

## SAFETY DATA SHEETS

**This SDS packet was issued with item:**

077181514

N/A

## GI-MASK Universal Separator

### Coltène/Whaledent AG

Version No: 1.1

Safety Data Sheet according to WHMIS 2015 requirements

Issue Date: **21/04/2022**

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L.GHS.CAN.EN

#### SECTION 1 Identification

##### Product Identifier

|                               |                             |
|-------------------------------|-----------------------------|
| Product name                  | GI-MASK Universal Separator |
| Chemical Name                 | Not Applicable              |
| Synonyms                      | Not Available               |
| Chemical formula              | Not Applicable              |
| Other means of identification | UFI:EGP7-W3MX-0N4M-MSM5     |

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

|                          |  |
|--------------------------|--|
| Relevant identified uses | For dental use only<br>Application is by spray atomisation from a hand held aerosol pack |
|--------------------------|--|

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

|                         |  |
|-------------------------|--|
| Registered company name | Coltène/Whaledent AG                                 |
| Address                 | Feldwiesenstrasse 20 Altstätten CH-9450 Switzerland  |
| Telephone               | +41 (71) 75 75 300                                   |
| Fax                     | +41 (71) 75 75 301                                   |
| Website                 | <a href="http://www.coltene.com">www.coltene.com</a> |
| Email                   | msds@coltene.com                                     |

##### Emergency phone number

|                                   |                              |
|-----------------------------------|------------------------------|
| Association / Organisation        | CHEMWATCH EMERGENCY RESPONSE |
| Emergency telephone numbers       | +1 867 670 2867              |
| Other emergency telephone numbers | +61 3 9573 3188              |

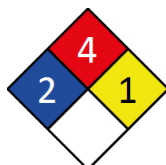
Once connected and if the message is not in your preferred language then please dial 01

Une fois connecté et si le message n'est pas dans votre langue préférée alors s'il vous plaît cadran 07

#### SECTION 2 Hazard(s) identification

##### Classification of the substance or mixture

NFPA 704 diamond



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

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|                       |   |
|-----------------------|---|
| <b>Classification</b> | Specific Target Organ Toxicity - Single Exposure (Narcotic Effects) Category 3, Hazardous to the Aquatic Environment Long-Term Hazard Category 2, Skin Corrosion/Irritation Category 2, Aspiration Hazard Category 1, Aerosols Category 1 |
|-----------------------|---|

## Label elements

|                            |  |
|----------------------------|--|
| <b>Hazard pictogram(s)</b> |  |
|----------------------------|--|

|                    |               |
|--------------------|---------------|
| <b>Signal word</b> | <b>Danger</b> |
|--------------------|---------------|

## Hazard statement(s)

|                  |  |
|------------------|--|
| <b>H336</b>      | May cause drowsiness or dizziness.                                       |
| <b>H411</b>      | Toxic to aquatic life with long lasting effects.                         |
| <b>H315</b>      | Causes skin irritation.  |
| <b>H304</b>      | May be fatal if swallowed and enters airways.                            |
| <b>H222+H229</b> | Extremely flammable aerosol. Pressurized container: may burst if heated. |

## Physical and Health hazard(s) not otherwise classified

Not Applicable

## Precautionary statement(s) Prevention

|             |  |
|-------------|--|
| <b>P210</b> | Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking. |
| <b>P211</b> | Do not spray on an open flame or other ignition source.  |
| <b>P251</b> | Do not pierce or burn, even after use.   |
| <b>P271</b> | Use only outdoors or in a well-ventilated area.  |
| <b>P261</b> | Avoid breathing mist/vapours/spray.  |
| <b>P273</b> | Avoid release to the environment.  |
| <b>P280</b> | Wear protective gloves and protective clothing.  |
| <b>P264</b> | Wash all exposed external body areas thoroughly after handling.                                |

## Precautionary statement(s) Response

|                  |  |
|------------------|--|
| <b>P301+P310</b> | IF SWALLOWED: Immediately call a POISON CENTER/doctor/physician/first aider. |
| <b>P331</b>      | Do NOT induce vomiting.  |
| <b>P312</b>      | Call a POISON CENTER/doctor/physician/first aider/if you feel unwell.        |
| <b>P391</b>      | Collect spillage.  |
| <b>P302+P352</b> | IF ON SKIN: Wash with plenty of water and soap.                              |
| <b>P304+P340</b> | IF INHALED: Remove person to fresh air and keep comfortable for breathing.   |
| <b>P332+P313</b> | If skin irritation occurs: Get medical advice/attention.                     |
| <b>P362+P364</b> | Take off contaminated clothing and wash it before reuse.                     |

## Precautionary statement(s) Storage

|                  |  |
|------------------|--|
| <b>P405</b>      | Store locked up.   |
| <b>P410+P412</b> | Protect from sunlight. Do not expose to temperatures exceeding 50 °C/122 °F. |
| <b>P403+P233</b> | Store in a well-ventilated place. Keep container tightly closed.             |

## Precautionary statement(s) Disposal

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

Not Applicable

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**SECTION 3 Composition / information on ingredients****Substances**

See section below for composition of Mixtures

**Mixtures**

| CAS No    | %[weight] | Name                     |
|-----------|-----------|--------------------------|
| 107-83-5  | 45-55     | <u>2-methylpentane</u>   |
| 108-21-4  | <1        | <u>isopropyl acetate</u> |
| 74-98-6   | 15-30     | <u>propane</u>           |
| 106-97-8. | 15-30     | <u>butane</u>            |
| 75-28-5.  | 5-15      | <u>iso-butane</u>        |

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

**SECTION 4 First-aid measures****Description of first aid measures**

|                     |   |
|---------------------|---|
| <b>Eye Contact</b>  | <p>If aerosols come in contact with the eyes:</p> <ul style="list-style-type: none"> <li>▶ Immediately hold the eyelids apart and flush the eye with fresh running water.</li> <li>▶ Ensure complete irrigation of the eye by keeping eyelids apart and away from eye and moving the eyelids by occasionally lifting the upper and lower lids.</li> <li>▶ Seek medical attention without delay; if pain persists or recurs seek medical attention.</li> <li>▶ Removal of contact lenses after an eye injury should only be undertaken by skilled personnel.</li> </ul>  |
| <b>Skin Contact</b> | <p>If solids or aerosol mists are deposited upon the skin:</p> <ul style="list-style-type: none"> <li>▶ Flush skin and hair with running water (and soap if available).</li> <li>▶ Remove any adhering solids with industrial skin cleansing cream.</li> <li>▶ <b>DO NOT use solvents.</b></li> <li>▶ Seek medical attention in the event of irritation.</li> </ul>   |
| <b>Inhalation</b>   | <p>If aerosols, fumes or combustion products are inhaled:</p> <ul style="list-style-type: none"> <li>▶ Remove to fresh air.</li> <li>▶ Lay patient down. Keep warm and rested.</li> <li>▶ Prostheses such as false teeth, which may block airway, should be removed, where possible, prior to initiating first aid procedures.</li> <li>▶ If breathing is shallow or has stopped, ensure clear airway and apply resuscitation, preferably with a demand valve resuscitator, bag-valve mask device, or pocket mask as trained. Perform CPR if necessary.</li> <li>▶ Transport to hospital, or doctor.</li> </ul> |
| <b>Ingestion</b>    | <ul style="list-style-type: none"> <li>▶ Avoid giving milk or oils.</li> <li>▶ Avoid giving alcohol.</li> <li>▶ Not considered a normal route of entry.</li> <li>▶ If spontaneous vomiting appears imminent or occurs, hold patient's head down, lower than their hips to help avoid possible aspiration of vomitus.</li> </ul>   |

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

For petroleum distillates

- In case of ingestion, gastric lavage with activated charcoal can be used promptly to prevent absorption - decontamination (induced emesis or lavage) is controversial and should be considered on the merits of each individual case; of course the usual precautions of an endotracheal tube should be considered prior to lavage, to prevent aspiration.
- Individuals intoxicated by petroleum distillates should be hospitalized immediately, with acute and continuing attention to neurologic and cardiopulmonary function.
- Positive pressure ventilation may be necessary.
- Acute central nervous system signs and symptoms may result from large ingestions of aspiration-induced hypoxia.
- After the initial episode, individuals should be followed for changes in blood variables and the delayed appearance of pulmonary oedema and chemical pneumonitis. Such patients should be followed for several days or weeks for delayed effects, including bone marrow toxicity, hepatic and renal impairment. Individuals with chronic pulmonary disease will be more seriously impaired, and recovery from inhalation exposure may be complicated.
- Gastrointestinal symptoms are usually minor and pathological changes of the liver and kidneys are reported to be uncommon in acute intoxications.
- Chlorinated and non-chlorinated hydrocarbons may sensitize the heart to epinephrine and other circulating catecholamines so that arrhythmias may occur. Careful consideration of this potential adverse effect should precede administration of epinephrine or other cardiac stimulants and the selection of bronchodilators.

