Room Spray (First Snow)

Ming Fai Enterprise International Co., Ltd

Safety Data Sheet according to OSHA HazCom Standard (2024) requirements

SDS No.: HKGH0325528607
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SECTION 1 Identification

Product Identifier

Product name	Room Spray (First Snow) Contains: Mentha Arvensis Leaf Oil
Synonyms	Not Available
Other means of identification	Not Available

Recommended use of the chemical and restrictions on use

Relevant identified uses	AROMATHERAPY

Name, address, and telephone number of the chemical manufacturer, importer, or other responsible party

Registered company name	**Ming Fai Enterprise International Co., Ltd**
Address	Unit D3, 8/F, TML Tower, No. 3 Hoi Shing Road, Tsuen Wan, New Territories, Hong Kong
Telephone	852 2455 4888
Fax	Not Available
Website	Not Available
Email	scarlett.chen@mingfaigroup.com

Emergency phone number

Association / Organisation	**ALDI, BATAVIA, IL 60510**
Emergency telephone number(s)	Not Available
Other emergency telephone number(s)	Not Available

SECTION 2 Hazard(s) identification

Classification of the substance or mixture

Classification	Sensitisation (Skin) Category 1

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Label elements

Hazard pictogram(s)	
Signal word	**Warning**

Hazard statement(s)

H317	May cause an allergic skin reaction.

Hazard(s) not otherwise classified

Not Applicable

Precautionary statement(s) General

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

Precautionary statement(s) Prevention

P261	Avoid breathing mist/vapours/spray.
P280	Wear protective gloves.
P272	Contaminated work clothing must not be allowed out of the workplace.

Precautionary statement(s) Response

P302+P352	IF ON SKIN: Wash with plenty of soap and water.
P333+P313	If skin irritation or rash occurs: Get medical advice/attention.
P321	Specific treatment (see instructions on this label)
P362+P364	Take off contaminated clothing and wash it before reuse.

Precautionary statement(s) Storage

Not Applicable

Precautionary statement(s) Disposal

P501	Dispose of contents/container to authorised hazardous or special waste collection point in accordance with any local regulation.

SECTION 3 Composition / information on ingredients

Substances

See section below for composition of Mixtures

Mixtures

CAS No	%[weight]	Name
7732-18-5	80-90	water
61788-85-0	5-10	castor oil, hydrogenated, ethoxylated
6132-04-3	1-5	sodium citrate
9038-95-3	1-5	butyl alcohol propoxylated
Not Applicable	1-5	Fragrance – BT555047
122-99-6	0.5-0.9	ethylene glycol phenyl ether

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Not Applicable	0.1-0.5	Fragrance – Peppermint oil
102-76-1	0.1-0.5	glyceryl triacetate (as part of fragrance BT555047)
5949-29-1	0.1-0.5	citric acid, monohydrate
89-78-1	0.1-0.5	Menthol (as part of peppermint oil)
68917-18-0	0.1-0.5	cornmint oil (Mentha Arvensis Leaf Oil) (as part of fragrance BT555047)
10458-14-7	0.1-0.5	menthone (as part of peppermint oil)
100-51-6	0.1-0.5	benzyl alcohol (as part of fragrance BT555047)
4940-11-8	0.05-0.1	ethyl maltol (as part of fragrance BT555047)
70445-33-9	0.05-0.1	ethylhexylglycerin
470-82-6	0.05-0.1	Eucalyptol (as part of fragrance BT555047 and peppermint oil)
21145-77-7	0.01-0.05	7-acetyl-1,1,3,4,4,6-hexamethyltetraline (as part of fragrance BT555047)
5471-51-2	0.01-0.05	4-(p-hydroxyphenyl)-2-butanone (as part of fragrance BT555047)
1222-05-5	0.01-0.05	galaxolide (as part of fragrance BT555047)
2623-23-6	0.01-0.05	menthyl acetate (as part of peppermint oil)
494-90-6	0.01-0.05	menthofuran (as part of peppermint oil)
138-86-3	0.01-0.05	dipentene (as part of peppermint oil)
8006-90-4	0.01-0.05	peppermint oil (as part of fragrance BT555047)
120-51-4	0.01-0.05	benzyl benzoate (as part of fragrance BT555047)
87-44-5	0.01-0.05	caryophyllene (as part of peppermint oil)
89-82-7	0.01-0.05	pulegone (as part of peppermint oil)
8008-56-8	0.01-0.05	lemon oil
80-56-8	0.005-0.01	alpha-pinene (as part of peppermint oil)
127-91-3	0.005-0.01	beta-pinene (as part of peppermint oil)
99-85-4	0.001-0.005	gamma-terpinene (as part of peppermint oil)
99-87-6	0.001-0.005	p-cymene (as part of peppermint oil)
10191-41-0	0.00005-0.0001	alpha-tocopherol

SECTION 4 First-aid measures

Description of first aid measures

Eye Contact	If this product comes in contact with eyes: ‣ Wash out immediately with water. ‣ If irritation continues, seek medical attention. ‣ Removal of contact lenses after an eye injury should only be undertaken by skilled personnel.
Skin Contact	If skin contact occurs: ‣ Immediately remove all contaminated clothing, including footwear. ‣ Flush skin and hair with running water (and soap if available). ‣ Seek medical attention in event of irritation.
Inhalation	‣ If fumes, aerosols or combustion products are inhaled remove from contaminated area. ‣ Other measures are usually unnecessary.
Ingestion	‣ Immediately give a glass of water. ‣ First aid is not generally required. If in doubt, contact a Poisons Information Centre or a doctor.

Most important symptoms and effects, both acute and delayed

See Section 11

Indication of any immediate medical attention and special treatment needed

Treat symptomatically.

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SECTION 5 Fire-fighting measures

Extinguishing media

- There is no restriction on the type of extinguisher which may be used.
- Use extinguishing media suitable for surrounding area.

Special hazards arising from the substrate or mixture

Fire Incompatibility	‣ Avoid contamination with oxidising agents i.e. nitrates, oxidising acids, chlorine bleaches, pool chlorine etc. as ignition may result

Special protective equipment and precautions for fire-fighters

Fire Fighting	‣ Alert Fire Brigade and tell them location and nature of hazard. ‣ Wear breathing apparatus plus protective gloves in the event of a fire. ‣ Prevent, by any means available, spillage from entering drains or water courses. ‣ Use fire fighting procedures suitable for surrounding area. ‣ **DO NOT** approach containers suspected to be hot. ‣ Cool fire exposed containers with water spray from a protected location. ‣ If safe to do so, remove containers from path of fire. ‣ Equipment should be thoroughly decontaminated after use.
Fire/Explosion Hazard	carbon dioxide (CO_2) other pyrolysis products typical of burning organic material. May emit poisonous fumes. May emit corrosive fumes.

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

Minor Spills	‣ Clean up all spills immediately. ‣ Avoid breathing vapours and contact with skin and eyes. ‣ Control personal contact with the substance, by using protective equipment. ‣ Contain and absorb spill with sand, earth, inert material or vermiculite. ‣ Wipe up. ‣ Place in a suitable, labelled container for waste disposal.
Major Spills	Moderate hazard. ‣ Clear area of personnel and move upwind. ‣ Alert Fire Brigade and tell them location and nature of hazard. ‣ Wear breathing apparatus plus protective gloves. ‣ Prevent, by any means available, spillage from entering drains or water course. ‣ Stop leak if safe to do so. ‣ Contain spill with sand, earth or vermiculite. ‣ Collect recoverable product into labelled containers for recycling. ‣ Neutralise/decontaminate residue (see Section 13 for specific agent). ‣ Collect solid residues and seal in labelled drums for disposal. ‣ Wash area and prevent runoff into drains. ‣ After clean up operations, decontaminate and launder all protective clothing and equipment before storing

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	and re-using. ▸ If contamination of drains or waterways occurs, advise emergency services.

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

SECTION 7 Handling and storage

Precautions for safe handling

Safe handling	▸ Avoid all personal contact, including inhalation. ▸ Wear protective clothing when risk of exposure occurs. ▸ Use in a well-ventilated area. ▸ Prevent concentration in hollows and sumps. ▸ **DO NOT** enter confined spaces until atmosphere has been checked. ▸ **DO NOT** allow material to contact humans, exposed food or food utensils. ▸ Avoid contact with incompatible materials. ▸ When handling, **DO NOT** eat, drink or smoke. ▸ Keep containers securely sealed when not in use. ▸ Avoid physical damage to containers. ▸ Always wash hands with soap and water after handling. ▸ Work clothes should be laundered separately. Launder contaminated clothing before re-use. ▸ Use good occupational work practice. ▸ Observe manufacturer's storage and handling recommendations contained within this SDS. ▸ Atmosphere should be regularly checked against established exposure standards to ensure safe working conditions are maintained. ▸ **DO NOT** allow clothing wet with material to stay in contact with skin
Other information	**NOTE**: Special security requirements may be mandated under Federal/State Regulation(s). ▸ Store in original containers. ▸ Store in vault fitted with warning devices or detectors recommended by various Federal/State authorities. ▸ Store in vault used only for the purpose of storage of drugs of addiction. ▸ Vault must be locked at all times except when the materials stored therein are required. ▸ Keep storage area free from debris, wastes and combustibles. ▸ Keep dry. ▸ Keep containers securely sealed. ▸ Protect containers against physical damage. ▸ Check regularly for spills and leaks.

Conditions for safe storage, including any incompatibilities

Suitable container	▸ Packaging as recommended by manufacturer. ▸ Check that containers are clearly labelled. ▸ Tamper-proof containers. ▸ Polyethylene or polypropylene containers. ▸ Metal drum with sealed plastic liner. ▸ Glass container is suitable for laboratory quantities
Storage incompatibility	▸ Avoid reaction with oxidising agents

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SECTION 8 Exposure controls / personal protection

Control parameters

Occupational Exposure Limits (OEL)

INGREDIENT DATA

Not Available

Emergency Limits

Ingredient	TEEL-1	TEEL-2	TEEL-3
sodium citrate	9.3 mg/m3	100 mg/m3	610 mg/m3
butyl alcohol propoxylated	27 mg/m3	300 mg/m3	1,800 mg/m3
ethylene glycol phenyl ether	1.5 ppm	16 ppm	97 ppm
benzyl benzoate	5.7 mg/m3	63 mg/m3	380 mg/m3
benzyl alcohol	30 ppm	52 ppm	740 ppm
glyceryl triacetate	19 mg/m3	210 mg/m3	1,200 mg/m3
alpha-pinene	60 ppm	120 ppm	1,500 ppm
p-cymene	120 mg/m3	1,300 mg/m3	1,900 mg/m3

Ingredient	Original IDLH	Revised IDLH
water	Not Available	Not Available
castor oil, hydrogenated, ethoxylated	Not Available	Not Available
sodium citrate	Not Available	Not Available
butyl alcohol propoxylated	Not Available	Not Available
ethylene glycol phenyl ether	Not Available	Not Available
citric acid, monohydrate	Not Available	Not Available
ethylhexylglycerin	Not Available	Not Available
alpha-tocopherol	Not Available	Not Available
eucalyptol	Not Available	Not Available
7-acetyl-1,1,3,4,4,6-hexamethyltetraline	Not Available	Not Available
4-(p-hydroxyphenyl)-2-butanone	Not Available	Not Available
benzyl benzoate	Not Available	Not Available

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Ingredient	Original IDLH	Revised IDLH
peppermint oil	Not Available	Not Available
galaxolide	Not Available	Not Available
ethyl maltol	Not Available	Not Available
benzyl alcohol	Not Available	Not Available
cornmint oil	Not Available	Not Available
glyceryl triacetate	Not Available	Not Available
menthol	Not Available	Not Available
menthone	Not Available	Not Available
menthyl acetate	Not Available	Not Available
menthofuran	Not Available	Not Available
beta-caryophyllene	Not Available	Not Available
pulegone	Not Available	Not Available
dipentene	Not Available	Not Available
beta-pinene	Not Available	Not Available
alpha-pinene	Not Available	Not Available
gamma-terpinene	Not Available	Not Available
p-cymene	Not Available	Not Available
lemon oil	Not Available	Not Available

Exposure controls

Appropriate engineering controls

Enclosed local exhaust ventilation is required at points of dust, fume or vapour generation.
HEPA terminated local exhaust ventilation should be considered at point of generation of dust, fumes or vapours.
Barrier protection or laminar flow cabinets should be considered for laboratory scale handling.
A fume hood or vented balance enclosure is recommended for weighing/ transferring quantities exceeding 500 mg.
When handling quantities up to 500 gram in either a standard laboratory with general dilution ventilation (e.g. 6-12 air changes per hour) is preferred. Quantities up to 1 kilogram may require a designated laboratory using fume hood, biological safety cabinet, or approved vented enclosures. Quantities exceeding 1 kilogram should be handled in a designated laboratory or containment laboratory using appropriate barrier/ containment technology.
Manufacturing and pilot plant operations require barrier/ containment and direct coupling technologies.
Barrier/ containment technology and direct coupling (totally enclosed processes that create a barrier between the equipment and the room) typically use double or split butterfly valves and hybrid unidirectional airflow/ local exhaust ventilation solutions (e.g. powder containment booths). Glove bags, isolator glove box systems are optional. HEPA filtration of exhaust from dry product handling areas is required.
Fume-hoods and other open-face containment devices are acceptable when face velocities of at least 1 m/s (200 feet/minute) are achieved. Partitions, barriers, and other partial containment technologies are required to prevent migration of the material to uncontrolled areas. For non-routine emergencies maximum local and general exhaust are necessary. Air contaminants generated in the workplace possess varying 'escape' velocities which, in turn, determine the 'capture velocities' of fresh circulating air required to effectively remove the contaminant.

Type of Contaminant:	Air Speed:
solvent, vapours, etc. evaporating from tank (in still air)	0.25-0.5 m/s (50-100 f/min.)
aerosols, fumes from pouring operations, intermittent container filling, low speed conveyer transfers (released at low velocity into zone of active generation)	0.5-1 m/s (100-200 f/min.)
direct spray, drum filling, conveyer loading, crusher dusts, gas discharge (active generation into zone of rapid air motion)	1-2.5 m/s (200-500 f/min.)

Within each range the appropriate value depends on:

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Lower end of the range	Upper end of the range
1: Room air currents minimal or favourable to capture	1: Disturbing room air currents
2: Contaminants of low toxicity or of nuisance value only.	2: Contaminants of high toxicity
3: Intermittent, low production.	3: High production, heavy use
4: Large hood or large air mass in motion	4: Small hood-local control only

Simple theory shows that air velocity falls rapidly with distance away from the opening of a simple extraction pipe. Velocity generally decreases with the square of distance from the extraction point (in simple cases). Therefore the air speed at the extraction point should be adjusted, accordingly, after reference to distance from the contaminating source. The air velocity at the extraction fan, for example, should be a minimum of 1-2.5 m/s (200-500 f/min.) for extraction of gases discharged 2 meters distant from the extraction point. Other mechanical considerations, producing performance deficits within the extraction apparatus, make it essential that theoretical air velocities are multiplied by factors of 10 or more when extraction systems are installed or used.
The need for respiratory protection should also be assessed where incidental or accidental exposure is anticipated: Dependent on levels of contamination, PAPR, full face air purifying devices with P2 or P3 filters or air supplied respirators should be evaluated.
The following protective devices are recommended where exposures exceed the recommended exposure control guidelines by factors of:
10; high efficiency particulate (HEPA) filters or cartridges
10-25; loose-fitting (Tyvek or helmet type) HEPA powered-air purifying respirator.
25-50; a full face-piece negative pressure respirator with HEPA filters
50-100; tight-fitting, full face-piece HEPA PAPR
100-1000; a hood-shroud HEPA PAPR or full face-piece supplied air respirator operated in pressure demand or other positive pressure mode.

