPINENE</b>	The following information refers to contact allergens as a group and may not be specific to this product. Contact allergies quickly manifest themselves as contact eczema, more rarely as urticaria or Quincke's oedema. The pathogenesis of contact eczema involves a cell-mediated (T lymphocytes) immune reaction of the delayed type. Other allergic skin reactions, e.g. contact urticaria, involve antibody-mediated immune reactions.
<b>ALPHA-PINENE &amp; ALPHA-HUMULENE &amp; BETA-CARYOPHYLLENE OXIDE &amp; MYRCENE &amp; TERPINOLENE &amp; beta pinene &amp; GAMMA-TERPINENE</b>	Asthma-like symptoms may continue for months or even years after exposure to the material ceases. This may be due to a non-allergenic condition known as reactive airways dysfunction syndrome (RADS) which can occur following exposure to high levels of highly irritating compound. Key criteria for the diagnosis of RADS include the absence of preceding respiratory disease, in a non-atopic individual, with abrupt onset of persistent asthma-like symptoms within minutes to hours of a documented exposure to the irritant. A reversible airflow pattern, on spirometry, with the presence of moderate to severe bronchial hyperreactivity on methacholine challenge testing and the lack of minimal lymphocytic inflammation,

	without eosinophilia, have also been included in the criteria for diagnosis of RADS.
<b>ALPHA-PINENE &amp; D-LIMONENE &amp; LINALOOL &amp; MYRCENE &amp; TERPINOLENE &amp; BETA-CARYOPHYLLENE</b>	Adverse reactions to fragrances in perfumes and in fragranced cosmetic products include allergic contact dermatitis, irritant contact dermatitis, photosensitivity, immediate contact reactions (contact urticaria), and pigmented contact dermatitis. Airborne and connubial contact dermatitis occur. Intolerance to perfumes, by inhalation, may occur if the perfume contains a sensitising principal. Symptoms may vary from general illness, coughing, phlegm, wheezing, chest-tightness, headache, exertional dyspnoea, acute respiratory illness, hayfever, and other respiratory diseases (including asthma).
<b>ALPHA-PINENE &amp; D-LIMONENE &amp; LINALOOL &amp; MYRCENE &amp; TERPINOLENE &amp; BETA-CARYOPHYLLENE</b>	Fragrance allergens act as haptens, i.e. low molecular weight chemicals that are immunogenic only when attached to a carrier protein. However, not all sensitising fragrance chemicals are directly reactive, but require previous activation. A <b>prehapten</b> is a chemical that itself is non- or low-sensitising, but that is transformed into a hapten outside the skin by simple chemical transformation (air oxidation, photoactivation) and without the requirement of specific enzymatic systems. In the case of prehapten, it is possible to prevent activation outside the body to a certain extent by different measures, e.g. prevention of air exposure during handling and storage of the ingredients and the final product, and by the addition of suitable antioxidants.
<b>ALPHA-PINENE &amp; LINALOOL</b>	The material may produce severe skin irritation after prolonged or repeated exposure, and may produce a contact dermatitis (nonallergic). This form of dermatitis is often characterised by skin redness (erythema) thickening of the epidermis. Histologically there may be intercellular oedema of the spongy layer (spongiosis) and intracellular oedema of the epidermis. Prolonged contact is unlikely, given the severity of response, but repeated exposures may produce severe ulceration.