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Treat symptomatically.

**SECTION 5 Fire-fighting measures**

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### Extinguishing media

#### SMALL FIRE:

- Water spray, dry chemical or CO2

#### LARGE FIRE:

- Water spray or fog.

### Special hazards arising from the substrate or mixture

|                             |  |
|-----------------------------|--|
| <b>Fire Incompatibility</b> | <ul style="list-style-type: none"> <li>▸ Avoid contamination with oxidising agents i.e. nitrates, oxidising acids, chlorine bleaches, pool chlorine etc. as ignition may result</li> </ul> |
|-----------------------------|--|

### Special protective equipment and precautions for fire-fighters

|                              |   |
|------------------------------|---|
| <b>Fire Fighting</b>         | <ul style="list-style-type: none"> <li>▸ Alert Fire Brigade and tell them location and nature of hazard.</li> <li>▸ May be violently or explosively reactive.</li> <li>▸ Wear breathing apparatus plus protective gloves.</li> <li>▸ Prevent, by any means available, spillage from entering drains or water course.</li> <li>▸ If safe, switch off electrical equipment until vapour fire hazard removed.</li> <li>▸ Use water delivered as a fine spray to control fire and cool adjacent area.</li> <li>▸ <b>DO NOT</b> approach containers suspected to be hot.</li> <li>▸ Cool fire exposed containers with water spray from a protected location.</li> <li>▸ If safe to do so, remove containers from path of fire.</li> <li>▸ Equipment should be thoroughly decontaminated after use.</li> </ul>  |
| <b>Fire/Explosion Hazard</b> | <ul style="list-style-type: none"> <li>▸ Liquid and vapour are highly flammable.</li> <li>▸ Severe fire hazard when exposed to heat or flame.</li> <li>▸ Vapour forms an explosive mixture with air.</li> <li>▸ Severe explosion hazard, in the form of vapour, when exposed to flame or spark.</li> <li>▸ Vapour may travel a considerable distance to source of ignition.</li> <li>▸ Heating may cause expansion or decomposition with violent container rupture.</li> <li>▸ Aerosol cans may explode on exposure to naked flames.</li> <li>▸ Rupturing containers may rocket and scatter burning materials.</li> <li>▸ Hazards may not be restricted to pressure effects.</li> <li>▸ May emit acrid, poisonous or corrosive fumes.</li> <li>▸ On combustion, may emit toxic fumes of carbon monoxide (CO).</li> </ul> <p>Combustion products include:</p> <ul style="list-style-type: none"> <li>, carbon monoxide (CO)</li> <li>, carbon dioxide (CO<sub>2</sub>)</li> <li>, other pyrolysis products typical of burning organic material.</li> </ul> <p><b>Contains low boiling substance:</b> Closed containers may rupture due to pressure buildup under fire conditions.<br/>May emit clouds of acrid smoke</p> |

## SECTION 6 Accidental release measures

### Personal precautions, protective equipment and emergency procedures

See section 8

### Environmental precautions

See section 12

### Methods and material for containment and cleaning up

|                     |   |
|---------------------|---|
| <b>Minor Spills</b> | <ul style="list-style-type: none"> <li>▸ Clean up all spills immediately.</li> <li>▸ Avoid breathing vapours and contact with skin and eyes.</li> <li>▸ Wear protective clothing, impervious gloves and safety glasses.</li> <li>▸ Shut off all possible sources of ignition and increase ventilation.</li> <li>▸ Wipe up.</li> <li>▸ If safe, damaged cans should be placed in a container outdoors, away from all ignition sources, until pressure has dissipated.</li> <li>▸ Undamaged cans should be gathered and stowed safely.</li> </ul>   |
| <b>Major Spills</b> | <ul style="list-style-type: none"> <li>▸ Clear area of all unprotected personnel and move upwind.</li> <li>▸ Alert Emergency Authority and advise them of the location and nature of hazard.</li> <li>▸ May be violently or explosively reactive.</li> <li>▸ Wear full body clothing with breathing apparatus.</li> <li>▸ Prevent by any means available, spillage from entering drains and water-courses.</li> <li>▸ Consider evacuation.</li> <li>▸ Shut off all possible sources of ignition and increase ventilation.</li> <li>▸ No smoking or naked lights within area.</li> <li>▸ Use extreme caution to prevent violent reaction.</li> </ul> |

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- Stop leak only if safe to do so.
- Water spray or fog may be used to disperse vapour.
- **DO NOT enter confined space where gas may have collected.**
- Keep area clear until gas has dispersed.
  
- Remove leaking cylinders to a safe place.
- Fit vent pipes. Release pressure under safe, controlled conditions
- Burn issuing gas at vent pipes.
- **DO NOT exert excessive pressure on valve; DO NOT attempt to operate damaged valve.**
- Clear area of personnel and move upwind.
- Alert Fire Brigade and tell them location and nature of hazard.
- May be violently or explosively reactive.
- Wear breathing apparatus plus protective gloves.
- Prevent, by any means available, spillage from entering drains or water courses
- No smoking, naked lights or ignition sources.
- Increase ventilation.
- Stop leak if safe to do so.
- Water spray or fog may be used to disperse / absorb vapour.
- Absorb or cover spill with sand, earth, inert materials or vermiculite.
- If safe, damaged cans should be placed in a container outdoors, away from ignition sources, until pressure has dissipated.
- Undamaged cans should be gathered and stowed safely.
- Collect residues and seal in labelled drums for disposal.

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

## SECTION 7 Handling and storage

### Precautions for safe handling

#### Safe handling

The conductivity of this material may make it a static accumulator., A liquid is typically considered nonconductive if its conductivity is below 100 pS/m and is considered semi-conductive if its conductivity is below 10 000 pS/m., Whether a liquid is nonconductive or semi-conductive, the precautions are the same., A number of factors, for example liquid temperature, presence of contaminants, and anti-static additives can greatly influence the conductivity of a liquid.

Natural gases contain a contaminant, radon-222, a naturally occurring radioactive gas. During subsequent processing, radon tends to concentrate in liquefied petroleum streams and in product streams having similar boiling points. Industry experience indicates that the commercial product may contain small amounts of radon-222 and its radioactive decay products (radon daughters). The actual concentration of radon-222 and radioactive daughters in process equipment (IE lines, filters, pumps and reactor units) may reach significant levels and produce potentially damaging levels of gamma radiation. A potential external radiation hazard exists at or near any pipe, valve or vessel containing a radon enriched stream or containing internal deposits of radioactive material. Field studies, however, have not shown that conditions exist that expose the worker to cumulative exposures in excess of general population limits. Equipment containing gamma-emitting decay products should be presumed to be internally contaminated with alpha-emitting decay products which may be hazardous if inhaled or ingested. During maintenance operations that require the opening of contaminated process equipment, the flow of gas should be stopped and a four hour delay enforced to allow gamma-radiation to drop to background levels. Protective equipment (including high efficiency particulate respirators (P3) suitable for radionucleotides or supplied air) should be worn by personnel entering a vessel or working on contaminated process equipment to prevent skin contamination or inhalation of any residue containing alpha-radiation. Airborne contamination may be minimised by handling scale and/or contaminated materials in a wet state. [TEXACO]

- 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.**
- Avoid smoking, naked lights or ignition sources.
- Avoid contact with incompatible materials.
- **When handling, DO NOT eat, drink or smoke.**
- **DO NOT incinerate or puncture aerosol cans.**
- **DO NOT spray directly on humans, exposed food or food utensils.**
- Avoid physical damage to containers.
- Always wash hands with soap and water after handling.
- Work clothes should be laundered separately.
- 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

- Keep dry to avoid corrosion of cans. Corrosion may result in container perforation and internal pressure may eject contents of can
- Store in original containers in approved flammable liquid storage area.
- **DO NOT store in pits, depressions, basements or areas where vapours may be trapped.**
- No smoking, naked lights, heat or ignition sources.