Individual protection measures, such as personal protective equipment

See below

Eye and face protection

When handling very small quantities of the material eye protection may not be required.
For laboratory, larger scale or bulk handling or where regular exposure in an occupational setting occurs:

- Chemical goggles. [AS/NZS 1337.1, EN166 or national equivalent]
- Face shield. Full face shield may be required for supplementary but never for primary protection of eyes.
- 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. This should include a review of lens absorption and adsorption for the class of chemicals in use and an account of injury experience. Medical and first-aid personnel should be trained in their removal and suitable equipment should be readily available. In the event of chemical exposure, begin eye irrigation immediately and remove contact lens as soon as practicable. Lens should be removed at the first signs of eye redness or irritation - lens should be removed in a clean environment only after workers have washed hands thoroughly. [CDC NIOSH Current Intelligence Bulletin 59].

Skin protection

See Hand protection below

Hands/feet protection

NOTE:

- 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.
- Contaminated leather items, such as shoes, belts and watch-bands should be removed and destroyed.

The selection of suitable gloves does not only depend on the material, but also on further marks of quality which vary from manufacturer to manufacturer. Where the chemical is a preparation of several substances, the resistance of the glove material can not be calculated in advance and has therefore to be checked prior to the application.
The exact break through time for substances has to be obtained from the manufacturer of the protective gloves and has to be observed when making a final choice.
Personal hygiene is a key element of effective hand care. Gloves must only be worn on clean hands. After using gloves, hands should be washed and dried thoroughly. Application of a non-perfumed moisturiser is recommended.
Suitability and durability of glove type is dependent on usage. Important factors in the selection of gloves include:

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	· frequency and duration of contact, · chemical resistance of glove material, · glove thickness and · dexterity Select gloves tested to a relevant standard (e.g. Europe EN 374, US F739, AS/NZS 2161.1 or national equivalent). · When prolonged or frequently repeated contact may occur, a glove with a protection class of 5 or higher (breakthrough time greater than 240 minutes according to EN 374, AS/NZS 2161.10.1 or national equivalent) is recommended. · When only brief contact is expected, a glove with a protection class of 3 or higher (breakthrough time greater than 60 minutes according to EN 374, AS/NZS 2161.10.1 or national equivalent) is recommended. · Some glove polymer types are less affected by movement and this should be taken into account when considering gloves for long-term use. · Contaminated gloves should be replaced. As defined in ASTM F-739-96 in any application, gloves are rated as: · Excellent when breakthrough time > 480 min · Good when breakthrough time > 20 min · Fair when breakthrough time < 20 min · Poor when glove material degrades For general applications, gloves with a thickness typically greater than 0.35 mm, are recommended. It should be emphasised that glove thickness is not necessarily a good predictor of glove resistance to a specific chemical, as the permeation efficiency of the glove will be dependent on the exact composition of the glove material. Therefore, glove selection should also be based on consideration of the task requirements and knowledge of breakthrough times. Glove thickness may also vary depending on the glove manufacturer, the glove type and the glove model. Therefore, the manufacturers technical data should always be taken into account to ensure selection of the most appropriate glove for the task. Note: Depending on the activity being conducted, gloves of varying thickness may be required for specific tasks. For example: · Thinner gloves (down to 0.1 mm or less) may be required where a high degree of manual dexterity is needed. However, these gloves are only likely to give short duration protection and would normally be just for single use applications, then disposed of. · Thicker gloves (up to 3 mm or more) may be required where there is a mechanical (as well as a chemical) risk i.e. where there is abrasion or puncture potential Gloves must only be worn on clean hands. After using gloves, hands should be washed and dried thoroughly. Application of a non-perfumed moisturiser is recommended. ‣ Rubber gloves (nitrile or low-protein, powder-free latex, latex/ nitrile). Employees allergic to latex gloves should use nitrile gloves in preference. ‣ Double gloving should be considered. ‣ PVC gloves. ‣ Change gloves frequently and when contaminated, punctured or torn. ‣ Wash hands immediately after removing gloves. ‣ Protective shoe covers. [AS/NZS 2210] ‣ Head covering.
Body protection	See Other protection below
Other protection	‣ For quantities up to 500 grams a laboratory coat may be suitable. ‣ For quantities up to 1 kilogram a disposable laboratory coat or coverall of low permeability is recommended. Coveralls should be buttoned at collar and cuffs. ‣ For quantities over 1 kilogram and manufacturing operations, wear disposable coverall of low permeability and disposable shoe covers. ‣ For manufacturing operations, air-supplied full body suits may be required for the provision of advanced respiratory protection. ‣ Eye wash unit. ‣ Ensure there is ready access to an emergency shower. ‣ For Emergencies: Vinyl suit

Recommended material(s) **Respiratory protection**

GLOVE SELECTION INDEX

Glove selection is based on a modified presentation of the:

Continued...

'Forsberg Clothing Performance Index'.
Not Available

Type A-P Filter of sufficient capacity. (AS/NZS 1716 & 1715, EN 143:2000 & 149:2001, ANSI Z88 or national equivalent)

Selection of the Class and Type of respirator will depend upon the level of breathing zone contaminant and the chemical nature of the contaminant. Protection Factors (defined as the ratio of contaminant outside and inside the mask) may also be important.

Required minimum protection factor	Maximum gas/vapour concentration present in air p.p.m. (by volume)	Half-face Respirator	Full-Face Respirator
up to 10	1000	A-AUS / Class1 P2	-
up to 50	1000	-	A-AUS / Class 1 P2
up to 50	5000	Airline *	-
up to 100	5000	-	A-2 P2
up to 100	10000	-	A-3 P2
100+			Airline**

* - Continuous Flow ** - Continuous-flow or positive pressure demand
A(All classes) = Organic vapours, B AUS or B1 = Acid gasses, B2 = Acid gas or hydrogen cyanide(HCN), B3 = Acid gas or hydrogen cyanide(HCN), E = Sulfur dioxide(SO2), G = Agricultural chemicals, K = Ammonia(NH3), Hg = Mercury, NO = Oxides of nitrogen, MB = Methyl bromide, AX = Low boiling point organic compounds(below 65 degC)

- 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.
- Cartridge performance is affected by humidity. Cartridges should be changed after 2 hr of continuous use unless it is determined that the humidity is less than 75%, in which case, cartridges can be used for 4 hr. Used cartridges should be discarded daily, regardless of the length of time used

SECTION 9 Physical and chemical properties

Information on basic physical and chemical properties

Appearance	self-color

Physical state	Liquid	**Relative density (Water = 1)**	Not Available
Odour	Not Available	**Partition coefficient n-octanol / water**	Not Available
Odour threshold	Not Available	**Auto-ignition temperature (°C)**	Not Available

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pH (as supplied)	5.89	**Decomposition temperature (°C)**	Not Available
Melting point / freezing point (°C)	Not Available	**Viscosity (cSt)**	Not Available
Initial boiling point and boiling range (°C)	Not Available	**Molecular weight (g/mol)**	Not Available
Flash point (°C)	Not Available	**Taste**	Not Available
Evaporation rate	Not Available	**Explosive properties**	Not Available
Flammability	Not Available	**Oxidising properties**	Not Available
Upper Explosive Limit (%)	Not Available	**Surface Tension (dyn/cm or mN/m)**	Not Available
Lower Explosive Limit (%)	Not Available	**Volatile Component (%vol)**	Not Available
Vapour pressure (kPa)	Not Available	**Gas group**	Not Available
Solubility in water	Not Available	**pH as a solution (1%)**	Not Available
Vapour density (Air = 1)	Not Available	**VOC g/L**	Not Available
Heat of Combustion (kJ/g)	Not Available	**Ignition Distance (cm)**	Not Available
Flame Height (cm)	Not Available	**Flame Duration (s)**	Not Available
Enclosed Space Ignition Time Equivalent (s/m3)	Not Available	**Enclosed Space Ignition Deflagration Density (g/m3)**	Not Available
Nanoform Solubility	Not Available	**Nanoform Particle Characteristics**	Not Available
Particle Size	Not Available		

SECTION 10 Stability and reactivity

Reactivity	See section 7
Chemical stability	‣ Unstable in the presence of incompatible materials. ‣ Product is considered stable. ‣ Hazardous polymerisation will not occur.
Possibility of hazardous reactions	See section 7
Conditions to avoid	See section 7
Incompatible materials	See section 7
Hazardous decomposition products	See section 5

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SECTION 11 Toxicological information

Information on toxicological effects

Inhaled	The material is not thought to produce adverse health effects or irritation of the respiratory tract. Nevertheless, good hygiene practice requires that exposure be kept to a minimum and that suitable control measures be used in an occupational setting.
Ingestion	Nonionic surfactants may produce localised irritation of the oral or gastrointestinal lining and induce vomiting and mild diarrhoea. At sufficiently high doses the material may be hepatotoxic (i.e. poisonous to the liver). The mechanisms by which pulegone and its proximate hepatotoxicant, menthofuran exert toxic effects have been studied extensively both in vitro and in vivo, presumably because of the use and abuse of pennyroyal oil. Pulegone has been shown to be the active constituent of pennyroyal oil, and menthofuran produced the same toxic effects as pulegone after intraperitoneal injection to mice. Pulegone is a major ingredient in pennyroyal and peppermint oils, producing liver damage. Small amounts (10mL) may produce gastrointestinal distress; larger amounts (30mL) may produce fatal liver necrosis. The material has **NOT** been classified by other classification systems as 'harmful by ingestion'. This is because of the lack of corroborating animal or human evidence.
Skin Contact	Skin contact is not thought to have harmful health effects; the material may still produce health damage following entry through wounds, lesions or abrasions. There is some evidence to suggest that this material can cause inflammation of the skin on contact in some persons. Non-ionic surfactants cause less irritation than other surfactants as they have less ability to denature protein in the skin. Open cuts, abraded or irritated skin should not be exposed to this material Entry into the blood-stream, through, for example, cuts, abrasions 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.
Eye	Although the liquid is not thought to be an irritant, direct contact with the eye may produce transient discomfort characterised by tearing or conjunctival redness (as with windburn). Non-ionic surfactants can cause numbing of the cornea, which masks discomfort normally caused by other agents and leads to corneal injury. Irritation varies depending on the duration of contact, the nature and concentration of the surfactant.
Chronic	Skin contact with the material is more likely to cause a sensitisation reaction in some persons compared to the general population. Prolonged or repeated skin contact may cause degreasing, followed by drying, cracking and skin inflammation.

Room Spray (First Snow)	**TOXICITY**	**IRRITATION**
	Not Available	Not Available
water	**TOXICITY**	**IRRITATION**
	Oral (Rat) LD50: >90000 mg/kg	Not Available
castor oil, hydrogenated, ethoxylated	**TOXICITY**	**IRRITATION**
	Oral (Rat) LD50: >2000 mg/kg	Eye: no adverse effect observed (not irritating)

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		Skin: no adverse effect observed (not irritating)

sodium citrate

TOXICITY	IRRITATION
dermal (rat) LD50: >2000 mg/kg	Eye: no adverse effect observed (not irritating)
Oral (Mouse) LD50; 5000-6000 mg/kg	Skin: no adverse effect observed (not irritating)

butyl alcohol propoxylated

TOXICITY	IRRITATION
Dermal (rabbit) LD50: 13340 mg/kg	Eye (Rodent - rabbit): 20mg/24H - Moderate
Inhalation (Rat) LC50: 0.147 mg/L4h	Eye (Rodent - rabbit): 500mg
Oral (Rabbit) LD50; 1770 mg/kg	Eye (Rodent - rabbit): 500mg
	Eye (Rodent - rabbit): 500mg/24H - Mild
	Eye (Rodent - rabbit): 500mg/24H - Mild
	Eye (Rodent - rabbit): 50mg - Severe
	Eye (Rodent - rabbit): 50mg - Severe
	Eye: adverse effect observed (irritating)
	Eye: no adverse effect observed (not irritating)
	Skin (Rodent - rabbit): 10mg/24H - Mild
	Skin (Rodent - rabbit): 500mg - Mild
	Skin (Rodent - rabbit): 500mg - Mild
	Skin (Rodent - rabbit): 500mg - Mild
	Skin (Rodent - rabbit): 500mg - Mild
	Skin (Rodent - rabbit): 500mg - Mild
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	Skin (Rodent - rabbit): 500mg - Mild
	Skin (Rodent - rabbit): 500mg - Mild
	Skin (Rodent - rabbit): 500mg/24H - Mild
	Skin (Rodent - rabbit): 500mg/24H - Mild
	Skin (Rodent - rabbit): 500mg/24H - Mild
	Skin (Rodent - rabbit): 80mg/4H
	Skin (Rodent - rabbit): 80mg/4H - Mild
	Skin: adverse effect observed (irritating)
	Skin: no adverse effect observed (not irritating)

ethylene glycol phenyl ether

TOXICITY	IRRITATION
dermal (rat) LD50: >2000 mg/kg	Eye (Rodent - rabbit): 250ug/24H - Severe
Oral (Rat) LD50: 1260 mg/kg	Eye (Rodent - rabbit): 6mg - Moderate
	Eye: adverse effect observed (irreversible damage)
	Eye: adverse effect observed (irritating)
	Skin (Rodent - rabbit): 500mg/24H - Mild

Continued...