<b>ALPHA-PINENE &amp; beta pinene</b>	For bicyclic terpenes: <b>Acute toxicity:</b> The literature abounds with clinical reports of accidental and intentional acute poisoning with pinene-based turpentine. Rat oral LD50 values are available for <i>alpha</i> -pinene, <i>beta</i> -pinene, camphene and turpentine oil and indicate these materials to be very low in oral acute toxicity with LD50 values in the range from 3388 mg/kg to greater than 5000 mg/kg. Rabbit dermal LD50 values similarly indicate very low toxicities with values greater than the limit doses of 2000 or 5000 mg/kg. Acute inhalation toxicity has been measure in different animal species.
<b>ALPHA-PINENE &amp; 3-CARENE &amp; D-LIMONENE &amp; MYRCENE &amp; TERPINOLENE &amp; BETA-CARYOPHYLLENE &amp; GAMMA-TERPINENE</b>	Monomethyltin chloride, thioglycolate esters, and tall oil ester reaction product: Monomethyltin trichloride (MMTC, CAS RN: 993-16-8), monomethyltin tris[2-ethylhexylmercaptoacetate (MMT (EHTG); MMT (2-EHMA), CAS RN: 57583-34-3), monomethyltin tris[isooctylmercaptoacetate (MMT(IOTG), CAS RN: 54849-38-6) and methyltin reverse ester tallate reaction product (TERP, CAS RNs: 201687-58-3, 201687-57-2, 68442-12-6, 151436-98-5) are considered one category of compounds for mammalian studies via the oral route. The justification for this category is based on structural similarities and the demonstrated rapid conversion of all of the esters to the MMTC when placed in simulated mammalian gastric contents [0.07M HCl] under physiological conditions. For the MMT(EHTG) >90% conversion to MMTC occurred within 0.5 hours. For TERP, 68% of the monomethyltin portion of the compound was converted to MMTC within 1 hour.
<b>BETA-CARYOPHYLLENE OXIDE &amp; MYRCENE &amp; GAMMA-TERPINENE</b>	The material may cause skin irritation after prolonged or repeated exposure and may produce a contact dermatitis (nonallergic). This form of dermatitis is often characterised by skin redness (erythema) and swelling the epidermis. Histologically there may be intercellular oedema of the spongy layer (spongiosis) and intracellular oedema of the epidermis.
<b>LINALOOL &amp; MYRCENE &amp; TERPINOLENE &amp; GAMMA-TERPINENE</b>	For monoterpenes: The chemical category designated terpenoid hydrocarbons includes three simple C10 isomeric monocyclic terpene hydrocarbons ( <i>d</i> -limonene, <i>d</i> -limonene, and terpinolene) two simple C10 acyclic terpene hydrocarbons ( <i>beta</i> -myrcene and dihydromyrcene) and mixtures composed primarily of <i>d</i> -limonene, <i>d</i> -limonene (dipentene), terpinolene, myrcene, and <i>alpha</i> and <i>beta</i> -pinene Monoterpene hydrocarbons are mainly released by coniferous woodland such as pine trees, cedars, redwood and firs. To a lesser extent, they are also produced and released by deciduous plants. They are common components of traditional foods occurring in essentially all fruits and vegetables. Members of this chemical category are of very low acute toxicity Studies of terpene hydrocarbons indicate that they are rapidly absorbed, distributed, metabolised and excreted.