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- ▶ Keep containers securely sealed. Contents under pressure.
- ▶ Store away from incompatible materials.
- ▶ Store in a cool, dry, well ventilated area.
- ▶ Avoid storage at temperatures higher than 40 deg C.
- ▶ Store in an upright position.
- ▶ Protect containers against physical damage.
- ▶ Check regularly for spills and leaks.
- ▶ Observe manufacturer's storage and handling recommendations contained within this SDS.

## Conditions for safe storage, including any incompatibilities

|                                |  |
|--------------------------------|--|
| <b>Suitable container</b>      | <p>Recommended storage temperature: 15 - 23 °C</p> <ul style="list-style-type: none"> <li>▶ Aerosol dispenser.</li> <li>▶ Check that containers are clearly labelled.</li> </ul>   |
| <b>Storage incompatibility</b> | <p>Methylpentane:</p> <ul style="list-style-type: none"> <li>▶ reacts violently with strong oxidisers</li> <li>▶ is incompatible with nitric acid, sulfuric acid</li> <li>▶ may generate electrostatic charges due to low conductivity</li> </ul> <p>Low molecular weight alkanes:</p> <ul style="list-style-type: none"> <li>▶ May react violently with strong oxidisers, chlorine, chlorine dioxide, dioxygenyl tetrafluoroborate.</li> <li>▶ May react with oxidising materials, nickel carbonyl in the presence of oxygen, heat.</li> <li>▶ Are incompatible with nitronium tetrafluoroborate(1-), halogens and interhalogens</li> <li>▶ may generate electrostatic charges, due to low conductivity, on flow or agitation.</li> <li>▶ Avoid flame and ignition sources</li> </ul> <p>Redox reactions of alkanes, in particular with oxygen and the halogens, are possible as the carbon atoms are in a strongly reduced condition. Reaction with oxygen (if present in sufficient quantity to satisfy the reaction stoichiometry) leads to combustion without any smoke, producing carbon dioxide and water. Free radical halogenation reactions occur with halogens, leading to the production of haloalkanes. In addition, alkanes have been shown to interact with, and bind to, certain transition metal complexes. Interaction between chlorine and ethane over activated carbon at 350 deg C has caused explosions, but added carbon dioxide reduces the risk. The violent interaction of liquid chlorine injected into ethane at 80 deg C/10 bar becomes very violent if ethylene is also present. A mixture prepared at -196 deg C with either methane or ethane exploded when the temp was raised to -78 deg C. Addition of nickel carbonyl to an n-butane-oxygen mixture causes an explosion at 20-40 deg C. Alkanes will react with steam in the presence of a nickel catalyst to give hydrogen.</p> <p>Butane/ isobutane</p> <ul style="list-style-type: none"> <li>▶ reacts violently with strong oxidisers</li> <li>▶ reacts with acetylene, halogens and nitrous oxides</li> <li>▶ is incompatible with chlorine dioxide, conc. nitric acid and some plastics</li> <li>▶ may generate electrostatic charges, due to low conductivity, in flow or when agitated - these may ignite the vapour.</li> </ul> <p>Segregate from nickel carbonyl in the presence of oxygen, heat (20-40 C)</p> <p>Propane:</p> <ul style="list-style-type: none"> <li>▶ reacts violently with strong oxidisers, barium peroxide, chlorine dioxide, dichlorine oxide, fluorine etc.</li> <li>▶ liquid attacks some plastics, rubber and coatings</li> <li>▶ may accumulate static charges which may ignite its vapours</li> <li>▶ Avoid reaction with oxidising agents</li> <li>▶ Compressed gases may contain a large amount of kinetic energy over and above that potentially available from the energy of reaction produced by the gas in chemical reaction with other substances</li> </ul> |

## SECTION 8 Exposure controls / personal protection

## Control parameters

## Occupational Exposure Limits (OEL)

## INGREDIENT DATA

| Source  | Ingredient      | Material name   | TWA                  | STEL                  | Peak          | Notes  |
|---|-----------------|---|----------------------|-----------------------|---------------|--|
| Canada - Nova Scotia Occupational Exposure Limits                                       | 2-methylpentane | 2-Methyl pentane                                      | 500 ppm              | 1000 ppm              | Not Available | TLV Basis: central nervous system impairment; upper respiratory tract & eye irritation |
| Canada - Alberta Occupational Exposure Limits   | 2-methylpentane | Dimethylbutane (Hexane, all isomers, except n-Hexane) | 500 ppm / 1760 mg/m3 | 3500 mg/m3 / 1000 ppm | Not Available | Not Available  |
| Canada - Alberta Occupational Exposure Limits   | 2-methylpentane | Hexane (all isomers except n-hexane)                  | 500 ppm / 1760 mg/m3 | 3500 mg/m3 / 1000 ppm | Not Available | Not Available  |
| Canada - Saskatchewan Occupational Health and Safety Regulations - Contamination Limits | 2-methylpentane | Hexane (other isomers)                                | 500 ppm              | 1000 ppm              | Not Available | Not Available  |

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| Source  | Ingredient        | Material name                       | TWA                  | STEL                  | Peak          | Notes  |
|---|-------------------|-------------------------------------|----------------------|-----------------------|---------------|--|
| Canada - Manitoba Occupational Exposure Limits  | 2-methylpentane   | Not Available                       | 500 ppm              | 1000 ppm              | Not Available | TLV® Basis: CNS impair; URT & eye irr  |
| Canada - British Columbia Occupational Exposure Limits                                  | 2-methylpentane   | Hexane, all isomers except n-Hexane | 200 ppm              | Not Available         | Not Available | Not Available  |
| Canada - Prince Edward Island Occupational Exposure Limits                              | 2-methylpentane   | Hexane isomers, other than n-Hexane | 500 ppm              | 1000 ppm              | Not Available | TLV® Basis: CNS impair; URT & eye irr  |
| Canada - Northwest Territories Occupational Exposure Limits                             | 2-methylpentane   | Hexane (other isomers)              | 500 ppm              | 1000 ppm              | Not Available | Not Available  |
| Canada - Quebec Permissible Exposure Values for Airborne Contaminants                   | 2-methylpentane   | Hexane (other isomers)              | 500 ppm / 1760 mg/m3 | 3500 mg/m3 / 1000 ppm | Not Available | Not Available  |
| Canada - Yukon Permissible Concentrations for Airborne Contaminant Substances           | isopropyl acetate | Isopropyl acetate                   | 250 ppm / 950 mg/m3  | 1,185 mg/m3 / 310 ppm | Not Available | Not Available  |
| Canada - Nova Scotia Occupational Exposure Limits                                       | isopropyl acetate | Isopropyl acetate                   | 100 ppm              | 200 ppm               | Not Available | TLV Basis: eye & upper respiratory tract irritation; central nervous system impairment |
| Canada - Alberta Occupational Exposure Limits   | isopropyl acetate | Isopropyl acetate                   | 100 ppm / 416 mg/m3  | 832 mg/m3 / 200 ppm   | Not Available | Not Available  |
| Canada - Saskatchewan Occupational Health and Safety Regulations - Contamination Limits | isopropyl acetate | Isopropyl acetate                   | 100 ppm              | 200 ppm               | Not Available | Not Available  |
| Canada - Manitoba Occupational Exposure Limits  | isopropyl acetate | Not Available                       | 100 ppm              | 200 ppm               | Not Available | TLV® Basis: Eye & URT irr; CNS impair  |
| Canada - British Columbia Occupational Exposure Limits                                  | isopropyl acetate | Isopropyl acetate                   | 100 ppm              | 200 ppm               | Not Available | Not Available  |
| Canada - Prince Edward Island Occupational Exposure Limits                              | isopropyl acetate | Isopropyl acetate                   | 100 ppm              | 200 ppm               | Not Available | TLV® Basis: Eye & URT irr; CNS impair  |
| Canada - Northwest Territories Occupational Exposure Limits                             | isopropyl acetate | Isopropyl acetate                   | 100 ppm              | 200 ppm               | Not Available | Not Available  |
| Canada - Quebec Permissible Exposure Values for Airborne Contaminants                   | isopropyl acetate | Isopropyl acetate                   | 250 ppm / 1040 mg/m3 | 1290 mg/m3 / 310 ppm  | Not Available | Not Available  |
| Canada - Yukon Permissible Concentrations for Airborne Contaminant Substances           | propane           | Propane                             | Not Available        | Not Available         | Not Available | (See Table 12)   |
| Canada - Nova Scotia Occupational Exposure Limits                                       | propane           | Propane                             | 1000 ppm             | Not Available         | Not Available | TLV Basis: cardiac sensitization; central nervous system impairment                    |
| Canada - Alberta Occupational Exposure Limits   | propane           | Propane                             | 1000 ppm             | Not Available         | Not Available | Not Available  |
| Canada - Saskatchewan Occupational Health and Safety Regulations - Contamination Limits | propane           | Propane                             | Not Available        | Not Available         | Not Available | Not Available  |
| Canada - Manitoba Occupational Exposure Limits  | propane           | Not Available                       | Not Available        | Not Available         | Not Available | TLV® Basis: Asphyxia; See Appendix F: Minimal Oxygen Content                           |
| Canada - British Columbia Occupational Exposure Limits                                  | propane           | Aliphatic hydrocarbon gases [C1-C4] | 1000 ppm             | Not Available         | Not Available | Not Available  |