	Skin: adverse effect observed (irritating)
	Skin: no adverse effect observed (not irritating)

citric acid, monohydrate

TOXICITY	IRRITATION
Oral (Mouse) LD50; 5790 mg/kg	Eye (Rodent - rabbit): 5mg/30S - Mild
	Eye (Rodent - rabbit): 750ug/24H - Severe
	Skin (Rodent - rabbit): 0.5mL - Moderate
	Skin (Rodent - rabbit): 500mg/24H - Mild

ethylhexylglycerin

TOXICITY	IRRITATION
dermal (rat) LD50: >2000 mg/kg	Skin (Human - woman): 5%/2D
Inhalation (Rat) LC50: 2.83 mg/l4h	Skin (Human - woman): 5%/2D (intermittent)
Oral (Rat) LD50: >2000 mg/kg	

alpha-tocopherol

TOXICITY	IRRITATION
dermal (rat) LD50: >3000 mg/kg	Eye: no adverse effect observed (not irritating)
Oral (Mouse) LD50; >5000 mg/kg	Skin: no adverse effect observed (not irritating)

eucalyptol

TOXICITY	IRRITATION
dermal (rat) LD50: >2000 mg/kg	Eye: no adverse effect observed (not irritating)
Oral (Rat) LD50: 2480 mg/kg	Skin: no adverse effect observed (not irritating)

7-acetyl-1,1,3,4,4,6-hexamethyltetraline

TOXICITY	IRRITATION
Dermal (rabbit) LD50: >5000 mg/kg	Eye: no adverse effect observed (not irritating)
Oral (Rat) LD50: 570 mg/kg	Skin: no adverse effect observed (not irritating)

4-(p-hydroxyphenyl)-2-butanone

TOXICITY	IRRITATION
dermal (rat) LD50: >2000 mg/kg	Eye: no adverse effect observed (not irritating)
Oral (Rat) LD50: 1320 mg/kg	Skin: no adverse effect observed (not irritating)

benzyl benzoate

TOXICITY	IRRITATION
Dermal (rabbit) LD50: 4000 mg/kg	Eye: no adverse effect observed (not irritating)
Oral (Rat) LD50: 1700 mg/kg	Skin: no adverse effect observed (not irritating)

peppermint oil

TOXICITY	IRRITATION
Dermal (rabbit) LD50: >5000 mg/kg	Eye: no adverse effect observed (not irritating)
Oral (Rat) LD50: 2426 mg/kg	Skin (Human - woman): 2%
	Skin: adverse effect observed (irritating)

galaxolide

TOXICITY	IRRITATION
dermal (rat) LD50: >2000 mg/kg	Eye: no adverse effect observed (not irritating)
Oral (Rat) LD50: >2000 mg/kg	Skin (Rodent - rabbit): 500mg/24H - Moderate

Continued...

	Skin: no adverse effect observed (not irritating)

ethyl maltol

TOXICITY	IRRITATION
Dermal (rabbit) LD50: >5000 mg/kg	Eye: no adverse effect observed (not irritating)
Oral (Mouse) LD50; 780 mg/kg	Skin: no adverse effect observed (not irritating)

benzyl alcohol

TOXICITY	IRRITATION
Dermal (rabbit) LD50: 2000 mg/kg	Eye (Rodent - rat): 0.1mL
Inhalation (Rat) LC50: >4.178 mg/L4h	Eye: adverse effect observed (irritating)
Oral (Rat) LD50: 1230 mg/kg	Skin (Human - man): 16mg/48H - Mild
	Skin (Human): 1%/2D
	Skin (Mammal - pig): 100% - Moderate
	Skin (Rodent - rabbit): 100mg/24H - Moderate
	Skin: no adverse effect observed (not irritating)

cornmint oil

TOXICITY	IRRITATION
Dermal (rabbit) LD50: >5000 mg/kg	Not Available
Oral (Rat) LD50: 1240 mg/kg	

glyceryl triacetate

TOXICITY	IRRITATION
Dermal (rabbit) LD50: >2000 mg/kg	Eye (Rodent - rabbit): 116mg
Inhalation (Rat) LC50: >1.721 mg/L4h	Eye: no adverse effect observed (not irritating)
Oral (Mouse) LD50; 1100 mg/kg	Skin: no adverse effect observed (not irritating)

menthol

TOXICITY	IRRITATION
Dermal (rabbit) LD50: >5000 mg/kg	Eye (Mammal - species unspecified): 0.7% - Mild
Inhalation (Rat) LC50: ~5.289 mg/L4h	Eye (Mammal - species unspecified): 100% - Severe
Oral (Cat) LD50; 800 mg/kg	Eye (Rodent - rabbit): 1%
	Eye (Rodent - rabbit): 1%
	Eye (Rodent - rabbit): 250ug - Severe
	Eye: adverse effect observed (irritating)
	Skin (Rodent - rabbit): 100%/24H - Mild
	Skin (Rodent - rabbit): 500mg/24H - Mild
	Skin: adverse effect observed (irritating)
	Skin: no adverse effect observed (not irritating)

menthone

TOXICITY	IRRITATION
Oral (Rat) LD50: 500 mg/kg	Eye: no adverse effect observed (not irritating)
	Skin (Rodent - rabbit): 500mg/24H - Mild
	Skin: no adverse effect observed (not irritating)

menthyl acetate

TOXICITY	IRRITATION

Continued...

	Dermal (rabbit) LD50: >5000 mg/kg	Eye: no adverse effect observed (not irritating) Skin
	Oral (Rat) LD50: >5000 mg/kg	(Rodent - rabbit): 500mg/24H - Mild
		Skin: no adverse effect observed (not irritating)

menthofuran

TOXICITY	IRRITATION
Not Available	Skin: adverse effect observed (irritating)
	Skin: no adverse effect observed (not irritating)

beta-caryophyllene

TOXICITY	IRRITATION
Oral (Mouse) LD50; >5000 mg/kg	Eye: no adverse effect observed (not irritating)
	Skin (Rodent - rabbit): 500mg/24H
	Skin: no adverse effect observed (not irritating)

pulegone

TOXICITY	IRRITATION
Dermal (rabbit) LD50: 3090 mg/kg	Skin (Rodent - rabbit): 500mg/24H - Moderate
Oral (Rat) LD50: 470 mg/kg	Skin: adverse effect observed (irritating)
	Skin: no adverse effect observed (not irritating)

dipentene

TOXICITY	IRRITATION
Oral (Mouse) LD50; 4773 mg/kg	Skin (Rodent - rabbit): 500mg/24H - Moderate
	Skin: adverse effect observed (irritating)
	Skin: no adverse effect observed (not irritating)

beta-pinene

TOXICITY	IRRITATION
Oral (Rabbit) LD50; 4700 mg/kg	Eye: no adverse effect observed (not irritating)
	Skin (Rodent - rabbit): 500mg/24H - Moderate
	Skin: adverse effect observed (irritating)

alpha-pinene

TOXICITY	IRRITATION
dermal (rat) LD50: >2000 mg/kg	Eye: no adverse effect observed (not irritating)
Oral (Rat) LD50: >500 mg/kg	Skin (Human - man): 100% - Severe
	Skin (Rodent - rabbit): 500mg/24H - Moderate
	Skin: adverse effect observed (irritating)

gamma-terpinene

TOXICITY	IRRITATION
dermal (rat) LD50: >2000 mg/kg	Skin (Rodent - rabbit): 500mg/24H - Moderate
Oral (Rat) LD50: >2000 mg/kg	Skin: adverse effect observed (irritating)
	Skin: no adverse effect observed (not irritating)

p-cymene

TOXICITY	IRRITATION
Dermal (rabbit) LD50: >5000 mg/kg	Eye: adverse effect observed (irritating)
Oral (Rat) LD50: 4750 mg/kg	Eye: no adverse effect observed (not irritating)

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		Skin (Rodent - rabbit): 500mg/24H - Moderate
		Skin: adverse effect observed (irritating)
		Skin: no adverse effect observed (not irritating)

	TOXICITY	IRRITATION
lemon oil	Dermal (rabbit) LD50: >5000 mg/kg	Skin (Rodent - mouse): 100 - Mild
	Oral (Rat) LD50: 2840 mg/kg	Skin (Rodent - rabbit): 500mg/24H - Moderate

CASTOR OIL, HYDROGENATED, ETHOXYLATED

Inhalation-risk test (IRT): No mortality within 8 hours as shown in animal studies. The inhalation of a highly saturated vapor-air mixture represents no acute hazard. Skin irritation: rabbit: non-irritant (OECD Guideline 404) Eye irritation : rabbit: non-irritant (BASF-Test) Sensitization: Guinea pig maximization test/guinea pig: Non-sensitizing. Chronic toxicity Genetic toxicity: In the majority of studies performed with microorganisms and in mammalian cell culture, a mutagenic effect was not found. A mutagenic effect was also not observed in in vivo tests. Developmental toxicity/teratogenicity: No indications of a developmental toxic / teratogenic effect were seen in animal studies. * BASF MSDS Cremaphor RH Surfactant

This product contains partially hydrogenated fatty acids and/ or trans fatty acids.

The consumption of trans fats increases the risk of coronary heart disease by raising levels of LDL cholesterol and lowering levels of 'good' HDL cholesterol. There is an ongoing debate about a possible differentiation between trans fats of natural origin and trans fats of man-made origin but so far no scientific consensus has been found. Two Canadian studies have shown that the natural trans fat vaccenic acid, found in beef and dairy products, may have an opposite health effect and could actually be beneficial compared to hydrogenated vegetable shortening, or a mixture of pork lard and soy fat, by lowering total and LDL cholesterol and triglyceride levels. In lack of recognized evidence and scientific agreement, nutritional authorities consider all trans fats as equally harmful for health and recommend that consumption of trans fats be reduced to trace amounts.

The use of hydrogenated oils in foods has never been completely satisfactory. Because the center arm of the triglyceride is shielded somewhat by the end fatty acids, most of the hydrogenation occurs on the end fatty acids,

While full hydrogenation produces largely saturated fatty acids, partial hydrogenation results in the transformation of unsaturated cis fatty acids to trans fatty acids in the oil mixture due to the heat used in hydrogenation. Partially hydrogenated oils and their trans fats have increasingly been viewed as 'unhealthy'.

Trans fat is the common name for unsaturated fat with trans-isomer (E-isomer) fatty acid(s). Because the term refers to the configuration of a double carbon-carbon bond, trans fats are sometimes monounsaturated or polyunsaturated, but never saturated. Trans fats do exist in nature but also occur during the processing of polyunsaturated fatty acids in food production. Trans fats occur naturally in a limited number of cases: vaccenyl and conjugated linoleyl (CLA) containing trans fats occur naturally in trace amounts in meat and dairy products from ruminants.

The exact biochemical methods by which trans fats produce specific health problems are a topic of continuing research. One theory is that the human lipase enzyme works only on the cis configuration and cannot metabolise a trans fat. A lipase is a water-soluble enzyme that helps digest, transport, and process dietary lipids such as triglycerides, fats, and oils in most - if not all - living organisms. While the mechanisms through which trans fats contribute to coronary heart disease are fairly well understood, the mechanism for trans fat's effect on diabetes is still under investigation. Trans fatty acids may impair the metabolism of long-chain polyunsaturated fatty acids (LCPUFAs), but maternal pregnancy trans fatty acid intake has been inversely associated with LCPUFAs levels in infants at birth thought to underlie the positive association between breastfeeding and intelligence.

There are suggestions that the negative consequences of trans fat consumption go beyond the cardiovascular risk. In general, there is much less scientific consensus asserting that eating trans fat specifically increases the risk of other chronic health problems:

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	It has been suggested that the intake of both trans fats and saturated fats promote the development of Alzheimer disease, although not confirmed in an animal model. It has been found that trans fats impaired memory and learning in middle-age rats. The rats' brains of trans-fat eaters had fewer proteins critical to healthy neurological function. Inflammation in and around the hippocampus, the part of the brain responsible for learning and memory. These are the exact types of changes normally seen at the onset of Alzheimer's, but seen after six weeks, even though the rats were still young. There is a growing concern that the risk of type 2 diabetes increases with trans fat consumption.[52] However, consensus has not been reached. For example, one study found that risk is higher for those in the highest quartile of trans fat consumption.Another study has found no diabetes risk once other factors such as total fat intake and BMI were accounted for. Research indicates that trans fat may increase weight gain and abdominal fat, despite a similar caloric intake. A 6-year experiment revealed that monkeys fed a trans fat diet gained 7.2% of their body weight, as compared to 1.8% for monkeys on a mono-unsaturated fat diet. Although obesity is frequently linked to trans fat in the popular media, this is generally in the context of eating too many calories; there is not a strong scientific consensus connecting trans fat and obesity, although the 6-year experiment did find such a link, concluding that 'under controlled feeding conditions, long-term TFA consumption was an independent factor in weight gain. TFAs enhanced intra-abdominal deposition of fat, even in the absence of caloric excess, and were associated with insulin resistance, with evidence that there is impaired post-insulin receptor binding signal transduction. Liver Dysfunction: Trans fats are metabolised differently by the liver than other fats and interfere with delta 6 desaturase. Delta 6 desaturase is an enzyme involved in converting essential fatty acids to arachidonic acid and prostaglandins, both of which are important to the functioning of cells. Infertility in women: One 2007 study found, 'Each 2% increase in the intake of energy from trans unsaturated fats, as opposed to that from carbohydrates, was associated with a 73% greater risk of ovulatory infertility...'. Major depressive disorder: Spanish researchers analysed the diets of 12,059 people over six years and found those who ate the most trans fats had a 48 per cent higher risk of depression than those who did not eat trans fats. One mechanism may be trans-fats' substitution for docosahexaenoic acid (DHA) levels in the orbitofrontal cortex (OFC). Very high intake of trans-fatty acids (43% of total fat) in mice from 2 to 16 months of age was associated with lowered DHA levels in the brain (p=0.001) When the brains of 15 major depressive subjects who had committed suicide were examined post-mortem and compared against 27 age-matched controls, the suicidal brains were found to have 16% less (male average) to 32% (female average) less DHA in the OFC. The OFC is known to control reward, reward expectation and empathy, which are all negatively impacted in depressive mood disorders, as well as regulating the limbic system>
SODIUM CITRATE	For citric acid (and its inorganic citrate salts) Based on extensive animal testing data and on human experience, citric acid has low acute toxicity. Citric acid is not suspected of causing cancer, birth defects or reproductive toxicity. Further, it does not cause mutations. Also, the sensitizing potential is considered low. In contrast, irritation, particularly of the eyes but also the airways and the skin, is the main hazard presented by citric acid.
BUTYL ALCOHOL PROPOXYLATED	In general, the toxicity of the PPGs Butyl Ether decreased with increasing molecular weight; for example, PPG-40 Butyl Ether was less toxic than PPG-2 Butyl Ether. Mutagenicity data were not found on the PPGs Butyl Ether. However, an ether of molecular weight 800 Da (~PPG-13 Butyl Ether) was non-carcinogenic when fed to rats for 2 years. Because the PPGs Butyl Ethers undergo metabolic degradation; i.e., the butyl group are removed and oxidized, the PPG chains are split into random length fragments, the genotoxicity of the component chemicals, propylene glycol (PG) and n- Butyl Alcohol, were also considered. Both PG and n-Butyl Alcohol were non-mutagenic in mammalian and microbial assays. PG was non-carcinogenic in a 2-year feeding study using rats and in a lifetime dermal study using mice. These studies effectively eliminated the need for genotoxicity data on the PPG Butyl Ethers. There was concern about the irritancy potential of PPG-2 Butyl Ether. In animal irritation studies, the ingredient caused minor, transient erythema and desquamation; in addition, erythema, edema, ecchymosis, necrosis, and other changes were observed during an acute percutaneous study. PPG-2 Butyl Ether also caused minor to moderate conjunctival irritation and minor corneal injury. It was concluded that the PPG Butyl Ethers were safe for use in cosmetics when formulated to avoid irritation. The dermal LD50 of PPG-3 Butyl Ether was 2 g/kg in rats and rabbits, and the dermal LD50 of Buteth-3 in rats was 3.5 g/kg. The oral LD50 of PPG-3 Butyl Ether and of Buteth-3 in rats was 2 g/kg and 6.6 g/kg, respectively. Polypropyleneglycol butyl ethers (not defined) had a dermal and an oral LD50 of 2 g/kg and 0.3-2 g/kg bw, respectively,in mice.Buteth-3 (1000 mg/kg/day) was not toxic to rabbits in a 21-day dermal study; erythema, desquamation,and fissuring were observed In short-term oral toxicity studies in rats, PPG-3 Butyl Ether had a NOAEL of 1000 mg/kg bw; polypropylene glycol butyl ethers had a NOEL of 100 mg/kg bw/day for clinical observations, higher absolute and relative