<b>Acute Toxicity</b>	⊘	<b>Carcinogenicity</b>	⊘
<b>Skin Irritation/Corrosion</b>	✓	<b>Reproductivity</b>	⊘
<b>Serious Eye Damage/Irritation</b>	✓	<b>STOT - Single Exposure</b>	✓
<b>Respiratory or Skin sensitisation</b>	✓	<b>STOT - Repeated Exposure</b>	⊘
<b>Mutagenicity</b>	⊘	<b>Aspiration Hazard</b>	✓

**Legend:** ✗ – Data available but does not fill the criteria for classification  
 ✓ – Data available to make classification  
 ⊘ – Data Not Available to make classification

## SECTION 12 ECOLOGICAL INFORMATION

### Toxicity

Continued...

## FWT-XJ1 N&amp;A XJ-13 Terpenes

FWT-XJ1 N&A XJ-13 Terpenes	ENDPOINT	TEST DURATION (HR)	SPECIES	VALUE	SOURCE
		Not Available	Not Available	Not Available	Not Available
alpha-pinene	ENDPOINT	TEST DURATION (HR)	SPECIES	VALUE	SOURCE
	LC50	96	Fish	0.28mg/L	2
	NOEC	96	Crustacea	=0.18mg/L	1
alpha-humulene	ENDPOINT	TEST DURATION (HR)	SPECIES	VALUE	SOURCE
	Not Available	Not Available	Not Available	Not Available	Not Available
beta-caryophyllene oxide	ENDPOINT	TEST DURATION (HR)	SPECIES	VALUE	SOURCE
	Not Available	Not Available	Not Available	Not Available	Not Available
3-carene	ENDPOINT	TEST DURATION (HR)	SPECIES	VALUE	SOURCE
	Not Available	Not Available	Not Available	Not Available	Not Available
d-limonene	ENDPOINT	TEST DURATION (HR)	SPECIES	VALUE	SOURCE
	LC50	96	Fish	0.702mg/L	2
	EC50	48	Crustacea	0.421mg/L	2
	EC50	72	Algae or other aquatic plants	ca.8mg/L	2
	NOEC	72	Algae or other aquatic plants	2.62mg/L	2
linalool	ENDPOINT	TEST DURATION (HR)	SPECIES	VALUE	SOURCE
	LC50	96	Fish	<19.9mg/L	1
	EC50	48	Crustacea	=20mg/L	1
	EC50	96	Algae or other aquatic plants	=88.3mg/L	1
	NOEC	96	Fish	<3.5mg/L	1
myrcene	ENDPOINT	TEST DURATION (HR)	SPECIES	VALUE	SOURCE
	Not Available	Not Available	Not Available	Not Available	Not Available
terpinolene	ENDPOINT	TEST DURATION (HR)	SPECIES	VALUE	SOURCE
	LC50	96	Fish	0.805mg/L	2
	EC50	48	Crustacea	0.634mg/L	2
	EC50	72	Algae or other aquatic plants	0.302mg/L	2
beta pinene	ENDPOINT	TEST DURATION (HR)	SPECIES	VALUE	SOURCE
	LC50	96	Fish	0.502mg/L	2
	EC50	48	Crustacea	1.248mg/L	2
	NOEC	1440	Fish	0.058mg/L	4
beta-caryophyllene	ENDPOINT	TEST DURATION (HR)	SPECIES	VALUE	SOURCE
	Not Available	Not Available	Not Available	Not Available	Not Available
gamma-terpinene	ENDPOINT	TEST DURATION (HR)	SPECIES	VALUE	SOURCE
	Not Available	Not Available	Not Available	Not Available	Not Available

**Legend:**

Extracted from 1. IUCLID Toxicity Data 2. Europe ECHA Registered Substances - Ecotoxicological Information - Aquatic Toxicity 3. EPIWIN Suite V3.12 (QSAR) - Aquatic Toxicity Data (Estimated) 4. US EPA, Ecotox database - Aquatic Toxicity Data 5. ECETOC Aquatic Hazard Assessment Data 6. NITE (Japan) - Bioconcentration Data 7. METI (Japan) -

*Bioconcentration Data 8. Vendor Data*

Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

Do NOT allow product to come in contact with surface waters or to intertidal areas below the mean high water mark. Do not contaminate water when cleaning equipment or disposing of equipment wash-waters.

Wastes resulting from use of the product must be disposed of on site or at approved waste sites.

Significant environmental findings are limited. Oxiranes (including glycidyl ethers and alkyl oxides, and epoxides) exhibit common characteristics with respect to environmental fate and ecotoxicology. One such oxirane is ethyloxirane and data presented here may be taken as representative.

for 1,2-butylene oxide (ethyloxirane):

**Environmental fate:** Ethyloxirane is highly soluble in water and has a very low soil-adsorption coefficient, which suggests that if released to water, adsorption of ethyloxirane to sediment and suspended solids is not expected. Volatilisation of ethyloxirane from water surfaces would be expected based on the moderate estimated Henry's Law constant. If ethyloxirane is released to soil, it is expected to have low adsorption and thus very high mobility. Volatilisation from moist soil and dry soil surfaces is expected, based on its vapour pressure.