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| Source  | Ingredient | Material name                                | TWA                   | STEL                  | Peak          | Notes   |
|---|------------|--|-----------------------|-----------------------|---------------|---|
| Canada - Prince Edward Island Occupational Exposure Limits                              | propane    | * Propane                                    | Not Available         | Not Available         | Not Available | TLV® Basis: Asphyxia; See Appendix F: Minimal Oxygen Content        |
| Canada - Northwest Territories Occupational Exposure Limits                             | propane    | Propane                                      | Not Available         | Not Available         | Not Available | See Aliphatic hydrocarbon gases [C1-C4]                             |
| Canada - Quebec Permissible Exposure Values for Airborne Contaminants                   | propane    | Propane                                      | 1000 ppm / 1800 mg/m3 | Not Available         | Not Available | Not Available   |
| Canada - Yukon Permissible Concentrations for Airborne Contaminant Substances           | butane     | Butane                                       | 600 ppm / 1,400 mg/m3 | 1,600 mg/m3 / 750 ppm | Not Available | Not Available   |
| Canada - Nova Scotia Occupational Exposure Limits                                       | butane     | Butane                                       | 1000 ppm              | Not Available         | Not Available | See Aliphatic hydrocarbon gases                                     |
| Canada - Nova Scotia Occupational Exposure Limits                                       | butane     | Aliphatic hydrocarbon gases - Alkane [C1-C4] | 1000 ppm              | Not Available         | Not Available | TLV Basis: Cardiac sensitization; CNS impairment                    |
| Canada - Nova Scotia Occupational Exposure Limits                                       | butane     | Butane - All isomers                         | 1000 ppm              | Not Available         | Not Available | See Aliphatic hydrocarbon gases                                     |
| Canada - Alberta Occupational Exposure Limits   | butane     | Butane                                       | 1000 ppm              | Not Available         | Not Available | Not Available   |
| Canada - Saskatchewan Occupational Health and Safety Regulations - Contamination Limits | butane     | Aliphatic hydrocarbon gases, Alkane [C1-C4]  | 1000 ppm              | 1250 ppm              | Not Available | Not Available   |
| Canada - Saskatchewan Occupational Health and Safety Regulations - Contamination Limits | butane     | Butane, All isomers                          | Not Available         | Not Available         | Not Available | Not Available   |
| Canada - Manitoba Occupational Exposure Limits  | butane     | Not Available                                | Not Available         | 1000 ppm              | Not Available | TLV® Basis: CNS impair  |
| Canada - British Columbia Occupational Exposure Limits                                  | butane     | n-Butane                                     | 600 ppm               | 750 ppm               | Not Available | Not Available   |
| Canada - Prince Edward Island Occupational Exposure Limits                              | butane     | * Butane, all isomers                        | Not Available         | 1000 ppm              | Not Available | TLV® Basis: CNS impair  |
| Canada - Northwest Territories Occupational Exposure Limits                             | butane     | Aliphatic hydrocarbon gases, Alkane [C1-C4]  | 1000 ppm              | 1250 ppm              | Not Available | Not Available   |
| Canada - Northwest Territories Occupational Exposure Limits                             | butane     | Butane, All isomers                          | Not Available         | Not Available         | Not Available | See Aliphatic hydrocarbon gases [C1-C4]                             |
| Canada - Quebec Permissible Exposure Values for Airborne Contaminants                   | butane     | Butane                                       | 800 ppm / 1900 mg/m3  | Not Available         | Not Available | Not Available   |
| Canada - Yukon Permissible Concentrations for Airborne Contaminant Substances           | iso-butane | Butane                                       | 600 ppm / 1,400 mg/m3 | 1,600 mg/m3 / 750 ppm | Not Available | Not Available   |
| Canada - Nova Scotia Occupational Exposure Limits                                       | iso-butane | Isobutane                                    | 1000 ppm              | Not Available         | Not Available | TLV Basis: cardiac sensitization; central nervous system impairment |
| Canada - Alberta Occupational Exposure Limits   | iso-butane | Aliphatic Hydrocarbon gases, Alkane (C2-C4)  | 1000 ppm              | Not Available         | Not Available | Not Available   |
| Canada - Saskatchewan Occupational Health and Safety Regulations - Contamination Limits | iso-butane | Butane, All isomers                          | Not Available         | Not Available         | Not Available | Not Available   |

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| Source  | Ingredient | Material name         | TWA           | STEL          | Peak          | Notes                                   |
|---|------------|-----------------------|---------------|---------------|---------------|---|
| Canada - Manitoba Occupational Exposure Limits              | iso-butane | Not Available         | Not Available | 1000 ppm      | Not Available | TLV® Basis: CNS impair                  |
| Canada - Prince Edward Island Occupational Exposure Limits  | iso-butane | * Butane, all isomers | Not Available | 1000 ppm      | Not Available | TLV® Basis: CNS impair                  |
| Canada - Northwest Territories Occupational Exposure Limits | iso-butane | Butane, All isomers   | Not Available | Not Available | Not Available | See Aliphatic hydrocarbon gases [C1-C4] |

## Emergency Limits

| Ingredient        | TEEL-1        | TEEL-2        | TEEL-3        |
|-------------------|---------------|---------------|---------------|
| 2-methylpentane   | 1,000 ppm     | 11000** ppm   | 66000*** ppm  |
| isopropyl acetate | 200 ppm       | 2700* ppm     | 16000** ppm   |
| propane           | Not Available | Not Available | Not Available |
| butane            | Not Available | Not Available | Not Available |
| iso-butane        | 5500* ppm     | 17000** ppm   | 53000*** ppm  |

| Ingredient        | Original IDLH | Revised IDLH  |
|-------------------|---------------|---------------|
| 2-methylpentane   | Not Available | Not Available |
| isopropyl acetate | 1,800 ppm     | Not Available |
| propane           | 2,100 ppm     | Not Available |
| butane            | Not Available | 1,600 ppm     |
| iso-butane        | Not Available | Not Available |

## MATERIAL DATA

for: hexane, isomers (excluding n-hexane)

The TLV-TWA is thought to be protective against nausea, headache, upper respiratory tract irritation and CNS depression. The STEL is added to prevent objective depression of the CNS. The lower value ascribed

to n-hexane is due to the neurotoxicity of its metabolites, principally 5-hydroxy-2-hexanone and 2,5-hexanedione. It is considered unlikely that other hexanes follow the same metabolic route. It should be noted however that the n-hexane TLV-TWA also applies to commercial hexane having a concentration of greater than 5% n-hexane.