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	liver weights, and an increased incidence of liver and thyroid gland hypertrophy; and 1-(2-butoxy-1-methylethoxy)propan-2-ol had a NOAEL of 100 mg/kg/day based on very slight to slight hepatocellular hypertrophy with no corresponding increases in liver weights in low-dose males. In a 90-day oral toxicity study, administration of up to 1000 mg/kg bw/day PPG-3 Butyl Ether to rats in drinking water produced treatment-related increases in absolute and relative liver and kidney weights. The NOAELs in rats and mice exposed to=3000 ppm methoxyisopropanol via inhalation for 2 yrs were 1000 ppm (based on slight body wt decreases in males and females) and 300 ppm (based on altered hepatocellular foci in males), respectively.Dermal application of propylene glycol butyl ether was not embryotoxic or teratogenic to rabbits (=100 mg/kg bw/day applied on days 7-18 of. gestation) or rats (=1.0 ml/kg bw/day applied on days 6-16 of gestation). 1-(2-Butoxy-1-methyl-ethoxy)propan-2-ol (applied on days 6-16 or 6-15 of gestation) also was not embryotoxic or teratogenic in rats. No test-article related adverse developmental or reproductive effects were observed in rats dosed by gavage with up to 1000 mg/kg Buteth-3 or 1-(2-butoxy-1-methylethoxy)propan-2-ol or up to 500 mg/kg bw/day polypropylene glycol butyl ethers. In inhalation studies, exposure of rats to =1.0 mg/l air PPG-3 Methyl Ether did not have any teratogenic or reproductive effects. Exposure to 1000 and 3000 ppm methoxyisopropanol produced some adverse effects in a two-generation study in rats; adverse effects were not observed with 300 ppm. PPG-3 Butyl Ether was not genotoxic in vitro in the Ames test or in vivo in a mouse micronucleus assay. Propylene glycol butyl ether was not genotoxic in an Ames test or a mammalian chromosomal aberration assay in rat lymphocytes, andneither propylene glycol butyl ether or 1-(2-butoxy-1-methylethoxy)propan-2-ol were genotoxic in a mammalian cellmutation assay in CHO cell. In inhalation carcinogenicity studies, mice and rats were exposed by whole body exposure to =3000 ppm methoxyisopropan-ol for 2 yrs. An increase in S-phase DNA synthesis and in MFO activity in the liver was observed in high-dose male mice and rats. Renal epithelial tumors were not observed, and the NOEL for carcinogenicity was 3000 ppm for mice and rats. Undiluted PPG-3 Butyl Ether was not irritating to rabbit skin or eyes, and it was not an irritant or sensitizer in guinea pigs. Polypropylene glycol butyl ethers were classified as non-corrosive in an EpiDermTM study Humans have regular contact with alcohol ethoxylates through a variety of industrial and consumer products such as soaps, detergents and other cleaning products. Exposure to these chemicals can occur through swallowing, inhalation, or contact with the skin or eyes. Studies of acute toxicity show that relatively high volumes would have to occur to produce any toxic response. No death due to poisoning with alcohol ethoxylates has ever been reported. Studies show that alcohol ethoxylates have low toxicity through swallowing and skin contact. Animal studies show these chemicals may produce gastrointestinal irritation, stomach ulcers, hair standing up, diarrhea and lethargy. Slight to severe irritation occurred when undiluted alcohol ethyoxylates were applied to the skin and eyes of animals. These chemicals show no indication of genetic toxicity or potential to cause mutations and cancers. Toxicity is thought to be substantially lower than that of nonylphenol ethoxylates. Some of the oxidation products of this group of substances may have sensitizing properties. As they cause less irritation, nonionic surfactants are often preferred to ionic surfactants in topical products. However, their tendency to auto-oxidise also increases their irritation. Due to their irritating effect it is difficult to diagnose allergic contact dermatitis (ACD) by patch testing. Both laboratory and animal testing has shown that there is no evidence for alcohol ethoxylates (AEs) causing genetic damage, mutations or cancer. No adverse reproductive or developmental effects were observed. Tri-ethylene glycol ethers undergo enzymatic oxidation to toxic alkoxy acids. They may irritate the skin and the eyes. At high oral doses, they may cause depressed reflexes, flaccid muscle tone, breathing difficulty and coma. Death may result in experimental animal. However, repeated exposure may cause dose dependent damage to the kidneys as well as reproductive and developmental defects.
ETHYLENE GLYCOL PHENYL ETHER	Bacterial cell mutagen
CITRIC ACID, MONOHYDRATE	The material may be irritating to the eye, with prolonged contact causing inflammation. Repeated or prolonged exposure to irritants may produce conjunctivitis.
ETHYLHEXYLGLYCERIN	Oral (-) LD50: >2000 mg/kg OECD 401 Skin: non-irritant OECD 404 Dermal (-) LD50: >2000 mg/kg OECD 402 Eye: irritant OECD 405 Non-sensitising (OECD 406) The no toxic effect level for oral application to rats over 28 days is 100 mg/kg/day. A NOEL cannot be determined. OECD 407 No experimental information on genotoxicity in vitro or in vivo available. * Schulke Alkyl glyceryl ethers (AGEs) often act as surfactants or skin conditioning agents in cosmetics. These substances show minimal dermal penetration. Furthermore, a review of the available data on toxicity revealed: an absence of genotoxicity in studies using ethylhexylglycerin, chimyl alcohol, batyl alcohol, and

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glyceryl allyl ether; an absence of reproductive and developmental toxicity in oral studies using ethylhexylglycerin; negative skin irritation/sensitization data in studies using ethylhexylglycerin and chimyl alcohol; and negative phototoxicity/photoallergenicity data in studies using ethylhexylglycerin. Overall, the available toxicity data, coupled with the limited dermal penetration, suggested that these ingredients could be used safely in the present practices of use and concentration.

Oral toxicity: Using chimyl alcohol a a surrogate of this group approximately 95% is absorbed following oral administration with 40% recovered (as metabolites) in the urine after 12 hours. The lymph shows significant absorption (50%) whilst triglycerides, phospholipids and free fatty acids also seem to incorporate the absorbed substance.

No mortalities or exposure-related toxicological findings were observed in rats dosed orally with undiluted ethylhexylglycerin or chimyl alcohol.

Ethylhexylglycerin administered orally to rats, at doses up to 800 mg/kg/day, in a 13-week study did not result in any treatment-related deaths, macroscopic observations,or neurotoxicity. A statistically significant increase in absolute and relative-to-body weight liver weights was observed in males of all dose groups and females of the highest dose group. A dose of 50 mg/kg/day (lowest dose) was considered the lowest observed adverse effect level (LOAEL) in one study and no observed adverse effect level (NOAEL) in another.

There were no treatment-related mortalities in rats dosed orally with ethylhexylglycerin at doses up to 1,500 mg/kg for 28 days. Increased liver and adrenal weights were observed in the highest dose group, and microscopic findings included slight to moderate liver hypertrophy in rats of all 3 dose groups. The 100 mg/kg dose was defined as the no-observed-adverse effect-level (NOAEL).

Dermal toxicity: Mean absorption of another surrogate, ethylhexylglycerin through the skin of rabbits is insignificant (0.2% at approximately 2 hours post application) and there were no signs of skin irritation. The quantity of ethylhexylglycerin in the plasma was below the detection limit at the end of the 4 h application period. Over a range of 3 concentrations (44.65, 47.15, and 54.94%) applied to human skin in vitro, mean penetration rates of 2.38, 8.19, and 20.38 ug/cm2/h were reported.

Chimyl alcohol was classified as a mild skin irritant in rabbits after a single application, but was a non-irritating to the skin of rabbits in a cumulative skin irritation study.

Skin sensitisation was not observed in guinea pigs tested with 0.5% ethylhexylglycerin during induction and challenged with a higher concentration (50%) in the maximization test. Local lymph node assay results for ethylhexylglycerin at concentrations up to 50% were also negative. Products containing ethylhexylglycerin at concentrations ranging from 0.4% to ~1% were neither skin irritants nor sensitisers.

Ethylhexylglycerin was not phototoxic or photoallergenic in guinea pigs when tested at concentrations up to 100% in the presence of UVA/UVB light. Chimyl alcohol suppressed the production of chemical mediators of UVB-irradiated keratinocytes in vitro and substantially suppressed UV-induced tanning in human skin. Based on these findings, a new concept for skin whitening via controlling keratinocyte function was proposed

No mortalities or signs of skin irritation or abnormal necropsy findings were observed after undiluted ethylhexylglycerin was applied to the skin of rats.Necropsy findings were unremarkable. there were no treatment-related mortalities in rats dosed orally with ethylhexylglycerin at doses up to 1,500 mg/kg for 28 days. Increased liver and adrenal weights were observed in the highest dose group, and microscopic findings included slight to moderate liver hypertrophy in rats of all 3 dose groups. The 100 mg/kg dose was defined as the no-observed-adverse effect-level (NOAEL).

Ocular toxicity: Undiluted ethylhexylglycerin was severely irritating , but 5% ethylhexylglycerin was mildly irritating, to the eyes of rabbits

Inhalation toxicity: In an acute inhalation toxicity study using groups of rats exposed to ethylhexylglycerin (nose-only, mean achieved concentrations of 1.89, 2.96, and 4.98 mg/l), a concentration-related increase in mortality was observed. The lung was described as a target organ, based on rapid deaths, severe respiratory changes, and abnormal colouration and enlargement of the lungs.

Parenteral toxicity: Batyl alcohol stimulated haematopoiesis (both red and white blood cells, following subcutaneous injection) in repeated dose studies involving rats and guinea pigs.

Developmental toxicity: The results of visceral and skeletal examinations in litters of female rats given oral doses of ethylhexylglycerin (up to 800 mg/kg/day) were negative.

In the one-generation developmental toxicity study (same doses) involving male and female rats, oestrous cycles were comparable between groups, but the fertility index for rats of the highest dose group was lower when compared to controls. There were no treatment-related effects on implantation. Necropsy findings in dosed rats found dead or killed did not indicate any treatment-related changes. The no-observed-effect-level (NOEL) for developmental toxicity in both sexes was 50/mg/kg/day

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	Genotoxicity: Ethylhexylglycerin, chimyl alcohol, batyl alcohol, glyceryl allyl ether were all non-genotoxic in the Ames test under a variety of conditions. No genotoxicity or clastogenic was exhibited in any of the AGEs using the micronucleus, chromosomal aberration assays assays, Studies on the carcinogenicity of the AGEs were not found in the published literature
ALPHA-TOCOPHEROL	[ROCHE] * Bronson and Jacobs SDS (for similar products) Use in foodstuffs is consistent with low order of toxicity. alpha-Tocopherol was non-mutagenic and non-carcinogenic, and the results of reproduction/ teratology studies did not indicate that alpha-tocopherol had adverse effects on reproductive function. However, in a long-term study in rats, a no-effect level could not be established with respect to effects on blood clotting and liver histology, and there was evidence from human studies that excessive intakes of alpha-tocopherol could cause haemorrhage. Other adverse effects noted in clinical studies at doses of > 720 mg alpha-tocopherol/day included weakness, fatigue, creatinuria and effects on steroid hormone metabolism. Clinical studies indicate that, generally, intakes of below about 720 mg/day are without adverse effects in man, but one investigation in elderly patients showed an increase in serum cholesterol at doses of 300 mg alpha-tocopherol daily. Incidences of allergic reactions seem to be very rare. alpha-Tocopherol may be an essential nutrient. The U.S. National Academy of Sciences/National Research Council has recommended a dietary allowance of 0.15 mg/kg b.w./day. However, excessive intakes of alpha-tocopherol produce adverse clinical and biochemical effects, and self-medication with large doses of vitamin E preparations could present a hazard. The previously-allocated ADI was amended to include a lower value, which reflects the fact that alpha-tocopherol may be an essential nutrient. The upper value, which represents the maximum value for the AID, is based on clinical experience in man. IPCS Inchem: https://www.inchem.org/documents/jecfa/jecmono/v21je05.htm
7-ACETYL-1,1,3,4,4,6-HEXAMETHYLTETRALINE	Liver changes, maternal effects recorded. **NOTE:** Substance has been shown to be mutagenic in at least one assay, or belongs to a family of chemicals producing damage or change to cellular DNA.
4-(P-HYDROXYPHENYL)-2-BUTANONE	Altered sleep time, analgesia recorded.
BENZYL BENZOATE	For certain benzyl derivatives: The members of this group are rapidly absorbed through the gastrointestinal tract, metabolised primarily in the liver, and excreted primarily in the urine either unchanged or as conjugates of benzoic acid derivatives. At high dose levels, gut micro-organisms may act to produce minor amounts of breakdown products. However, no adverse effects have been reported even at repeated high doses. Similarly, no effects were observed on reproduction, foetal development and tumour potential.
PEPPERMINT OIL	Oral (rat) TDLo: 9000 mg/kg/90D-I *[Givaudan] Ataxia, respiratory depression and convulsions recorded. Bacterial mutagen. The toxicity studies of the plant have received controversial results. Some authors reported that the plant may induce hepatic diseases (liver disease), while others found that it is of protective functions against the liver damages which are caused by heavy metal inductions. In addition to that, the toxicities of the plant seem to vary from one cultivar to anotherand are dose dependent. This is probably attributed from the content level of pulegone. Some of the toxic components may come from herbicides
GALAXOLIDE	Changes in liver weight, maternal effects, foetotoxicity reported.
ETHYL MALTOL	Oral (rat) TDLo: 90000 mg/kg/90d-I * HCA Colours MSDS A member or analogue of EFSA Chemical Group 10 secondary aliphatic saturated or unsaturated alcohols, ketones, ketals and esters with a secondary or tertiary oxygenated functional group used as flavourings No safety concern would arise for the consumer from the use of these compounds up to the highest proposed level in feeds. Hazards for skin and eye contact and respiratory exposure are recognised for the majority of the compounds under application. Most are classified as irritating to the respiratory system. Aliphatic acyclic and alicyclic alpha-diketones and alpha-hydroxyketones are generally used as flavouring agents up to average maximum levels of 200 ppm. In rats and mice, orally administered aliphatic alpha-diketones are rapidly absorbed from the gastrointestinal tract. It is anticipated that at low levels of exposure, humans will metabolize aliphatic acyclic alpha-diketone principally by alpha-hydroxylation and subsequent oxidation of the terminal methyl group to yield the corresponding ketocarboxylic acid. The acid may undergo oxidative decarboxylation to yield