Monomethyltin chloride, thioglycolate esters, and tall oil ester reaction product

Monomethyltin trichloride (MMTC, CAS RN: 993-16-8), monomethyltin tris[2-ethylhexylmercaptoacetate (MMT (EHTG; MMT (2-EHMA)), CAS RN: 57583-34-3), monomethyltin tris[isooctylmercaptoacetate (MMT(IOTG), CAS RN: 54849-38-6), CAS RN: 57583-34-3) and methyltin reverse ester tallate reaction product (TERP, CAS RNs: 201687-58-3, 201687-57-2, 68442-12-6, 151436-98-5) are considered as a single category of compounds for the purpose of an environmental assessment.

MMT(IOTG), MMT(EHTG), and TERP are sparingly soluble in water (0.6-10.7 mg/L). In water, these monomethyltin compounds undergo rapid degradation by hydrolysis.

Substances containing unsaturated carbons are ubiquitous in indoor environments. They result from many sources (see below). Most are reactive with environmental ozone and many produce stable products which are thought to adversely affect human health. The potential for surfaces in an enclosed space to facilitate reactions should be considered.

Source of unsaturated substances    Unsaturated substances (Reactive Emissions)    Major Stable Products produced following reaction with ozone.  
For limonenes

**Atmospheric fate:** Due to the high volatility of limonene the atmosphere is expected to be the major environmental sink for this chemical where it is expected to undergo gas-phase reactions with photochemically produced hydroxyl radicals, ozone and nitrate radicals. Calculated lifetimes for the reaction of d-limonene with photochemically produced hydroxyl radicals range from 0.3-2 h based on experimentally determined rate constants. The oxidation of limonene may contribute to aerosol and photochemical smog formation.

Calculated lifetimes for the night-time reaction of d-limonene with nitrate radicals range from 0.9 to 9 minutes.

**DO NOT discharge into sewer or waterways.**

### Persistence and degradability

Ingredient	Persistence: Water/Soil	Persistence: Air
alpha-pinene	HIGH	HIGH
alpha-humulene	HIGH	HIGH
3-carene	HIGH	HIGH
d-limonene	HIGH	HIGH
linalool	HIGH	HIGH
myrcene	HIGH	HIGH
terpinolene	HIGH	HIGH
beta pinene	HIGH	HIGH
beta-caryophyllene	HIGH	HIGH
gamma-terpinene	HIGH	HIGH

### Bioaccumulative potential

Ingredient	Bioaccumulation
alpha-pinene	MEDIUM (LogKOW = 4.44)
alpha-humulene	HIGH (LogKOW = 6.9518)
3-carene	MEDIUM (LogKOW = 4.38)
d-limonene	HIGH (LogKOW = 4.8275)
linalool	LOW (LogKOW = 2.97)
myrcene	MEDIUM (LogKOW = 4.17)
terpinolene	MEDIUM (LogKOW = 4.47)
beta pinene	MEDIUM (LogKOW = 4.16)
beta-caryophyllene	HIGH (LogKOW = 6.3018)
gamma-terpinene	MEDIUM (LogKOW = 4.5)

### Mobility in soil

Ingredient	Mobility
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alpha-pinene	LOW (KOC = 1204)
alpha-humulene	LOW (KOC = 22020)
3-carene	LOW (KOC = 1204)
d-limonene	LOW (KOC = 1324)
linalool	LOW (KOC = 56.32)
myrcene	LOW (KOC = 1269)
terpinolene	LOW (KOC = 1324)
beta pinene	LOW (KOC = 1204)
beta-caryophyllene	LOW (KOC = 22290)
gamma-terpinene	LOW (KOC = 1324)