For isopropyl acetate:

Odour Threshold Value: 0.50-34 ppm (detection), 0.91-41 ppm (recognition)

The TLV-TWA is thought to be protective against ocular and upper respiratory tract irritation. It must be noted however that one study demonstrated that the majority of subjects exposed at 200 ppm for 15 minutes experienced eye irritation.

Odour Safety Factor(OSF)

OSF=74 (ISOPROPYL ACETATE)

Exposed individuals are **NOT** reasonably expected to be warned, by smell, that the Exposure Standard is being exceeded.

Odour Safety Factor (OSF) is determined to fall into either Class C, D or E.

The Odour Safety Factor (OSF) is defined as:

OSF= Exposure Standard (TWA) ppm/ Odour Threshold Value (OTV) ppm

Classification into classes follows:

| Class | OSF    | Description  |
|-------|--------|--|
| A     | 550    | Over 90% of exposed individuals are aware by smell that the Exposure Standard (TLV-TWA for example) is being reached, even when distracted by working activities |
| B     | 26-550 | As "A" for 50-90% of persons being distracted  |
| C     | 1-26   | As "A" for less than 50% of persons being distracted   |
| D     | 0.18-1 | 10-50% of persons aware of being tested perceive by smell that the Exposure Standard is being reached  |
| E     | <0.18  | As "D" for less than 10% of persons aware of being tested  |

For butane:

Odour Threshold Value: 2591 ppm (recognition)

Butane in common with other homologues in the straight chain saturated aliphatic hydrocarbon series is not characterised by its toxicity but by its narcosis-inducing effects at high concentrations. The TLV is based on analogy with pentane by comparing their lower explosive limits in air. It is concluded that this limit will protect workers against the significant risk of drowsiness and other narcotic effects.


Odour Safety Factor(OSF)

OSF=0.22 (n-BUTANE)

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For propane  
 Odour Safety Factor(OSF)  
 OSF=0.16 (PROPANE)

## Exposure controls

| <p><b>Appropriate engineering controls</b></p>  | <p><b>CARE:</b> Use of a quantity of this material in confined space or poorly ventilated area, where rapid build up of concentrated atmosphere may occur, could require increased ventilation and/or protective gear</p> <p>Engineering controls are used to remove a hazard or place a barrier between the worker and the hazard. Well-designed engineering controls can be highly effective in protecting workers and will typically be independent of worker interactions to provide this high level of protection.</p> <p>The basic types of engineering controls are:</p> <p>Process controls which involve changing the way a job activity or process is done to reduce the risk.</p> <p>Enclosure and/or isolation of emission source which keeps a selected hazard "physically" away from the worker and ventilation that strategically "adds" and "removes" air in the work environment. Ventilation can remove or dilute an air contaminant if designed properly. The design of a ventilation system must match the particular process and chemical or contaminant in use. Employers may need to use multiple types of controls to prevent employee overexposure.</p> <p>General exhaust is adequate under normal conditions. If risk of overexposure exists, wear SAA approved respirator. Correct fit is essential to obtain adequate protection.</p> <p>Provide adequate ventilation in warehouse or closed storage areas.</p> <p>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.</p> <table border="1" data-bbox="384 842 1489 981"> <thead> <tr> <th>Type of Contaminant:</th> <th>Speed:</th> </tr> </thead> <tbody> <tr> <td>aerosols, (released at low velocity into zone of active generation)</td> <td>0.5-1 m/s</td> </tr> <tr> <td>direct spray, spray painting in shallow booths, gas discharge (active generation into zone of rapid air motion)</td> <td>1-2.5 m/s (200-500 f/min.)</td> </tr> </tbody> </table> <p>Within each range the appropriate value depends on:</p> <table border="1" data-bbox="384 1025 1201 1216"> <thead> <tr> <th>Lower end of the range</th> <th>Upper end of the range</th> </tr> </thead> <tbody> <tr> <td>1: Room air currents minimal or favourable to capture</td> <td>1: Disturbing room air currents</td> </tr> <tr> <td>2: Contaminants of low toxicity or of nuisance value only.</td> <td>2: Contaminants of high toxicity</td> </tr> <tr> <td>3: Intermittent, low production.</td> <td>3: High production, heavy use</td> </tr> <tr> <td>4: Large hood or large air mass in motion</td> <td>4: Small hood-local control only</td> </tr> </tbody> </table> <p>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 m/s (200-400 f/min.) for extraction of solvents generated in a tank 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.</p> | Type of Contaminant: | Speed: | aerosols, (released at low velocity into zone of active generation) | 0.5-1 m/s | direct spray, spray painting in shallow booths, gas discharge (active generation into zone of rapid air motion) | 1-2.5 m/s (200-500 f/min.) | 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 |
|---|---|----------------------|--------|---|-----------|---|----------------------------|------------------------|------------------------|---|---------------------------------|--|----------------------------------|----------------------------------|-------------------------------|---|----------------------------------|
| Type of Contaminant:  | Speed:  |                      |        |   |           |   |                            |                        |                        |   |                                 |  |                                  |                                  |                               |   |                                  |
| aerosols, (released at low velocity into zone of active generation)   | 0.5-1 m/s   |                      |        |   |           |   |                            |                        |                        |   |                                 |  |                                  |                                  |                               |   |                                  |
| direct spray, spray painting in shallow booths, gas discharge (active generation into zone of rapid air motion) | 1-2.5 m/s (200-500 f/min.)  |                      |        |   |           |   |                            |                        |                        |   |                                 |  |                                  |                                  |                               |   |                                  |
| 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  |                      |        |   |           |   |                            |                        |                        |   |                                 |  |                                  |                                  |                               |   |                                  |
| <p><b>Personal protection</b></p>   |    |                      |        |   |           |   |                            |                        |                        |   |                                 |  |                                  |                                  |                               |   |                                  |
| <p><b>Eye and face protection</b></p>   | <ul style="list-style-type: none"> <li>▶ Close fitting gas tight goggles</li> <li><b>DO NOT wear contact lenses.</b></li> <li>▶ Contact lenses may pose a special hazard; soft contact lenses may absorb and concentrate irritants. A written policy document, describing the wearing of lens 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], [AS/NZS 1336 or national equivalent]</li> </ul> <p>No special equipment for minor exposure i.e. when handling small quantities.</p> <p><b>OTHERWISE:</b> For potentially moderate or heavy exposures:</p> <ul style="list-style-type: none"> <li>▶ Safety glasses with side shields.</li> <li>▶ <b>NOTE:</b> Contact lenses pose a special hazard; soft lenses may absorb irritants and <b>ALL</b> lenses concentrate them.</li> <li>▶ Safety glasses with side shields.</li> <li>▶ Chemical goggles.</li> <li>▶ Contact lenses may pose a special hazard; soft contact lenses may absorb and concentrate irritants. A written policy document, describing the wearing of lenses or restrictions on use, should be created for each workplace or task. 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], [AS/NZS 1336 or national equivalent]</li> </ul>  |                      |        |   |           |   |                            |                        |                        |   |                                 |  |                                  |                                  |                               |   |                                  |