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carbon dioxide and a simple aliphatic carboxylic acid, which may be completely metabolized in the fatty acid pathway and citric acid cycle. At high concentrations, another detoxification pathway is used which involves reduction to the diol and subsequent conjugation with glucuronic acid. Acyclic alpha-diketones and alpha-hydroxyketones without a terminal methyl group and alicyclic diketones and hydroxyketones are mainly metabolized by reduction to the corresponding diol, followed by glucuronic acid conjugation and excretion

Compounds belonging to CG 10 are absorbed from the gastrointestinal tract and share common pathways of metabolism: (i) hydrolysis of esters by carboxylesterases, (ii) reduction of ketones to alcohols, (iii) oxidation of alcohols to acids, (iv) alpha–hydroxylation of the terminal methyl group to yield corresponding ketocarboxylic acids, (v) oxidative decarboxylation to yield carbon dioxide and an aliphatic carboxylic acid, and (vi) conjugation of alpha-hydroxyketones or their diol metabolites with glucuronic acid. Aliphatic acyclic diketones and alpha–hydroxyketones, which contain a carbonyl function at the 2-position (i.e. a methyl ketone) are expected to undergo alpha–hydroxylation and subsequent oxidation of the terminal methyl group to eventually yield corresponding ketocarboxylic acids. These compounds are intermediary metabolites (e.g.alpha-ketoacids), which may undergo oxidative decarboxylation to yield carbon dioxide and an aliphatic carboxylic acid. The acid is then metabolised via beta-oxidation and the citric acid cycle. beta-Ketoacids and derivatives readily undergo decarboxylation to yield breakdown products, which are incorporated into normal biochemical pathways. Alternatively, the methyl-substituted diketones may be successively reduced to the corresponding hydroxyketones and diols, which are excreted in the urine as glucuronic acid conjugates. This pathway is favoured at elevated in vivo concentrations, especially for longer chain length ketones. If the carbonyl function is located elsewhere on the chain, reduction is the predominant pathway. alpha-hydroxyketones or their diol metabolites may be excreted as glucuronic acid conjugates. Low concentrations of aliphatic acyclic methyl ketones are mainly metabolised by oxidation of the terminal methyl group. At higher concentrations, acyclic

alpha-diketones are metabolised via a reduction pathway to the diol and subsequent conjugation with glucuronic acid

In a 13-week study in rats (males/females, 15 animals/group), 3-hydroxybutan-2-one was administered with the diet at doses of 0, 85, 330 and 1,345 mg/kg bw per day. No treatment-related effects on body weight gain, haematological and urinary parameters, serum chemistry, organ weight and histopathology were seen up to 330 mg/kg bw per day. Several effects were observed at the highest dose tested, i.e. a reduction in body weight gain associated with a reduction in food and water

consumption, an increase in relative liver weight and a slight anaemia. From this study, a no observed adverse effect level (NOAEL) of 330 mg/kg bw per day could be derived.

A NOAEL of 90 mg/kg bw per day was derived from a 13-week study in rats (15 males/15 females each group), in which diacetyl [07.052] was administered by gavage at nominal doses of 0, 10, 30, 90 and 540 mg/kg bw per day. No adverse effects were seen at the three low doses tested on haematological and urinary parameters, serum chemistry, absolute and relative organ weight and histopathology. Several effects were observed at the highest dose tested (540 mg/kg bw), i.e. a decrease in weight gain associated with an increase in water consumption, anaemia, increased leucocyte count, increased relative weights of the liver, kidneys, adrenals and pituitary glands. At the same dose, stomach lesions seen at

necropsy revealed necrosis with in filtration by inflammatory cells.

A trial was conducted to assess the chronic toxicity of 3-ethylcyclopentan-1,2-dione ((due to keto-enol tautomerism this substance can exist as two isomers; the keto-isomer is 3-ethylcyclopentan-1,2-dione a synonym for the keto-isomer is ethylcyclopentenolone) on reproduction and development in rats (male and female Charles River CD-COBS) following administration to three successive generations. In each generation, rats received diet containing 3-ethylcyclopentan-1,2-dione corresponding to dose levels of 0 (untreated controls), 0 (propylene glycol vehicle), 30, 80, and 200 mg/kg body weight/day. The F0 group (20 animals/sex/treatment) entered the study at weaning and were mated on day 64. Animals from the control groups and the high-dose group were maintained on trial for 12 months. The F1 generation 50 animals/sex per treatment except control, 100 animals/sex) was exposed to the test substance in utero, via milk until weaning and then through the diet for a further 23 months. The final examination of the F1 generation included ophthalmology, clinical chemistry, haematology and a full histopathology. The F1 generation was bred twice (days 99 and 155) and 20 litters/treatment group from the first mating selected to provide the F2 generation which were in turn mated at day 84. The F3 generation were killed after weaning. Survival, food consumption, growth, reproductive performance, haematological and clinical chemistry parameters were not adversely affected. Gross pathological and histopathological examination revealed no significant treatment-related effects. The incidence of benign or malignant tumours in treated animals was not significantly different to that in controls in the

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	F0 and F1 generations. From this study, it is concluded that ethylcyclopentan-1,2-dione was not carcinogenic in rats under the study conditions and that a NOAEL of 200 mg/kg body weight (the highest dose tested) can be derived for chronic and developmental effects. A structural alert for genotoxicity is overruled for 3-ethyl-2-hydroxy-2-cyclopenten-1-one as well as for the nine structurally related substances (alpha,beta-unsaturated alicyclic ketones and their precursors) Maltol and ethyl maltol were considered separately because in contrast to the other substances in this subgroup they contain a ring-oxygen atom. Ethyl maltol induced gene mutations in bacteria Maltol induced gene mutations in bacteria and sister chromatid exchanges (SCE) in human lymphocytes In vivo, maltol induced micronuclei in mouse bone marrow after intraperitoneal application. Negative results were obtained in a sex-linked recessive lethal mutation assay in Drosophila. However, the micronucleus assay is considered more relevant than the Drosophila assay.Ethyl maltol induced gene mutations in bacteria EFSA Scientific Opinion October 2016: Safety and efficacy of secondary aliphatic saturated or unsaturated alcohols, ketones, ketals and esters with a second secondary or tertiary oxygenated functional group belonging to chemical group 10 when used as flavourings for all animal species Safety Evaluation of Aliphatic, Acyclic and Alicyclic alpha-Diketones and related Hydroxyketones; WHO Food Additive Series Joint FAO/ WHO Expert Committee on Food Additives 1999 The alpha,beta-unsaturated aldehyde and ketone structures are considered by the Panel to be structural alerts for genotoxicity. Flavouring Group Evaluation 213: alpha,beta-Unsaturated alicyclic ketones and precursors from chemical subgroup 2.7 of FGE.19: Scientific Opinion of the Panel on Food Contact Materials, Enzymes, Flavourings and Processing Aids (CEF)
BENZYL ALCOHOL	CYP1A2 is a member of the cytochrome P450 super family, is one of the best characterized. It is responsible for the metabolism of commonly drugs belonging to classes such as antidepressants, antipsychotics, mood stabilizers, beta blockers and sedative/hypnotics CYP1A2 also metabolises a number of procarcinogens (such as those in cigarettes). Cigarette smoking may lead to three fold increase in 1A2 activity, which explains why smokers require higher doses of beta blockers than than non-smokers Drugs that inhibit CYP1A2 will predictably increase the plasma concentrations of the medications or decrease in clearance of substrates. Drugs such as ciprofloxacin, fluvoxamine, verapamil cimetidine , caffeine and isoniazid are inhibitors of CYP1A2 enzyme. Vegetables such as grape fruit juice, cumic and turmeric are inhibitors of the CYP1A2 enzyme which may leads to increase plasma concentration of psychotropics Unlike benzylic alcohols, the beta-hydroxyl group of the members of benzyl alkyl alcohols contributes to break down reactions but do not undergo phase II metabolic activation. Though structurally similar to cancer causing ethyl benzene, phenethyl alcohol is only of negligible concern due to limited similarity in their pattern of activity. For benzoates: Benzyl alcohol, benzoic acid and its sodium and potassium salt have a common metabolic and excretion pathway. All but benzyl alcohol are considered to be unharmful and of low acute toxicity. They may cause slight irritation by oral, dermal or inhalation exposure except sodium benzoate which doesn't irritate the skin. Studies showed increased mortality, reduced weight gain, liver and kidney effects at higher doses, also, lesions of the brains, thymus and skeletal muscles may occur with benzyl alcohol. However, they do not cause cancer, genetic or reproductive toxicity. Developmental toxicity may occur but only at maternal toxic level.
MENTHOL	Bacterial mutagenicity (Ames) test: negative * No evidence of carcinogenic, mutagenic or teratogenic effects After inhalation ; mucosal irritation After swallowing: gastric spasms, nausea, vomiting Systemic effects: dizziness, ataxia (impaired locomotor coordination), tiredness, depressed respiration. Risk of methaemoglobin formation. *Merck MSDS With few exceptions* (see below), there are no safety concerns regarding certain cyclic and non-cyclic terpene alcohols **, as fragrance ingredients, under present declared levels of use and exposure, because - They have low acute toxicity - No significant toxicity was observed in repeat dose toxicity tests - They were not found to cause mutations or genetic toxicity - Substances in this group are processed similarly in the body - There is no indication of persistent breakdown products causing severe toxicity - They practically do not irritate the skin - They have a generally low potential for sensitization - The margin of safety is more than 100 times the maximum daily exposure.

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	*Safety concerns exist for the following substances for the following reasons: - 6,7-dihydrogeraniol, hydroabietyl alcohol and 2-isopropyl-2-decahydronapthalenol are potent skin sensitisers. - Farnesol is a weak sensitizer. - Scalerol and linalool may contain impurities and/or oxidation products that are strong sensitisers. - No sensitization test results were available for 2(10)-pinen-3-ol, 2,6-dimethyloct-3,5-dien-2-ol, and 3,7-dimethyl-4,6-octadien-3-ol. These materials should be regarded as potential sensitizers until tested. ** The common characteristic structural element of acyclic -noncyclic- and cyclic terpene alcohols is the typically branched isoprene unit 2-methyl-1,3-butadiene
BETA-CARYOPHYLLENE	-Caryophyllene acts as a full agonist of the Cannabinoid receptor type 2 (CB2 receptor) in rats.[7] ß-Caryophyllene has a binding affinity of Ki = 155nM at the CB2 receptors in mice.[8] ß-Caryophyllene has been shown to have anti-inflammatory action linked to its CB2 receptor activity in a study comparing the pain killing effects in mice with and without CB2 receptors with the group of mice without CB2 receptors seeing little benefit compared to the mice with functional CB2 receptors.[7] ß-Caryophyllene has the highest cannabinoid activity compared to the ring opened isomer a-caryophyllene Humulene which may modulate CB2 activity.[9] To compare binding, Cannabinol (CBN) binds to the CB2 receptors as a partial agonist with an affinity of CB2 Ki = 126.4 nM[10] while Delta-9-Tetrahydrocannabinol binds to the CB2 receptors as a partial agonist with an affinity of Ki = 36nM.[11] Caryophyllene helps to improve cold tolerance at low ambient temperatures. Wild giant pandas frequently roll in horse manure, which contains beta-caryophyllene/caryophyllene oxide, to inhibit transient receptor potential melastatin 8 (TRPM8), an archetypical cold-activated ion channel of mammal Caryophyllene has been given GRAS (generally regarded as safe) designation by the FDA and is approved by the FDA for use as a food additive, typically for flavoring] Rats given up to 700mg/kg daily for 90 days did not produce any significant toxic effects [15] Caryophyllene has an LD50 of 5,000mg/kg in mice In animal testing, cannabinoids (found in marijuana) caused changes in behaviour, hyperactivity, and seizures. High doses has caused delayed death. Long-term effects included central nervous system depression, showing as inco-ordination, decreased activity and generalized depression, with prolonged exposure leading to development of tolerance and symptoms of central nervous system stimulation, characterized by irritability, hypersensitivity, excessive activity, aggression, tremor and convulsions. Animals showed impaired specific motor and learning skills. Monkeys exposed chronically to marijuana showed changes in emotion, endocrine function and memory. It has been thought that THC (tetrahydrocannabinol) may be selectively lethal to female embryos. Animal studies have shown that marijuana extracts and THC cause birth defects. Marijuana and THC appear to affect all phases of reproduction in human men and women, by altering sex hormone levels, acting directly on the reproductive organs, or both. Chronic marijuana smokers have lower sperm counts and poorer sperm motility than the general population. In women, THC and marijuana has been shown to block ovulation and disrupt the menstrual cycle. In humans, exposure before birth is reportedly associated with voice anomalies, short stature, low body weight, decreased head size and decreased verbal and memory scores on intelligence tests in infants and children. Regular use of marijuana has reportedly been associated with cancer of the upper airway, lung and tongue in patients under 40 years old. An increased incidence of leukaemia in offspring of mothers who smoked marijuana before or during pregnancy has also been reported. Animal testing has shown an increase in benign tumours of the thyroid.
PULEGONE	* Opinion of the Scientific Committee on Food on pulegone and menthofuran **WARNING:** This substance has been classified by the IARC as Group 2B: Possibly Carcinogenic to Humans.
ALPHA-PINENE	The material may cause severe skin irritation after prolonged or repeated exposure and may produce on contact skin redness, swelling, the production of vesicles, scaling and thickening of the skin. Repeated exposures may produce severe ulceration.
P-CYMENE	For aromatic terpenes: p-cymene and cumene have low toxic potential and are excreted in the urine. At very high doses in animal testing, inco-ordination, damage to the kidneys and lung inflammation, with decrease in thymus weight, occurred. This group of substances does not seem to cause cancer, genetic damage or developmental toxicity and has low potential for reproductive toxicity.
LEMON OIL	The essential oils, oleoresins (solvent-free), and natural extractives (including distillates) derived from citrus fruits are generally recognized as safe (GRAS) for their intended use in foods for human consumption.