## SECTION 13 DISPOSAL CONSIDERATIONS

### Waste treatment methods

<b>Product / Packaging disposal</b>	<ul style="list-style-type: none"> <li>▶ Containers may still present a chemical hazard/ danger when empty.</li> <li>▶ Return to supplier for reuse/ recycling if possible.</li> </ul> <p>Otherwise:</p> <ul style="list-style-type: none"> <li>▶ If container can not be cleaned sufficiently well to ensure that residuals do not remain or if the container cannot be used to store the same product, then puncture containers, to prevent re-use, and bury at an authorised landfill.</li> <li>▶ Where possible retain label warnings and SDS and observe all notices pertaining to the product.</li> </ul> <p>Legislation addressing waste disposal requirements may differ by country, state and/ or territory. Each user must refer to laws operating in their area. In some areas, certain wastes must be tracked.</p> <p>A Hierarchy of Controls seems to be common - the user should investigate:</p> <ul style="list-style-type: none"> <li>▶ Reduction</li> <li>▶ Reuse</li> <li>▶ Recycling</li> <li>▶ Disposal (if all else fails)</li> </ul> <p>This material may be recycled if unused, or if it has not been contaminated so as to make it unsuitable for its intended use.</p> <ul style="list-style-type: none"> <li>▶ <b>DO NOT allow wash water from cleaning or process equipment to enter drains.</b></li> <li>▶ It may be necessary to collect all wash water for treatment before disposal.</li> <li>▶ In all cases disposal to sewer may be subject to local laws and regulations and these should be considered first.</li> <li>▶ Where in doubt contact the responsible authority.</li> <li>▶ Recycle wherever possible.</li> <li>▶ Consult manufacturer for recycling options or consult local or regional waste management authority for disposal if no suitable treatment or disposal facility can be identified.</li> <li>▶ Dispose of by: burial in a land-fill specifically licensed to accept chemical and / or pharmaceutical wastes or Incineration in a licensed apparatus (after admixture with suitable combustible material).</li> <li>▶ Decontaminate empty containers.</li> </ul>
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## SECTION 14 TRANSPORT INFORMATION

### Labels Required

	
Marine Pollutant	

### Land transport (DOT)

UN number	1197
UN proper shipping name	Extracts, flavoring, liquid
Transport hazard class(es)	Class 3
	Subrisk Not Applicable



<b>Packing group</b>	III	
<b>Environmental hazard</b>	Environmentally hazardous	
<b>Special precautions for user</b>	Hazard Label	3
	Special provisions	B1, IB3, T2, TP1

**Air transport (ICAO-IATA / DGR)**

<b>UN number</b>	1197	
<b>UN proper shipping name</b>	Extracts, flavouring, liquid	
<b>Transport hazard class(es)</b>	ICAO/IATA Class	3
	ICAO / IATA Subrisk	Not Applicable
	ERG Code	3L
<b>Packing group</b>	III	
<b>Environmental hazard</b>	Environmentally hazardous	
<b>Special precautions for user</b>	Special provisions	A3
	Cargo Only Packing Instructions	366
	Cargo Only Maximum Qty / Pack	220 L
	Passenger and Cargo Packing Instructions	355
	Passenger and Cargo Maximum Qty / Pack	60 L
	Passenger and Cargo Limited Quantity Packing Instructions	Y344
	Passenger and Cargo Limited Maximum Qty / Pack	10 L

**Sea transport (IMDG-Code / GGVSee)**

<b>UN number</b>	1197	
<b>UN proper shipping name</b>	EXTRACTS, FLAVOURING, LIQUID	
<b>Transport hazard class(es)</b>	IMDG Class	3
	IMDG Subrisk	Not Applicable
<b>Packing group</b>	III	
<b>Environmental hazard</b>	Marine Pollutant	
<b>Special precautions for user</b>	EMS Number	F-E , S-D
	Special provisions	223 955
	Limited Quantities	5 L

**Transport in bulk according to Annex II of MARPOL and the IBC code**

Not Applicable

**SECTION 15 REGULATORY INFORMATION****Safety, health and environmental regulations / legislation specific for the substance or mixture****ALPHA-PINENE(80-56-8) IS FOUND ON THE FOLLOWING REGULATORY LISTS**

US - Massachusetts - Right To Know Listed Chemicals

US - Pennsylvania - Hazardous Substance List

US ACGIH Threshold Limit Values (TLV)

US ACGIH Threshold Limit Values (TLV) - Carcinogens

US List of Active Substances Exempt from the TSCA Inventory Notifications (Active-Inactive) Rule

US Toxic Substances Control Act (TSCA) - Chemical Substance Inventory

US TSCA Chemical Substance Inventory - Interim List of Active Substances

**ALPHA-HUMULENE(6753-98-6) IS FOUND ON THE FOLLOWING REGULATORY LISTS**

Continued...