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|                              |  |
|------------------------------|--|
| <b>Skin protection</b>       | See Hand protection below  |
| <b>Hands/feet protection</b> | <p>Wear general protective gloves, eg. light weight rubber gloves.</p> <ul style="list-style-type: none"> <li>▸ No special equipment needed when handling small quantities.</li> <li>▸ <b>OTHERWISE:</b></li> <li>▸ For potentially moderate exposures:</li> <li>▸ Wear general protective gloves, eg. light weight rubber gloves.</li> <li>▸ For potentially heavy exposures:</li> <li>▸ Wear chemical protective gloves, eg. PVC. and safety footwear.</li> </ul>  |
| <b>Body protection</b>       | See Other protection below   |
| <b>Other protection</b>      | <ul style="list-style-type: none"> <li>▸ The clothing worn by process operators insulated from earth may develop static charges far higher (up to 100 times) than the minimum ignition energies for various flammable gas-air mixtures. This holds true for a wide range of clothing materials including cotton.</li> <li>▸ Avoid dangerous levels of charge by ensuring a low resistivity of the surface material worn outermost.</li> </ul> <p>BREThERICK: Handbook of Reactive Chemical Hazards.</p> <p>No special equipment needed when handling small quantities.</p> <p><b>OTHERWISE:</b></p> <ul style="list-style-type: none"> <li>▸ Overalls.</li> <li>▸ Skin cleansing cream.</li> <li>▸ Eyewash unit.</li> <li>▸ Do not spray on hot surfaces.</li> </ul> |

## Respiratory protection

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

Where the concentration of gas/particulates in the breathing zone, approaches or exceeds the "Exposure Standard" (or ES), respiratory protection is required. Degree of protection varies with both face-piece and Class of filter; the nature of protection varies with Type of filter.

| Required Minimum Protection Factor | Half-Face Respirator | Full-Face Respirator | Powered Air Respirator |
|------------------------------------|----------------------|----------------------|------------------------|
| up to 10 x ES                      | Air-line*            | A-2                  | A-PAPR-2 ^             |
| up to 20 x ES                      | -                    | A-3                  | -                      |
| 20+ x ES                           | -                    | Air-line**           | -                      |

\* - Continuous-flow; \*\* - Continuous-flow or positive pressure demand

^ - Full-face

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(SO<sub>2</sub>), G = Agricultural chemicals, K = Ammonia(NH<sub>3</sub>), 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
- Generally not applicable.

Aerosols, in common with most vapours/ mists, should never be used in confined spaces without adequate ventilation. Aerosols, containing agents designed to enhance or mask smell, have triggered allergic reactions in predisposed individuals.

## SECTION 9 Physical and chemical properties

## Information on basic physical and chemical properties

| Appearance  | Colourless    |  |               |
|---|---------------|--|---------------|
| <b>Physical state</b>                               | Liquid        | <b>Relative density (Water = 1)</b>            | Not Available |
| <b>Odour</b>  | Not Available | <b>Partition coefficient n-octanol / water</b> | Not Available |
| <b>Odour threshold</b>                              | Not Available | <b>Auto-ignition temperature (°C)</b>          | Not Available |
| <b>pH (as supplied)</b>                             | Not Available | <b>Decomposition temperature</b>               | Not Available |
| <b>Melting point / freezing point (°C)</b>          | Not Available | <b>Viscosity (cSt)</b>                         | Not Available |
| <b>Initial boiling point and boiling range (°C)</b> | Not Available | <b>Molecular weight (g/mol)</b>                | Not Available |

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|                           |                   |                                   |               |
|---------------------------|-------------------|-----------------------------------|---------------|
| Flash point (°C)          | <0                | Taste                             | Not Available |
| Evaporation rate          | Not Available     | Explosive properties              | Not Available |
| Flammability              | HIGHLY FLAMMABLE. | 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       | Immiscible        | pH as a solution (Not Available%) | Not Available |
| Vapour density (Air = 1)  | Not Available     | VOC g/L                           | Not Available |

## SECTION 10 Stability and reactivity

|                                    |  |
|------------------------------------|--|
| Reactivity                         | See section 7  |
| Chemical stability                 | <ul style="list-style-type: none"> <li>▸ Elevated temperatures.</li> <li>▸ Presence of open flame.</li> <li>▸ Product is considered stable.</li> <li>▸ Hazardous polymerisation will not occur.</li> </ul> |
| Possibility of hazardous reactions | See section 7  |
| Conditions to avoid                | See section 7  |
| Incompatible materials             | See section 7  |
| Hazardous decomposition products   | See section 5  |

## SECTION 11 Toxicological information

## Information on toxicological effects

|         |  |
|---------|--|
| Inhaled | <p>The material is not thought to produce respiratory irritation (as classified by EC Directives using animal models). Nevertheless inhalation of vapours, fumes or aerosols, especially for prolonged periods, may produce respiratory discomfort and occasionally, distress.</p> <p>Inhalation of vapours may cause drowsiness and dizziness. This may be accompanied by narcosis, reduced alertness, loss of reflexes, lack of coordination and vertigo.</p> <p>Inhalation of aerosols (mists, fumes), generated by the material during the course of normal handling, may be damaging to the health of the individual.</p> <p>2-Methylpentane did not produce signs of neurobehavioural changes and microscopic examination of the tibial nerve showed no signs of neuropathy. In contrast, n-hexane treatment produces signs of giant axonal degeneration in several branches of the tibial nerve</p> <p>No health effects were seen in humans exposed at 1,000 ppm isobutane for up to 8 hours or 500 ppm for 8 hours/day for 10 days. Isobutane can have anaesthetic and asphyxiant effects at high concentrations, well above the lower explosion limit of 1.8% (18,000 ppm).</p> <p>Butane is a simple asphyxiant and is mildly anaesthetic at high concentrations (20-25%). 10000 ppm for 10 minutes causes drowsiness.</p> <p>Narcotic effects may be accompanied by exhilaration, dizziness, headache, nausea, confusion, incoordination and unconsciousness in severe cases</p> <p>The paraffin gases C1-4 are practically nontoxic below the lower flammability limit, 18,000 to 50,000 ppm; above this, low to moderate incidental effects such as CNS depression and irritation occur, but are completely reversible upon cessation of the exposure.</p> <p>Common, generalised symptoms associated with toxic gas inhalation include:</p> <ul style="list-style-type: none"> <li>▸ central nervous system effects such as depression, headache, confusion, dizziness, progressive stupor, coma and seizures;</li> <li>▸ respiratory system complications may include acute pulmonary oedema, dyspnoea, stridor, tachypnoea, bronchospasm, wheezing and other reactive airway symptoms, and respiratory arrest;</li> <li>▸ cardiovascular effects may include cardiovascular collapse, arrhythmias and cardiac arrest;</li> <li>▸ gastrointestinal effects may also be present and may include mucous membrane irritation, nausea and vomiting (sometimes bloody), and abdominal pain.</li> </ul> <p>Acute effects from inhalation of high concentrations of vapour are pulmonary irritation, including coughing, with nausea; central nervous system depression - characterised by headache and dizziness, increased reaction time, fatigue and loss of co-ordination</p> <p>Central nervous system (CNS) depression may include nonspecific discomfort, symptoms of giddiness, headache, dizziness, nausea, anaesthetic effects, slowed reaction time, slurred speech and may progress to unconsciousness. Serious poisonings may result in respiratory depression and may be fatal.</p> <p>Some aliphatic hydrocarbons produce axonal neuropathies. Isoparaffinic hydrocarbons produce injury to the kidneys of male rats. When albino rats were exposed to isoparaffins at 21.4 mg/l for 4 hours, all animals experienced weakness, tremors, salivation, mild to moderate convulsions, chromodacryorrhoea and ataxia within the first 24 hours. Symptoms disappeared after 24 hours.</p> |
|---------|--|