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	Botanicals such as citrus are comprised of hundreds of ingredients, some of which have the potential to cause toxic effects; for example, bergapten (5-methoxypsoralen; 5-MOP) is a naturally occurring furocoumarin (psoralen) in bergamot oil that causes light-mediated toxicity. Acute toxicity: Animal testing shows that the acute toxicity of these substances is generally low via skin contact. Skin irritation: In animal testing, undiluted citrus essential oils caused varying degrees of irritation. In humans, no irritation was observed after applying a variety of these oils to skin. Eye irritation: There appeared to be no significant eye irritation in testing with these substances. Sensitisation: Testing in humans have shown that these substances generally do not cause sensitisation. However, among professional food handlers, some proportion (under 10%) had positive reactions to orange and lemon peel. Light-mediated toxicity and sensitization: Testing for this group of substances has yielded mixed results. Light-mediated toxicity and sensitization have been seen in several people exposed to bergamot oil or limes/lime juice. Cancer-causing potential: Animal testing showed that essential oils of citrus fruits promoted tumours. However, most were benign.
WATER & PEPPERMINT OIL & MENTHYL ACETATE & MENTHOFURAN & LEMON OIL	No significant acute toxicological data identified in literature search.
CASTOR OIL, HYDROGENATED, ETHOXYLATED & BUTYL ALCOHOL PROPOXYLATED	Polyethers (such as ethoxylated surfactants and polyethylene glycols) are highly susceptible to being oxidized in the air. They then form complex mixtures of oxidation products. Animal testing reveals that whole the pure, non-oxidised surfactant is non-sensitizing, many of the oxidation products are sensitisers. The oxidization products also cause irritation.
ETHYLENE GLYCOL PHENYL ETHER & CORNMINT OIL & MENTHOL & LEMON OIL	The material may produce severe irritation to the eye causing pronounced inflammation. Repeated or prolonged exposure to irritants may produce conjunctivitis.
ETHYLENE GLYCOL PHENYL ETHER & PEPPERMINT OIL & GALAXOLIDE & BENZYL ALCOHOL & DIPENTENE & GAMMA-TERPINENE & P-CYMENE & LEMON OIL	The material may cause skin irritation after prolonged or repeated exposure and may produce on contact skin redness, swelling, the production of vesicles, scaling and thickening of the skin.
ETHYLENE GLYCOL PHENYL ETHER & BENZYL ALCOHOL	The aryl alkyl alcohol (AAA) fragrance ingredients have diverse chemical structures, with similar metabolic and toxicity profiles. The AAA fragrances demonstrate low acute and subchronic toxicity by skin contact and swallowing. At concentrations likely to be encountered by consumers, AAA fragrance ingredients are non-irritating to the skin. The potential for eye irritation is minimal. With the exception of benzyl alcohol, phenethyl and 2-phenoxyethyl AAA alcohols, testing in humans indicate that AAA fragrance ingredients generally have no or low sensitization potential. Available data indicate that the potential for photosensitization is low. Testing suggests that at current human exposure levels, this group of chemicals does not cause maternal or developmental toxicity. Animal testing shows no cancer-causing evidence, with little or no genetic toxicity. It has been concluded that these materials would not present a safety concern at current levels of use, as fragrance ingredients.

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CITRIC ACID, MONOHYDRATE & EUCALYPTOL & PEPPERMINT OIL & CORNMINT OIL & MENTHOL & BETA-PINENE & ALPHA-PINENE & GAMMA-TERPINENE & P-CYMENE & LEMON OIL	Asthma-like symptoms may continue for months or even years after exposure to the material ends. This may be due to a non-allergic condition known as reactive airways dysfunction syndrome (RADS) which can occur after exposure to high levels of highly irritating compound. Main criteria for diagnosing RADS include the absence of previous airways disease in a non-atopic individual, with sudden onset of persistent asthma-like symptoms within minutes to hours of a documented exposure to the irritant. Other criteria for diagnosis of RADS include a reversible airflow pattern on lung function tests, moderate to severe bronchial hyperreactivity on methacholine challenge testing, and the lack of minimal lymphocytic inflammation, without eosinophilia. RADS (or asthma) following an irritating inhalation is an infrequent disorder with rates related to the concentration of and duration of exposure to the irritating substance. On the other hand, industrial bronchitis is a disorder that occurs as a result of exposure due to high concentrations of irritating substance (often particles) and is completely reversible after exposure ceases. The disorder is characterized by difficulty breathing, cough and mucus production.
ALPHA-TOCOPHEROL & 7-ACETYL-1,1,3,4,4,6-HEXAMETHYLTETRALINE	Based on laboratory and animal testing, exposure to the material may result in irreversible effects and mutations in humans.
EUCALYPTOL & GAMMA-TERPINENE	The terpenoid hydrocarbons are found in needle trees and deciduous plants. This category of chemicals shows very low acute toxicity. They are ecreted in the urine. They are unlikely to cause genetic damage, but animal testing shows that they do cause increased rates of kidney cancer. They have low potential to cause reproductive and developmental toxicity.
EUCALYPTOL & PEPPERMINT OIL & DIPENTENE & LEMON OIL	d-Limonene is readily absorbed by inhalation and swallowing. Absorption through the skin is reported to the lower than by inhalation. It is rapidly distributed to different tissues in the body, readily metabolized and eliminated, primary through the urine. Limonene shows low acute toxicity by all three routes in animals. Limonene is a skin irritant in both experimental animals and humans. Limited data is available on the potential to cause eye and airway irritation. Autooxidised products of d-limonene have the potential to sensitise the skin. Limited data is available on the potential to cause respiratory sensitization in humans. Limonene will automatically oxidize in the presence of light in air, forming a variety of oxygenated monocyclic terpenes. When contact with these oxidation products occurs, the risk of skin sensitization is high. Limonene does not cause genetic toxicity of birth defects, and it is not toxic to the reproductive system.
7-ACETYL-1,1,3,4,4,6-HEXAMETHYLTETRALINE & GALAXOLIDE	There is increasing evidence emerging that some nitromusks and polycyclic musks, including those commonly used in perfumes, may be capable (either as parent compounds or as metabolites) of interfering with hormone communication systems in fish, amphibians and mammals, and may exacerbate the effects of exposure to other toxic chemicals.
BENZYL BENZOATE & GALAXOLIDE & BENZYL ALCOHOL & CORNMINT OIL & MENTHYL ACETATE	Fragrance allergens act as haptens, low molecular weight chemicals that cause an immune response only when attached to a carrier protein. However, not all sensitizing fragrance chemicals are directly reactive, but require previous activation. A prehapten is a chemical that itself causes little or no sensitization, but is transformed into a hapten in the skin (bioactivation), usually via enzyme catalysis. It is not always possible to know whether a particular allergen that is not directly reactive acts as a prehapten or a prohapten , or both. Prohaptens: Compounds that are bioactivated in the skin and thereby form haptens are referred to prohaptens. The possibility of a prohapten being activated cannot be avoided by outside measures. Activation processes increase the risk for cross-reactivity between fragrance substances. Various enzymes play roles in both activating and deactivating prohaptens. Skin-sensitizing prohaptens can be recognized and grouped into chemical classes based on knowledge of xenobiotic bioactivation reactions, clinical observations and/or studies of sensitization. QSAR prediction: Prediction of sensitization activity of these substances is complex, especially for those substances that can act both as pre- and prohaptens.
BENZYL BENZOATE & BENZYL ALCOHOL	This is a member or analogue of a group of benzyl derivatives generally regarded as safe (GRAS), based partly on their self-limiting properties as flavouring substances in food. In humans and other animals, they are rapidly absorbed, broken down and excreted, with a wide safety margin. They also lack significant potential to cause genetic toxicity and mutations. The intake of benzyl derivatives as natural components of traditional foods is actually higher than the intake as intentionally added flavouring substances.

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CORNMINT OIL & MENTHOL	For kappa-opioid agonists: Kappa-opioid receptors are widely distributed in the brain, spinal cord and in pain neurons. Kappa-opioid receptor agonists produce unpleasant moods such as sadness, but their effects have been shown to vary between sexes. The receptors are thought to play a major role in mediating addiction and its remission, as well as the hallucinogenic side effects of opioids such as pentazocine. It is now widely accepted that kappa-opioid partial agonists block signals to the conscious mind from other parts of the brain and cause stupor and confusion. Although some of the agents are thought to have reduced potential for abuse due to their hallucinogenic side effects, some drugs in this group are abused even though the substance causes low mood. Kappa-opioid receptors have associated with a reduction in self-administration of alcohol and have been used to treat heroin dependence. Kappa-opioid receptor ligands cause a diuretic effect (increasing urine output), kappa-opioid agonists may also be protective to the nervous system where oxygen deficiency occurs, and this may be the target of new treatments.
MENTHOL & PULEGONE	A member or analogue of a group of aliphatic and alicyclic terpenoid tertiary alcohols and structurally related substances generally regarded as safe. Most alicyclic substances used as flavour ingredients are mono- and bicyclic terpenes which occur naturally in a wide variety of foods. With the exception of pulegone, alicyclic substances show very low oral acute toxicity. In most subchronic studies performed on animals, no adverse effects were observed at any dose level.
BETA-CARYOPHYLLENE & PULEGONE	Epoxidation of double bonds is a common bioactivation pathway for alkenes. The allylic epoxides formed were found to be sensitizing. Research has shown that conjugated dienes in or in conjunction with a six-membered ring are prohaptens, while related dienes containing isolated double bonds or an acrylic conjugated diene were weak or non-sensitising.
BETA-CARYOPHYLLENE & BETA-PINENE & ALPHA-PINENE & GAMMA-TERPINENE & LEMON OIL	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

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compound was converted to MMTC within 1 hour. Thus, MMTC is the appropriate surrogate for mammalian toxicology studies via the oral route.
TERP is a reaction product of MMTC and dimethyltin dichloride (DMTC), Na2S, and tall oil fatty acid [a mixture of carboxylic acids, predominantly C-18]. The reaction product is a mixture of carboxylic esters and includes short oligomers of mono/dimethyltins bridged by sulfide groups. Although the tall oil component of TERP is not structurally similar to EHTG, TERP s conversion to MMTC justifies its inclusion. While the contribution of the various ligands to the overall toxicity may vary, the contribution is expected to be small relative to that of the MMTC. Further, the EHTG ligand from MMT(EHTG) is likely to be more toxic than the oleic or linoleic acid from TERP so inclusion of TERP in the category is a rather conservative approach. The other possible degradate of tall oil and EHTG is 2-mercaptoethanol (2-ME), and it is common to both ligands.
Data for MMT(EHTG) and MMT(IOTG) are used interchangeably because they are isomers differing only slightly in the structure of the C-8 alcohol of the mercaptoester ligand. In addition, the breakdown products of MMT(EHTG) and MMT(IOTG) are the thioglycolate esters (EHTG and IOTG), which have the common degradates, thioglycolic acid and C-8 alcohols (either 2-ethylhexanol or isooctanol). EHTG and IOTG also have similar physicochemical and toxicological properties.
The chemistry of the alkyl organotins has been well studied. For organotins, like MMT(EHTG), the alkyl groups are strongly bound to tin and remain bound to tin under most reaction conditions. However, other ligands, such as carboxylates or sulfur based ligands (EHTG), are more labile and are readily replaced under mild reaction conditions. To assess the reactivity of MMT(EHTG) under physiological conditions simulating the mammalian stomach, an in-vitro hydrolysis test was performed. This in vitro test provides chemical information that strongly suggests both the probable in vivo metabolic pathway and the toxicokinetics of the MMT(EHTG) substance. This result verifies that under physiological conditions MMT(EHTG) is rapidly and essentially completely converted to the corresponding monomethyltin chloride, MMTC.
Acute toxicity:
The majority of toxicology studies were conducted with commercial mixtures having high monoalkyltin to dialkyltin ratios.
Gastric hydrolysis studies were conducted with TERP and MMT(EHTG) in which simulated gastric fluid [0.07M HCl under physiological conditions] converted these substances to methyltin chloride and the respective organic acids. Based on data for DMTC and DMT esters the dermal penetration of MMTC and its esters is expected to be low.
Oral:
Acute oral LD50 values for MMTC, MMT(EHTG), MMT(IOTG), and TERP indicated low to moderate toxicity; the most reliable data place the LD50s in the range of 1000 mg/kg.
The acute oral LD50 of MMT(2-EHMA) was 880 mg/kg in rats. Clinical observations included depression, comatose, piloerection, eye squinting, hunched posture, laboured breathing, ataxia, faecal/urine stains, and masticatory movement. No gross pathological changes were reported in surviving animals.
Dermal
Acute dermal LD50 values were =1000 mg/kg bw, and inhalation LC50 was >200 mg/L. MMTC was corrosive to skin and assumed corrosive to eyes.
The acute dermal LD50 of MMT(2-EHMA) in rabbits was 1000 (460 to 2020) mg/kg for females and 2150 (1000 to 4620) mg/kg for males. There were no deaths at 215 and 464 mg/kg, 0/2 males and 1/2 females died at 1000 mg/kg and 1/2 males and 2/2 females died at 2150 mg/kg. All animals died at 4640 and 10 000 mg/kg. A variety of clinical abnormalities were observed and disappeared in surviving animals by the end of the exposure period. Clinical signs included death, uncoordinated movements, shaking, and hypersensitivity to external stimuli.
Gross necropsy results for animals that died during the study included irritated intestines; blanched stomach; reddened lungs; pale or congested kidneys; and oral, ocular and/or nasal discharges
Inhalation:
The acute inhalation LC50 of MMT(2-EHMA) was 240 mg/L.
The study reported an acute inhalation LC50 of 240 (212 to 271) mg/L in a 1-hr aerosol exposure to male and female rats. The mortality rate was 2/10, 6/10, 9/10 and 10/10 animals at dose levels of 200, 250, 300 and 250 mg/L/hr, respectively. Gross findings included blood in lungs, dark spleen, pale kidneys, fluid in the chest cavity, and heart failure. The slope of the dose-response curve was 1.22 (1.04 to 1.43).
Irritation:
MMT(IOTG)/(EHTG) are irritating to skin, but not to eyes.
Sensitisation:

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No data on sensitization are available on MMT(EHTG/(IOTG), but the hydrolysis products EHTG or IOTG are sensitizers. No primary irritation data were available for TERP, but it was a sensitizer in the mouse Local Lymph Node Assay.
Topical application with 5, 25 and 50 % v/v MMT(2-EHMA) elicited a stimulation index (SI) of 2.13, 7.25 and 9.05, respectively in a local lymph node assay (OECD 429), thus the material is a sensitiser.
Repeat dose toxicity:
There are no repeated-dose studies for the category members via the dermal or inhalation routes.
In a 90-day repeated dose oral study of MMTC, treatment-related changes were limited to the high dose group (750 ppm in diet; 50 mg/kg bw/d with some gender-related variation). Organ weight changes (adrenal, kidney, thymus, spleen, brain, epididymides), haematology, clinical chemistry, and urinalysis changes were noted, but histopathology only confirmed effects in the thymus and brain. The critical toxic effects were neurotoxicity and thymic atrophy. Both sexes had decreased cortex/medulla ratios in the thymus. In the brain there was loss of perikarya of neuronal cells in the pyramidal layer of the Hippocampus CA1/2 in both sexes, and in males there was loss of perikarya in the piriform cortex. The NOAEL was 150 ppm (10 mg/kg bw/d). Another 90-day dietary study using MMTC showed increased relative kidney weights and slight to moderate epithelial hyperplasia of the bladder in females at the lowest dose (NOAEL <20 ppm in diet [<1-3.6 mg/kg bw/d]) and additional effects including increased relative thymus weights in females and urinalysis results in both sexes at higher doses.
A 90-day dietary study with dose levels of 30, 100, 300, and 1000 ppm TERP in the diet resulted in slightly decreased food intake, body and organ weight changes, and decreased specific gravity of the urine at the highest dose. The NOAEL was 300 ppm in diet (equivalent to 15 mg/kg bw/d). A 28-day gavage study using TERP showed changes in clinical chemistry and slight differences in haematology at 150 mg/kg bw/d and higher. The NOAEL was 50 mg/kg bw/d.
The effects of MMT(IOTG) were evaluated in a 90-day dietary study using doses of 100, 500, and 1500 ppm (decreased from 2500 ppm) in the diet. Based on clinical chemistry effects at 500 ppm and other effects at higher doses, the NOAEL was 100 ppm in diet (approximately 6-21 mg/kg bw/d).
Neurotoxicity:
In a guideline 90-day subchronic dietary study conducted in Wistar rats, effects occurred at the high dose of 750 ppm MMT(2-EHMA, (equivalent to 49.7 mg/kg bw/day in males and 53.6 mg/kg bw/day in females), which consisted of changes in neurobehavioral parameters and associated brain histopathology. The NOAEL was the next lower dose of 150 ppm (equivalent to 9.8 mg/kg bw/day in males and 10.2 mg/kg bw/day in females
Immunotoxicity:
Immune function was assessed in male Sprague-Dawley rats exposed to the mixture of organotins used in PVC pipe production.
Adult male rats were given drinking water for 28 d containing a mixture of dibutyltin dichloride (DBTC), dimethyltin dichloride (DMTC), monobutyltin trichloride (MBT), and monomethyltin trichloride (MMT) in a 2:2:1:1 ratio, respectively, at 3 different concentrations (5:5:2.5:2.5, 10:10:5:5, or 20:20:10:10 mg organotin/L). Rats were also exposed to MMT alone (20 or 40 mg MMT/L) or plain water as a control. Delayed-type hypersensitivity, antibody synthesis, and natural killer cell cytotoxicity were evaluated in separate endpoint groups immediately after exposure ended.
The evaluated immune functions were not affected by the mixture or by MMT alone. The data suggest that immunotoxicity is unlikely to result from the concentration of organotins present in drinking water delivered via PVC pipes, as the concentrations used were several orders of magnitude higher than those expected to leach from PVC pipes
Genotoxicity:
In a guideline 90-day subchronic dietary study in rats,with MMT(2-EHMA), based on the changes in neurobehavioral parameters and associated brain histopathology that occurred at the high dose of 750 ppm (equivalent to 49.7 mg/kg bw/day in males and 53.6 mg/kg bw/day in females), as well as changes in haematology, clinical chemistry, urinalysis, organ weights, and pathology of the thymus at the same dose, the NOAEL was the next lower dose of 150 ppm (equivalent to 9.8 mg/kg bw/day in males and 10.2 mg/kg bw/day in females).
The monomethyltin compounds as a class are not mutagenic in the Ames test. TERP was positive in a human lymphocyte assay. MMTC was equivocal for induction of micronucleated polychromatic erythrocytes (MPEs) in an in vivo rat micronucleus test (OECD 474). In this study a statistically significant increase in MPE was observed only at 24 h and not at 48 h after treatment and there was no dose-response. Based on these observations the overall conclusion is that MMTC does not have genotoxic potential.
From the results obtained in a micronucleus test with MMT(2-EHMA), it was demonstrated that the substance was weakly genotoxic to bone marrow cells of rats and that the substance has the potential to

Continued...

	induce damage to the mitotic spindle apparatus of the bone marrow target cells. Carcinogenicity: In a limited carcinogenicity study, MMT(EHTG) produced no compound-related macroscopic or microscopic changes in rats fed 100 ppm in the diet for two years. Toxicity to reproduction: In the reproductive satellite portion of the 90-day study using MMTC (with dose levels of 30, 150, and 750 ppm in the diet), post-implantation loss, decreased litter size and increased neonatal mortality occurred at 750 ppm (26-46 mg/kg bw/d for females). Maternal gestational body weights were transiently suppressed and other maternal toxicity was inferred from the repeated dose results at this dose. There were no malformations observed at any dose. The NOAEL for maternal toxicity, and reproductive, and foetotoxic effects was 150 ppm in the diet (6-12 mg/kg bw/d). SIDS Inital Assessment Profile (SIAM 23 2006) ECHA Registration Dossier for MMT(2-EHMA) (ethylhexyl 10-ethyl-4-[[2-[(2-ethylhexyl)oxy]-2-oxoethyl]thio]-4-methyl-7-oxo-8-oxa-3,5-dithia-4-stannatetradecanoate)
BETA-PINENE & ALPHA-PINENE & LEMON OIL	Bicyclic terpenes are very low in acute toxicity. However, repeated dosing may have deleterious effects on the liver and kidney. Members of this category show no significant reproductive or developmental toxicity and may have a little, if any, potential to alter genetic material.

Acute Toxicity	✗	**Carcinogenicity**	✗
Skin Irritation/Corrosion	✗	**Reproductivity**	✗
Serious Eye Damage/Irritation	✗	**STOT - Single Exposure**	✗
Respiratory or Skin sensitisation	✓	**STOT - Repeated Exposure**	✗
Mutagenicity	✗	**Aspiration Hazard**	✗

Legend: ✗ *– Data either not available or does not fill the criteria for classification*
✓ *– No data available for the final mixture, but the level of individual ingredients are considered in the overall property.*

SECTION 12 Ecological information

Toxicity

Room Spray (First Snow)

Endpoint	Test Duration (hr)	Species	Value	Source
Not Available	Not Available	Not Available	Not Available	Not Available

water

Endpoint	Test Duration (hr)	Species	Value	Source
Not Available	Not Available	Not Available	Not Available	Not Available

castor oil, hydrogenated, ethoxylated

Endpoint	Test Duration (hr)	Species	Value	Source
EC50(ECx)	48h	Crustacea	>1mg/l	2
EC50	48h	Crustacea	>1mg/l	2
EC50	72h	Algae or other aquatic plants	>1mg/l	2
LC50	96h	Fish	>1mg/l	2

sodium citrate

Endpoint	Test Duration (hr)	Species	Value	Source
EC50	48h	Crustacea	>50mg/l	2
EC50	96h	Algae or other aquatic plants	>18000-32000mg/l	1
EC50(ECx)	48h	Crustacea	>50mg/l	2

butyl alcohol propoxylated

Endpoint	Test Duration (hr)	Species	Value	Source
EC50	48h	Crustacea	>500mg/l	1

Continued...

EC50	72h	Algae or other aquatic plants	>500mg/l	1
EC50	96h	Algae or other aquatic plants	744.74mg/l	2
NOEC(ECx)	72h	Algae or other aquatic plants	62.5mg/l	2
LC50	96h	Fish	1350mg/l	1
LC50	96h	Fish	564mg/l	2
EC50	48h	Crustacea	>100mg/l	2
EC50	72h	Algae or other aquatic plants	445mg/l	2
NOEC(ECx)	96h	Algae or other aquatic plants	<15.9mg/l	2
EC50	96h	Algae or other aquatic plants	315mg/l	2
EC50	48h	Crustacea	89-101mg/L	4
EC50(ECx)	48h	Crustacea	89-101mg/L	4
LC50	96h	Fish	48-52mg/L	4

ethylene glycol phenyl ether

Endpoint	Test Duration (hr)	Species	Value	Source
EC50	48h	Crustacea	460mg/l	2
EC50	72h	Algae or other aquatic plants	>100mg/l	2
NOEC(ECx)	24h	Fish	5mg/l	2
LC50	96h	Fish	154mg/l	2

citric acid, monohydrate

Endpoint	Test Duration (hr)	Species	Value	Source
EC10(ECx)	24h	Algae or other aquatic plants	>1000mg/l	4

ethylhexylglycerin

Endpoint	Test Duration (hr)	Species	Value	Source
EC50	48h	Crustacea	78.3mg/l	2
NOEC(ECx)	72h	Fish	<1.5mg/l	2
EC50	72h	Algae or other aquatic plants	48.28mg/l	2
LC50	96h	Fish	60.2mg/l	2

alpha-tocopherol

Endpoint	Test Duration (hr)	Species	Value	Source
LC50	96h	Fish	>10mg/l	2
EC50	48h	Crustacea	>23.53mg/l	2
EC50	72h	Algae or other aquatic plants	>25.8mg/l	2
NOEC(ECx)	384h	Fish	1mg/l	4

eucalyptol

Endpoint	Test Duration (hr)	Species	Value	Source
EC50	48h	Crustacea	>100mg/l	2
EC50	72h	Algae or other aquatic plants	>74mg/l	2
EC50	96h	Algae or other aquatic plants	>74mg/l	2
NOEC(ECx)	96h	Algae or other aquatic plants	9.1mg/l	2
LC50	96h	Fish	57mg/l	2

7-acetyl-1,1,3,4,4,6-hexamethyltetraline

Endpoint	Test Duration (hr)	Species	Value	Source
EC50	72h	Algae or other aquatic plants	0.438-0.508mg/l	4
NOEC(ECx)	3h	Crustacea	0.004-0.009mg/L	4
LC50	96h	Fish	0.95-1.05mg/l	4

Continued...

4-(p-hydroxyphenyl)-2-butanone

Endpoint	Test Duration (hr)	Species	Value	Source
LC50	96h	Fish	75.746mg/l	2
EC50	48h	Crustacea	<100mg/l	2
EC50(ECx)	48h	Crustacea	<100mg/l	2
EC50	96h	Algae or other aquatic plants	101.054mg/l	2

benzyl benzoate

Endpoint	Test Duration (hr)	Species	Value	Source
EC50	48h	Crustacea	3.09mg/l	2
EC50	72h	Algae or other aquatic plants	0.311mg/l	2
NOEC(ECx)	840h	Fish	0.023mg/l	2
LC50	96h	Fish	1.06-2.21mg/L	4

peppermint oil

Endpoint	Test Duration (hr)	Species	Value	Source
EC50	48h	Crustacea	2.7mg/l	2
EC50	96h	Algae or other aquatic plants	2.61mg/l	2
EC50(ECx)	96h	Algae or other aquatic plants	2.61mg/l	2
LC50	96h	Fish	3.4mg/l	2
EC50	48h	Crustacea	2.43mg/l	2
EC50	96h	Algae or other aquatic plants	2.63mg/l	2
EC50(ECx)	48h	Crustacea	2.43mg/l	2
LC50	96h	Fish	3.01mg/l	2

galaxolide

Endpoint	Test Duration (hr)	Species	Value	Source
EC50	48h	Crustacea	0.194mg/l	2
EC50	72h	Algae or other aquatic plants	0.678-0.778mg/l	4
NOEC(ECx)	3h	Crustacea	<=0.001mg/L	4
LC50	96h	Fish	0.464-0.512mg/L	4

ethyl maltol

Endpoint	Test Duration (hr)	Species	Value	Source
EC50	48h	Crustacea	27mg/l	2
EC50	72h	Algae or other aquatic plants	7.2mg/l	2
NOEC(ECx)	72h	Algae or other aquatic plants	0.77mg/l	2
LC50	96h	Fish	>85mg/l	2

benzyl alcohol

Endpoint	Test Duration (hr)	Species	Value	Source
EC50	48h	Crustacea	230mg/l	2
EC50	72h	Algae or other aquatic plants	500mg/l	2
NOEC(ECx)	336h	Fish	5.1mg/l	2
EC50	96h	Algae or other aquatic plants	76.828mg/l	2
LC50	96h	Fish	10mg/l	2

cornmint oil

Endpoint	Test Duration (hr)	Species	Value	Source
Not Available	Not Available	Not Available	Not Available	Not Available

glyceryl triacetate

Endpoint	Test Duration (hr)	Species	Value	Source

Continued...

	EC50	48h	Crustacea	380mg/l	1
	EC50	72h	Algae or other aquatic plants	>940mg/l	2
	EC0(ECx)	48h	Crustacea	65mg/l	1
	LC50	96h	Fish	>100mg/l	2

	Endpoint	Test Duration (hr)	Species	Value	Source
menthol	EC50	48h	Crustacea	26.6mg/l	2
	EC50	72h	Algae or other aquatic plants	0.33mg/l	2
	NOEC(ECx)	72h	Algae or other aquatic plants	0.089mg/l	2
	LC50	96h	Fish	18.9mg/l	2

	Endpoint	Test Duration (hr)	Species	Value	Source
menthone	EC50	48h	Crustacea	24.987mg/L	2
	EC50	72h	Algae or other aquatic plants	65mg/l	2
	EC0(ECx)	48h	Crustacea	11.7mg/l	2
	LC50	96h	Fish	>28mg/l	2
	EC50	48h	Crustacea	26.6mg/l	2
	EC50	72h	Algae or other aquatic plants	>2.5mg/l	2
	EC50	96h	Algae or other aquatic plants	13.399mg/l	2
	NOEC(ECx)	72h	Algae or other aquatic plants	2.5mg/l	2
	LC50	96h	Fish	13mg/l	2

	Endpoint	Test Duration (hr)	Species	Value	Source
menthyl acetate	EC50	48h	Crustacea	9.1mg/l	2
	EC50	72h	Algae or other aquatic plants	0.71mg/l	2
	NOEC(ECx)	72h	Algae or other aquatic plants	0.16mg/l	2
	LC50	96h	Fish	6.72mg/l	2

	Endpoint	Test Duration (hr)	Species	Value	Source
menthofuran	Not Available	Not Available	Not Available	Not Available	Not Available

	Endpoint	Test Duration (hr)	Species	Value	Source
beta-caryophyllene	EC50	48h	Crustacea	>0.17mg/l	2
	EC50	72h	Algae or other aquatic plants	>0.033mg/l	2
	NOEC(ECx)	72h	Algae or other aquatic plants	>=0.033mg/l	2

	Endpoint	Test Duration (hr)	Species	Value	Source
pulegone	EC50	48h	Crustacea	24.4mg/L	4
	EC50(ECx)	48h	Crustacea	24.4mg/L	4

	Endpoint	Test Duration (hr)	Species	Value	Source
dipentene	EC50	48h	Crustacea	28.2mg/l	4
	EC50(ECx)	24h	Fish	~17.2mg/L	4
	LC50	96h	Fish	35.4-41.8mg/l	4

Continued...

beta-pinene

Endpoint	Test Duration (hr)	Species	Value	Source
NOEC(ECx)	1440h	Fish	0.058mg/L	4
EC50	48h	Crustacea	1.09mg/l	2
EC50	72h	Algae or other aquatic plants	0.7mg/l	2
NOEC(ECx)	96h	Algae or other aquatic plants	<0.02-0.65mg/L	4
LC50	96h	Fish	0.402-0.625mg/L	4

alpha-pinene

Endpoint	Test Duration (hr)	Species	Value	Source
EC50	48h	Crustacea	0.475mg/l	2
EC50	72h	Algae or other aquatic plants	0.31mg/l	2
NOEC(ECx)	48h	Algae or other aquatic plants	0.131mg/l	2
LC50	96h	Fish	0.303mg/l	2

gamma-terpinene

Endpoint	Test Duration (hr)	Species	Value	Source
EC50	48h	Crustacea	2.99-4.07mg/l	4
EC50	72h	Algae or other aquatic plants	>10.82mg/l	2
EC50(ECx)	96h	Fish	2.792mg/l	2

p-cymene

Endpoint	Test Duration (hr)	Species	Value	Source
EC50	48h	Crustacea	1.9mg/l	2
EC50	72h	Algae or other aquatic plants	2.01mg/l	2
EC50	96h	Algae or other aquatic plants	22mg/L	4
NOEC(ECx)	72h	Algae or other aquatic plants	<0.623mg/l	2
LC50	96h	Fish	2mg/l	2

lemon oil

Endpoint	Test Duration (hr)	Species	Value	Source
Not Available	Not Available	Not Available	Not Available	Not Available