US List of Active Substances Exempt from the TSCA Inventory Notifications (Active-Inactive) Rule

US Toxic Substances Control Act (TSCA) - Chemical Substance Inventory

#### BETA-CARYOPHYLLENE OXIDE(1139-30-6) IS FOUND ON THE FOLLOWING REGULATORY LISTS

US List of Active Substances Exempt from the TSCA Inventory Notifications (Active-Inactive) Rule

US Toxic Substances Control Act (TSCA) - Chemical Substance Inventory

#### 3-CARENE(13466-78-9) IS FOUND ON THE FOLLOWING REGULATORY LISTS

US ACGIH Threshold Limit Values (TLV)

US ACGIH Threshold Limit Values (TLV) - Carcinogens

US List of Active Substances Exempt from the TSCA Inventory Notifications (Active-Inactive) Rule

US Toxic Substances Control Act (TSCA) - Chemical Substance Inventory

#### D-LIMONENE(5989-27-5) IS FOUND ON THE FOLLOWING REGULATORY LISTS

International Agency for Research on Cancer (IARC) - Agents Classified by the IARC Monographs

US AIHA Workplace Environmental Exposure Levels (WEELs)

US Spacecraft Maximum Allowable Concentrations (SMACs) for Airborne Contaminants

US Toxic Substances Control Act (TSCA) - Chemical Substance Inventory

US TSCA Chemical Substance Inventory - Interim List of Active Substances

#### LINALOOL(78-70-6) IS FOUND ON THE FOLLOWING REGULATORY LISTS

US List of Active Substances Exempt from the TSCA Inventory Notifications (Active-Inactive) Rule

US Toxic Substances Control Act (TSCA) - Chemical Substance Inventory

US TSCA Chemical Substance Inventory - Interim List of Active Substances

#### MYRCENE(123-35-3) IS FOUND ON THE FOLLOWING REGULATORY LISTS

International Agency for Research on Cancer (IARC) - Agents Classified by the IARC Monographs

US - California Proposition 65 - Carcinogens

US Toxic Substances Control Act (TSCA) - Chemical Substance Inventory

US TSCA Chemical Substance Inventory - Interim List of Active Substances

#### TERPINOLENE(586-62-9) IS FOUND ON THE FOLLOWING REGULATORY LISTS

US Toxic Substances Control Act (TSCA) - Chemical Substance Inventory

US TSCA Chemical Substance Inventory - Interim List of Active Substances

US TSCA Section 12(b) - List of Chemical Substances Subject to Export Notification Requirements

#### BETA PINENE(127-91-3\*) IS FOUND ON THE FOLLOWING REGULATORY LISTS

US ACGIH Threshold Limit Values (TLV)

US ACGIH Threshold Limit Values (TLV) - Carcinogens

US Toxic Substances Control Act (TSCA) - Chemical Substance Inventory

US TSCA Chemical Substance Inventory - Interim List of Active Substances

#### BETA-CARYOPHYLLENE(87-44-5) IS FOUND ON THE FOLLOWING REGULATORY LISTS

US Toxic Substances Control Act (TSCA) - Chemical Substance Inventory

US TSCA Chemical Substance Inventory - Interim List of Active Substances

#### GAMMA-TERPINENE(99-85-4) IS FOUND ON THE FOLLOWING REGULATORY LISTS

US Toxic Substances Control Act (TSCA) - Chemical Substance Inventory

US TSCA Chemical Substance Inventory - Interim List of Active Substances

## Federal Regulations

### Superfund Amendments and Reauthorization Act of 1986 (SARA)

#### SECTION 311/312 HAZARD CATEGORIES

Flammable (Gases, Aerosols, Liquids, or Solids)	Yes
Gas under pressure	No
Explosive	No
Self-heating	No
Pyrophoric (Liquid or Solid)	No
Pyrophoric Gas	No
Corrosive to metal	No
Oxidizer (Liquid, Solid or Gas)	No
Organic Peroxide	No
Self-reactive	No
In contact with water emits flammable gas	No
Combustible Dust	No

Continued...