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|  |  |
|--|--|
|  | <p>Several studies have evaluated sensory irritation in laboratory animals or odor or sensory response in humans. When evaluated by a standard procedure to assess upper airway irritation, isoparaffins did not produce sensory irritation in mice exposed to up to 400 ppm isoparaffin in air. Human volunteers were exposed for six hours to 100 ppm isoparaffin. The subjects were given a self-administered questionnaire to evaluate symptoms, which included dryness of the mucous membranes, loss of appetite, nausea, vomiting, diarrhea, fatigue, headache, dizziness, feeling of inebriation, visual disturbances, tremor, muscular weakness, impairment of coordination or paresthesia. No symptoms associated with solvent exposure were observed. With a human expert panel, odour from liquid imaging copier emissions became weakly discernible at approximately 50 ppm.</p> <p>Numerous long-term exposures have been conducted in animals with only one major finding observed. Renal tubular damage has been found in kidneys of male rats upon repeated exposures to isoparaffins. It does not occur in mice or in female rats. This male rat nephropathy has been observed with a number of hydrocarbons, including wholly vaporized unleaded gasoline. The phenomenon has been attributed to reversible binding of hydrocarbon to alpha2-globulin. Since humans do not synthesize alpha2-globulin or a similar protein, the finding is not considered to be of biological significance to man. No clinically significant renal abnormalities have been found in refinery workers exposed to hydrocarbons.</p> <p>When evaluated for developmental toxicity in rats, isoparaffins were neither embryotoxic nor teratogenic. Isoparaffins were consistently negative on standard bacterial genotoxicity assays. They were also non-genotoxic in <i>in vivo</i> mammalian testing for somatic or germ cell mutations (mouse micronucleus test and rat dominant lethal assay, respectively).</p> <p>Mullin et al: Jnl Applied Toxicology 10, pp 136-142, 2006</p> <p>Material is highly volatile and may quickly form a concentrated atmosphere in confined or unventilated areas. The vapour may displace and replace air in breathing zone, acting as a simple asphyxiant. This may happen with little warning of overexposure.</p> <p><b>WARNING: Intentional misuse by concentrating/inhaling contents may be lethal.</b></p> <p>Hydrocarbons may sensitise the heart to adrenalin and other circulatory catecholamines; as a result cardiac arrhythmias and ventricular fibrillation may occur. Abrupt collapse may produce traumatic injury. Central nervous system (CNS) depression may be evident early. Symptoms of moderate poisoning may include giddiness, headache, dizziness and nausea. Serious poisonings may result in respiratory depression and may be fatal.</p> <p>The paraffin gases C1-4 are practically non-toxic below their lower flammability limits (18000-50000 ppm). Above this level, incidental effects include CNS depression and irritation but these are reversible upon cessation of the exposure. The C3 and iso-C5 hydrocarbons show increasing narcotic properties; branching of the chain also enhances the effect. The C4 hydrocarbons appear to be more highly neurotoxic than the C3 and C5 members. Several fatalities due to voluntary inhalation of butane have been reported, possibly due to central, respiratory and circulatory effects resulting from anaesthesia, laryngeal oedema, chemical pneumonia or the combined effects of cardiac toxicity and increased sympathomimetic effects.</p> <p>Inhalation of petroleum gases may produce narcosis, due in part to olefinic impurities. Displacement of oxygen in the air may cause cyanosis. If present in sufficient quantity these gases may reduce the oxygen level to below 18% producing asphyxiation. Symptoms include rapid respiration, mental dullness, lack of coordination, poor judgement, nausea and vomiting. The onset of cyanosis may lead to unconsciousness and death.</p> |
| <p style="text-align: center;"><b>Ingestion</b></p>    | <p>Accidental ingestion of the material may be damaging to the health of the individual.</p> <p>Not normally a hazard due to physical form of product.</p> <p>Considered an unlikely route of entry in commercial/industrial environments</p> <p>Many aliphatic hydrocarbons create a burning sensation because they are irritating to the GI mucosa. Vomiting has been reported in up to one third of all hydrocarbon exposures. While most aliphatic hydrocarbons have little GI absorption, aspiration frequently occurs, either initially or in a semi-delayed fashion as the patient coughs or vomits, thereby resulting in pulmonary effects. Once aspirated, the hydrocarbons can create a severe pneumonitis.</p> <p>Rats given isoparaffinic hydrocarbons - isoalkanes- (after 18-24 hours fasting) showed lethargy and/or general weakness, ataxia and diarrhoea. Symptoms disappeared within 24-28 hours.</p> <p>Swallowing of the liquid may cause aspiration of vomit into the lungs with the risk of haemorrhaging, pulmonary oedema, progressing to chemical pneumonitis; serious consequences may result.</p> <p>Signs and symptoms of chemical (aspiration) pneumonitis may include coughing, gasping, choking, burning of the mouth, difficult breathing, and bluish coloured skin (cyanosis).</p>   |
| <p style="text-align: center;"><b>Skin Contact</b></p> | <p>Evidence exists, or practical experience predicts, that the material either produces inflammation of the skin in a substantial number of individuals following direct contact, and/or produces significant inflammation when applied to the healthy intact skin of animals, for up to four hours, such inflammation being present twenty-four hours or more after the end of the exposure period.</p> <p>Skin irritation may also be present after prolonged or repeated exposure; this may result in a form of contact dermatitis (nonallergic). The dermatitis is often characterised by skin redness (erythema) and swelling (oedema) which may progress to blistering (vesiculation), scaling and thickening of the epidermis. At the microscopic level there may be intercellular oedema of the spongy layer of the skin (spongiosis) and intracellular oedema of the epidermis.</p> <p>The material may accentuate any pre-existing dermatitis condition</p> <p>Dermal absorption of 2-methylpentane (in vitro) is about 0.11 ug/cm<sup>2</sup>/h and is slow compared to toluene (47 ug/cm<sup>2</sup>/h)</p> <p>Dermally, isoparaffins have produced slight to moderate irritation in animals and humans under occluded patch conditions where evaporation cannot freely occur. However, they are not irritating in non-occluded tests, which are a more realistic simulation of human exposure. They have not been found to be sensitisers in guinea pig or human patch testing. However, occasional rare idiosyncratic sensitisation reactions in humans have been reported.</p> <p>Spray mist may produce discomfort</p> <p>Open cuts, abraded or irritated skin should not be exposed to this material</p> <p>Entry into the blood-stream through, for example, cuts, abrasions, puncture wounds or lesions, may produce systemic injury with harmful effects. Examine the skin prior to the use of the material and ensure that any external damage is suitably protected.</p> <p>The liquid may be miscible with fats or oils and may degrease the skin, producing a skin reaction described as non-allergic contact dermatitis. The material is unlikely to produce an irritant dermatitis as described in EC Directives .</p>   |
| <p style="text-align: center;"><b>Eye</b></p>          | <p>Although the liquid is not thought to be an irritant (as classified by EC Directives), direct contact with the eye may produce transient discomfort characterised by tearing or conjunctival redness (as with windburn).</p>  |

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|                |   |
|----------------|---|
|                | <p>Instillation of isoparaffins into rabbit eyes produces only slight irritation. Direct contact with the eye may not cause irritation because of the extreme volatility of the gas; however concentrated atmospheres may produce irritation after brief exposures..</p>  |
| <b>Chronic</b> | <p>Long-term exposure to the product is not thought to produce chronic effects adverse to health (as classified by EC Directives using animal models); nevertheless exposure by all routes should be minimised as a matter of course.</p> <p>Repeated or prolonged exposure to mixed hydrocarbons may produce narcosis with dizziness, weakness, irritability, concentration and/or memory loss, tremor in the fingers and tongue, vertigo, olfactory disorders, constriction of visual field, paraesthesias of the extremities, weight loss and anaemia and degenerative changes in the liver and kidney. Chronic exposure by petroleum workers, to the lighter hydrocarbons, has been associated with visual disturbances, damage to the central nervous system, peripheral neuropathies (including numbness and paraesthesias), psychological and neurophysiological deficits, bone marrow toxicities (including hypoplasia possibly due to benzene) and hepatic and renal involvement. Chronic dermal exposure to petroleum hydrocarbons may result in defatting which produces localised dermatoses. Surface cracking and erosion may also increase susceptibility to infection by microorganisms. One epidemiological study of petroleum refinery workers has reported elevations in standard mortality ratios for skin cancer along with a dose-response relationship indicating an association between routine workplace exposure to petroleum or one of its constituents and skin cancer, particularly melanoma. Other studies have been unable to confirm this finding.</p> <p>Hydrocarbon solvents are liquid hydrocarbon fractions derived from petroleum processing streams, containing only carbon and hydrogen atoms, with carbon numbers ranging from approximately C5-C20 and boiling between approximately 35-370 deg C. Many of the hydrocarbon solvents have complex and variable compositions with constituents of 4 types, alkanes (normal paraffins, isoparaffins, and cycloparaffins) and aromatics (primarily alkylated one- and two-ring species). Despite the compositional complexity, most hydrocarbon solvent constituents have similar toxicological properties, and the overall toxicological hazards can be characterized in generic terms. Hydrocarbon solvents can cause chemical pneumonitis if aspirated into the lung, and those that are volatile can cause acute CNS effects and/or ocular and respiratory irritation at exposure levels exceeding occupational recommendations. Otherwise, there are few toxicologically important effects. The exceptions, n-hexane and naphthalene, have unique toxicological properties</p> <p>Animal studies:<br/>No deaths or treatment related signs of toxicity were observed in rats exposed to light alkylate naphtha (paraffinic hydrocarbons) at concentrations of 668, 2220 and 6646 ppm for 6 hrs/day, 5 days/wk for 13 weeks. Increased liver weights and kidney toxicity (male rats) was observed in high dose animals. Exposure to pregnant rats at concentrations of 137, 3425 and 6850 ppm did not adversely affect reproduction or cause maternal or foetal toxicity. Lifetime skin painting studies in mice with similar naphthas have shown weak or no carcinogenic activity following prolonged and repeated exposure. Similar naphthas/distillates, when tested at nonirritating dose levels, did not show any significant carcinogenic activity indicating that this tumorigenic response is likely related to chronic irritation and not to dose. The mutagenic potential of naphthas has been reported to be largely negative in a variety of mutagenicity tests. The exact relationship between these results and human health is not known. Some components of this product have been shown to produce a species specific, sex hormonal dependent kidney lesion in male rats from repeated oral or inhalation exposure. Subsequent research has shown that the kidney damage develops via the formation of a alpha-2u-globulin, a mechanism unique to the male rat. Humans do not form alpha-2u-globulin, therefore, the kidney effects resulting from this mechanism are not relevant in human.<br/>Principal route of occupational exposure to the gas is by inhalation.</p> |