Persistence and degradability

Ingredient	Persistence: Water/Soil	Persistence: Air
water	LOW	LOW
butyl alcohol propoxylated	LOW	LOW
ethylene glycol phenyl ether	LOW	LOW
citric acid, monohydrate	LOW	LOW
alpha-tocopherol	HIGH	HIGH
eucalyptol	HIGH	HIGH
7-acetyl-1,1,3,4,4,6-hexamethyltetraline	HIGH	HIGH
4-(p-hydroxyphenyl)-2-butanone	HIGH	HIGH
benzyl benzoate	HIGH	HIGH
galaxolide	HIGH	HIGH
ethyl maltol	HIGH	HIGH

Continued...

benzyl alcohol	LOW	LOW
glyceryl triacetate	LOW	LOW
menthol	HIGH	HIGH
menthone	HIGH	HIGH
menthyl acetate	LOW	LOW
menthofuran	HIGH	HIGH
beta-caryophyllene	HIGH	HIGH
pulegone	HIGH	HIGH
dipentene	HIGH	HIGH
beta-pinene	HIGH	HIGH
alpha-pinene	HIGH	HIGH
gamma-terpinene	HIGH	HIGH
p-cymene	HIGH	HIGH

Bioaccumulative potential

Ingredient	Bioaccumulation
water	LOW (LogKOW = -1.38)
sodium citrate	LOW (LogKOW = -0.28)
butyl alcohol propoxylated	LOW (LogKOW = 1.2706)
ethylene glycol phenyl ether	LOW (LogKOW = 1.16)
citric acid, monohydrate	LOW (LogKOW = -1.64)
alpha-tocopherol	LOW (LogKOW = 12.18)
eucalyptol	LOW (LogKOW = 2.74)
7-acetyl-1,1,3,4,4,6-hexamethyltetraline	HIGH (LogKOW = 5.7)
4-(p-hydroxyphenyl)-2-butanone	LOW (LogKOW = 1.4837)
benzyl benzoate	MEDIUM (LogKOW = 3.97)
peppermint oil	LOW (LogKOW = 3.19)
galaxolide	HIGH (LogKOW = 5.9)
ethyl maltol	LOW (LogKOW = 1.787)
benzyl alcohol	LOW (LogKOW = 1.1)
cornmint oil	LOW (LogKOW = 3.05)
glyceryl triacetate	LOW (BCF = 1.3)
menthol	LOW (BCF = 15)
menthone	LOW (LogKOW = 3.05)
menthyl acetate	MEDIUM (LogKOW = 4.3866)
menthofuran	MEDIUM (LogKOW = 4.292)
beta-caryophyllene	HIGH (LogKOW = 6.3)
pulegone	LOW (LogKOW = 3.08)
dipentene	MEDIUM (LogKOW = 4.38)
beta-pinene	MEDIUM (LogKOW = 4.16)
alpha-pinene	MEDIUM (LogKOW = 4.44)
gamma-terpinene	MEDIUM (LogKOW = 4.5)
p-cymene	MEDIUM (LogKOW = 3.9963)

Continued...

lemon oil	MEDIUM (LogKOW = 4.38)

Mobility in soil

Ingredient	Mobility
butyl alcohol propoxylated	LOW (Log KOC = 10)
ethylene glycol phenyl ether	LOW (Log KOC = 12.12)
citric acid, monohydrate	LOW (Log KOC = 10)
alpha-tocopherol	LOW (Log KOC = 51280000)
eucalyptol	LOW (Log KOC = 106.7)
7-acetyl-1,1,3,4,4,6-hexamethyltetraline	LOW (Log KOC = 8564)
4-(p-hydroxyphenyl)-2-butanone	LOW (Log KOC = 249.3)
benzyl benzoate	LOW (Log KOC = 3119)
galaxolide	LOW (Log KOC = 10380)
ethyl maltol	LOW (Log KOC = 10)
benzyl alcohol	LOW (Log KOC = 15.66)
glyceryl triacetate	LOW (Log KOC = 48.06)
menthol	LOW (Log KOC = 66.19)
menthone	LOW (Log KOC = 123.7)
menthyl acetate	LOW (Log KOC = 592)
menthofuran	LOW (Log KOC = 2668)
beta-caryophyllene	LOW (Log KOC = 22290)
pulegone	LOW (Log KOC = 123.7)
dipentene	LOW (Log KOC = 1324)
beta-pinene	LOW (Log KOC = 1204)
alpha-pinene	LOW (Log KOC = 1204)
gamma-terpinene	LOW (Log KOC = 1324)
p-cymene	LOW (Log KOC = 1324)

Other adverse effects

One or more ingredients within this SDS has the potential of causing ozone depletion and/or photochemical ozone creation.

Continued...

SECTION 13 Disposal considerations

Waste treatment methods

Product / Packaging disposal	▸ Containers may still present a chemical hazard/ danger when empty. ▸ Return to supplier for reuse/ recycling if possible. Otherwise: ▸ 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. ▸ Where possible retain label warnings and SDS and observe all notices pertaining to the product. Valuable substance, hold all residues for recovery. Disposal of the material must be carried out in accordance with the requirements of the relevant Federal/State Act(s) or Code(s) regulating the disposal of Drugs of Addiction. ▸ Consult manufacturer/supplier for recycling options. ▸ Decontaminate empty containers with water; incinerate plastic bags. ▸ **DO NOT** reuse containers. Bury empty containers in an authorised landfill. 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. A Hierarchy of Controls seems to be common - the user should investigate: ▸ Reduction ▸ Reuse ▸ Recycling ▸ Disposal (if all else fails) This material may be recycled if unused, or if it has not been contaminated so as to make it unsuitable for its intended use. If it has been contaminated, it may be possible to reclaim the product by filtration, distillation or some other means. Shelf life considerations should also be applied in making decisions of this type. Note that properties of a material may change in use, and recycling or reuse may not always be appropriate. ▸ **DO NOT** allow wash water from cleaning or process equipment to enter drains. ▸ It may be necessary to collect all wash water for treatment before disposal. ▸ In all cases disposal to sewer may be subject to local laws and regulations and these should be considered first. ▸ Where in doubt contact the responsible authority. ▸ Recycle wherever possible. ▸ 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. ▸ 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). ▸ Decontaminate empty containers. Observe all label safeguards until containers are cleaned and destroyed.

SECTION 14 Transport information

Labels Required

Marine Pollutant	NO

Land transport (DOT): NOT REGULATED FOR TRANSPORT OF DANGEROUS GOODS

Air transport (ICAO-IATA / DGR): NOT REGULATED FOR TRANSPORT OF DANGEROUS GOODS

Sea transport (IMDG-Code / GGVSee): NOT REGULATED FOR TRANSPORT OF DANGEROUS GOODS

14.7. Maritime transport in bulk according to IMO instruments

Continued...

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

Not Applicable

14.7.2. Transport in bulk in accordance with MARPOL Annex V and the IMSBC Code

Product name	Group
water	Not Available
castor oil, hydrogenated, ethoxylated	Not Available
sodium citrate	Not Available
butyl alcohol propoxylated	Not Available
ethylene glycol phenyl ether	Not Available
citric acid, monohydrate	Not Available
ethylhexylglycerin	Not Available
alpha-tocopherol	Not Available
eucalyptol	Not Available
7-acetyl-1,1,3,4,4,6-hexamethyltetraline	Not Available
4-(p-hydroxyphenyl)-2-butanone	Not Available
benzyl benzoate	Not Available
peppermint oil	Not Available
galaxolide	Not Available
ethyl maltol	Not Available
benzyl alcohol	Not Available
cornmint oil	Not Available
glyceryl triacetate	Not Available
menthol	Not Available
menthone	Not Available
menthyl acetate	Not Available
menthofuran	Not Available
beta-caryophyllene	Not Available
pulegone	Not Available
dipentene	Not Available
beta-pinene	Not Available
alpha-pinene	Not Available
gamma-terpinene	Not Available
p-cymene	Not Available
lemon oil	Not Available

14.7.3. Transport in bulk in accordance with the IGC Code

Product name	Ship Type
water	Not Available
castor oil, hydrogenated, ethoxylated	Not Available
sodium citrate	Not Available

Continued...

Product name	Ship Type
butyl alcohol propoxylated	Not Available
ethylene glycol phenyl ether	Not Available
citric acid, monohydrate	Not Available
ethylhexylglycerin	Not Available
alpha-tocopherol	Not Available
eucalyptol	Not Available
7-acetyl-1,1,3,4,4,6-hexamethyltetraline	Not Available
4-(p-hydroxyphenyl)-2-butanone	Not Available
benzyl benzoate	Not Available
peppermint oil	Not Available
galaxolide	Not Available
ethyl maltol	Not Available
benzyl alcohol	Not Available
cornmint oil	Not Available
glyceryl triacetate	Not Available
menthol	Not Available
menthone	Not Available
menthyl acetate	Not Available
menthofuran	Not Available
beta-caryophyllene	Not Available
pulegone	Not Available
dipentene	Not Available
beta-pinene	Not Available
alpha-pinene	Not Available
gamma-terpinene	Not Available
p-cymene	Not Available
lemon oil	Not Available

SECTION 15 Regulatory information

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

water is found on the following regulatory lists

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

castor oil, hydrogenated, ethoxylated is found on the following regulatory lists

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

sodium citrate is found on the following regulatory lists

US DOE Temporary Emergency Exposure Limits (TEELs)

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

butyl alcohol propoxylated is found on the following regulatory lists

US - California Hazardous Air Pollutants Identified as Toxic Air Contaminants

US - Pennsylvania - Hazardous Substance List

Continued...

US DOE Temporary Emergency Exposure Limits (TEELs)
US EPA Integrated Risk Information System (IRIS)
US EPCRA Section 313 Chemical List
US New York City Community Right-to-Know: List of Hazardous Substances
US Toxic Substances Control Act (TSCA) - Chemical Substance Inventory
US TSCA Section 4/12 (b) - Sunset Dates/Status

ethylene glycol phenyl ether is found on the following regulatory lists

US - California Hazardous Air Pollutants Identified as Toxic Air Contaminants
US - Pennsylvania - Hazardous Substance List
US DOE Temporary Emergency Exposure Limits (TEELs)
US EPCRA Section 313 Chemical List
US New York City Community Right-to-Know: List of Hazardous Substances
US Toxic Substances Control Act (TSCA) - Chemical Substance Inventory

citric acid, monohydrate is found on the following regulatory lists

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

ethylhexylglycerin is found on the following regulatory lists

Not Applicable

alpha-tocopherol is found on the following regulatory lists

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

eucalyptol is found on the following regulatory lists

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

7-acetyl-1,1,3,4,4,6-hexamethyltetraline is found on the following regulatory lists

US Clean Air Act - Hazardous Air Pollutants
US Toxic Substances Control Act (TSCA) - Chemical Substance Inventory

4-(p-hydroxyphenyl)-2-butanone is found on the following regulatory lists

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

benzyl benzoate is found on the following regulatory lists

US DOE Temporary Emergency Exposure Limits (TEELs)
US Toxic Substances Control Act (TSCA) - Chemical Substance Inventory

peppermint oil is found on the following regulatory lists

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

galaxolide is found on the following regulatory lists

US EPCRA Section 313 Chemical List
US Toxic Substances Control Act (TSCA) - Chemical Substance Inventory

ethyl maltol is found on the following regulatory lists

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

benzyl alcohol is found on the following regulatory lists

US - Massachusetts - Right To Know Listed Chemicals
US - Pennsylvania - Hazardous Substance List
US AIHA Workplace Environmental Exposure Levels (WEELs)
US DOE Temporary Emergency Exposure Limits (TEELs)
US Toxic Substances Control Act (TSCA) - Chemical Substance Inventory
US Toxicology Excellence for Risk Assessment (TERA) Workplace Environmental Exposure Levels (WEEL)

cornmint oil is found on the following regulatory lists

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

Continued...

glyceryl triacetate is found on the following regulatory lists

US DOE Temporary Emergency Exposure Limits (TEELs)
US Toxic Substances Control Act (TSCA) - Chemical Substance Inventory

menthol is found on the following regulatory lists

US AIHA Workplace Environmental Exposure Levels (WEELs)
US Toxic Substances Control Act (TSCA) - Chemical Substance Inventory
US Toxicology Excellence for Risk Assessment (TERA) Workplace Environmental Exposure Levels (WEEL)

menthone is found on the following regulatory lists

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

menthyl acetate is found on the following regulatory lists

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

menthofuran is found on the following regulatory lists

Chemical Footprint Project - Chemicals of High Concern List
US Toxic Substances Control Act (TSCA) - Chemical Substance Inventory

beta-caryophyllene is found on the following regulatory lists

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

pulegone is found on the following regulatory lists

Chemical Footprint Project - Chemicals of High Concern List
International Agency for Research on Cancer (IARC) - Agents Classified by the IARC Monographs
International Agency for Research on Cancer (IARC) - Agents Classified by the IARC Monographs - Group 2B: Possibly carcinogenic to humans
US - California Proposition 65 - Carcinogens
US - California Safe Drinking Water and Toxic Enforcement Act of 1986 - Proposition 65 List
US Toxic Substances Control Act (TSCA) - Chemical Substance Inventory

dipentene is found on the following regulatory lists

US - New Jersey Right to Know Hazardous Substances
US New York City Community Right-to-Know: List of Hazardous Substances
US Toxic Substances Control Act (TSCA) - Chemical Substance Inventory
US Toxicology Excellence for Risk Assessment (TERA) Workplace Environmental Exposure Levels (WEEL)

beta-pinene is found on the following regulatory lists

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

alpha-pinene is found on the following regulatory lists

US - Massachusetts - Right To Know Listed Chemicals
US - New Jersey Right to Know - Special Health Hazard Substance List (SHHSL): Flammables
US - New Jersey Right to Know Hazardous Substances
US - Pennsylvania - Hazardous Substance List
US DOE Temporary Emergency Exposure Limits (TEELs)
US New York City Community Right-to-Know: List of Hazardous Substances
US Toxic Substances Control Act (TSCA) - Chemical Substance Inventory

gamma-terpinene is found on the following regulatory lists

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

p-cymene is found on the following regulatory lists

US - Massachusetts - Right To Know Listed Chemicals
US - New Jersey Right to Know - Special Health Hazard Substance List (SHHSL): Flammables
US - Pennsylvania - Hazardous Substance List
US DOE Temporary Emergency Exposure Limits (TEELs)

Continued...

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

lemon oil is found on the following regulatory lists

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

Additional Regulatory Information

Not Applicable

SECTION 16 Other information

Other information

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.

End of SDS