Carcinogenicity	No
Acute toxicity (any route of exposure)	No
Reproductive toxicity	No
Skin Corrosion or Irritation	Yes
Respiratory or Skin Sensitization	Yes
Serious eye damage or eye irritation	Yes
Specific target organ toxicity (single or repeated exposure)	Yes
Aspiration Hazard	Yes
Germ cell mutagenicity	No
Simple Asphyxiant	No

**US. EPA CERCLA HAZARDOUS SUBSTANCES AND REPORTABLE QUANTITIES (40 CFR 302.4)**

None Reported

**State Regulations****US. CALIFORNIA PROPOSITION 65**

WARNING: This product contains a chemical known to the State of California to cause cancer and birth defects or other reproductive harm

**US - CALIFORNIA PROPOSITION 65 - CARCINOGENS & REPRODUCTIVE TOXICITY (CRT): LISTED SUBSTANCE**

beta-Myrcene Listed

National Inventory	Status
Australia - AICS	N (alpha-humulene)
Canada - DSL	N (alpha-humulene)
Canada - NDSL	N (myrcene; 3-carene; gamma-terpinene; d-limonene; beta pinene; terpinolene; beta-caryophyllene; linalool)
China - IECSC	N (alpha-humulene)
Europe - EINEC / ELINCS / NLP	Y
Japan - ENCS	Y
Korea - KECI	N (3-carene; alpha-humulene)
New Zealand - NZIoC	Y
Philippines - PICCS	N (alpha-humulene)
USA - TSCA	Y
<b>Legend:</b>	Y = All ingredients are on the inventory N = Not determined or one or more ingredients are not on the inventory and are not exempt from listing(see specific ingredients in brackets)

**SECTION 16 OTHER INFORMATION**

<b>Revision Date</b>	04/13/2018
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**Other information****Ingredients with multiple cas numbers**

Name	CAS No
alpha-pinene	80-56-8, 1330-16-1, 2437-95-8, 7785-70-8, 7785-26-4
beta-caryophyllene oxide	1139-30-6, 17627-43-9, 13877-94-6
3-carene	13466-78-9, 498-15-7, 74806-04-5
d-limonene	5989-27-5, 138-86-3
linalool	78-70-6, 126-91-0, 126-90-9
beta-caryophyllene	13877-93-5, 87-44-5, 1407-53-0, 8007-38-3, 1233519-47-5

Classification of the preparation and its individual components has drawn on official and authoritative sources as well as independent review by the Chemwatch Classification committee using available literature references.

The SDS is a Hazard Communication tool and should be used to assist in the Risk Assessment. Many factors determine whether the reported Hazards are Risks in the workplace or other settings. Risks may be determined by reference to Exposures Scenarios. Scale of use, frequency of use and current or available engineering controls must be considered.

**Definitions and abbreviations**

PC—TWA: Permissible Concentration-Time Weighted Average  
PC—STEL: Permissible Concentration-Short Term Exposure Limit  
IARC: International Agency for Research on Cancer  
ACGIH: American Conference of Governmental Industrial Hygienists  
STEL: Short Term Exposure Limit  
TEEL: Temporary Emergency Exposure Limit.  
IDLH: Immediately Dangerous to Life or Health Concentrations  
OSF: Odour Safety Factor  
NOAEL :No Observed Adverse Effect Level  
LOAEL: Lowest Observed Adverse Effect Level  
TLV: Threshold Limit Value  
LOD: Limit Of Detection  
OTV: Odour Threshold Value  
BCF: BioConcentration Factors  
BEI: Biological Exposure Index

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