| GI-MASK Universal Separator | TOXICITY   | IRRITATION  |
|-----------------------------|--|---|
|                             | Not Available  | Not Available   |
| 2-methylpentane             | TOXICITY   | IRRITATION  |
|                             | Oral (Rat) LD50; ~15.84 mg/kg <sup>[1]</sup>                     | Not Available   |
| isopropyl acetate           | TOXICITY   | IRRITATION  |
|                             | Dermal (rabbit) LD50: >20000 mg/kg <sup>[2]</sup>                | Eye (human): 200 ppm/15m  |
|                             | Oral (Rabbit) LD50; 6946 mg/kg <sup>[2]</sup>                    | Eye (rabbit): 500 mg open                                       |
|                             |  | Eye (rabbit): 500 mg/24h - mild                                 |
|                             |  | Eye: no adverse effect observed (not irritating) <sup>[1]</sup> |
|                             | Skin (rabbit): 500 mg/24h - mild                                 |   |
|                             | Skin: no adverse effect observed (not irritating) <sup>[1]</sup> |   |
| propane                     | TOXICITY   | IRRITATION  |
|                             | Inhalation(Rat) LC50; >13023 ppm4h <sup>[1]</sup>                | Not Available   |
| butane                      | TOXICITY   | IRRITATION  |
|                             | Inhalation(Rat) LC50; 658 mg/14h <sup>[2]</sup>                  | Not Available   |
| iso-butane                  | TOXICITY   | IRRITATION  |
|                             | Inhalation(Rat) LC50; >13023 ppm4h <sup>[1]</sup>                | Not Available   |

**Legend:**

1. Value obtained from Europe ECHA Registered Substances - Acute toxicity 2.\* Value obtained from manufacturer's SDS. Unless otherwise specified data extracted from RTECS - Register of Toxic Effect of chemical Substances

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|                                      |   |
|--------------------------------------|---|
| <b>GI-MASK Universal Separator</b>   | <p>Studies indicate that normal, branched and cyclic paraffins are absorbed from the mammalian gastrointestinal tract and that the absorption of n-paraffins is inversely proportional to the carbon chain length, with little absorption above C30. With respect to the carbon chain lengths likely to be present in mineral oil, n-paraffins may be absorbed to a greater extent than iso- or cyclo-paraffins.</p> <p>The major classes of hydrocarbons have been shown to be well absorbed by the gastrointestinal tract in various species. In many cases, the hydrophobic hydrocarbons are ingested in association with dietary lipids. The dependence of hydrocarbon absorption on concomitant triglyceride digestion and absorption is known as the "hydrocarbon continuum hypothesis", and asserts that a series of solubilising phases in the intestinal lumen, created by dietary triglycerides and their digestion products, afford hydrocarbons a route to the lipid phase of the intestinal absorptive cell (enterocyte) membrane. While some hydrocarbons may traverse the mucosal epithelium unmetabolised and appear as solutes in lipoprotein particles in intestinal lymph, there is evidence that most hydrocarbons partially separate from nutrient lipids and undergo metabolic transformation in the enterocyte. The enterocyte may play a major role in determining the proportion of an absorbed hydrocarbon that, by escaping initial biotransformation, becomes available for deposition in its unchanged form in peripheral tissues such as adipose tissue, or in the liver.</p>   |
| <b>ISOPROPYL ACETATE</b>             | <p>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.</p> <p>The material may be irritating to the eye, with prolonged contact causing inflammation. Repeated or prolonged exposure to irritants may produce conjunctivitis.</p> <p>The material may cause skin irritation after prolonged or repeated exposure and may produce a contact dermatitis (nonallergic). This form of dermatitis is often characterised by skin redness (erythema) and swelling epidermis. Histologically there may be intercellular oedema of the spongy layer (spongiosis) and intracellular oedema of the epidermis.</p> |
| <b>2-METHYLPENTANE &amp; PROPANE</b> | No significant acute toxicological data identified in literature search.  |

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

**Legend:** ✗ – Data either not available or does not fill the criteria for classification  
 ✓ – Data available to make classification

## SECTION 12 Ecological information

## Toxicity

| GI-MASK Universal Separator | Endpoint      | Test Duration (hr) | Species                       | Value         | Source        |
|-----------------------------|---------------|--------------------|-------------------------------|---------------|---------------|
|                             | Not Available | Not Available      | Not Available                 | Not Available | Not Available |
| 2-methylpentane             | Endpoint      | Test Duration (hr) | Species                       | Value         | Source        |
|                             | EC50(ECx)     | 96h                | Algae or other aquatic plants | 4.321mg/l     | 2             |
|                             | EC50          | 96h                | Algae or other aquatic plants | 4.321mg/l     | 2             |
| isopropyl acetate           | Endpoint      | Test Duration (hr) | Species                       | Value         | Source        |
|                             | EC50(ECx)     | 96h                | Algae or other aquatic plants | 37.1mg/l      | 2             |
|                             | LC50          | 96h                | Fish                          | 400mg/l       | 2             |
|                             | EC50          | 72h                | Algae or other aquatic plants | 250mg/l       | 2             |
|                             | EC50          | 48h                | Crustacea                     | 110mg/l       | 1             |
|                             | EC50          | 96h                | Algae or other aquatic plants | 37.1mg/l      | 2             |
| propane                     | Endpoint      | Test Duration (hr) | Species                       | Value         | Source        |
|                             | EC50(ECx)     | 96h                | Algae or other aquatic plants | 7.71mg/l      | 2             |



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|                   |   |                           |                               |              |               |
|-------------------|---|---------------------------|-------------------------------|--------------|---------------|
|                   | LC50  | 96h                       | Fish                          | 24.11mg/l    | 2             |
|                   | EC50  | 96h                       | Algae or other aquatic plants | 7.71mg/l     | 2             |
| <b>butane</b>     | <b>Endpoint</b>   | <b>Test Duration (hr)</b> | <b>Species</b>                | <b>Value</b> | <b>Source</b> |
|                   | EC50(ECx)   | 96h                       | Algae or other aquatic plants | 7.71mg/l     | 2             |
|                   | LC50  | 96h                       | Fish                          | 24.11mg/l    | 2             |
|                   | EC50  | 96h                       | Algae or other aquatic plants | 7.71mg/l     | 2             |
| <b>iso-butane</b> | <b>Endpoint</b>   | <b>Test Duration (hr)</b> | <b>Species</b>                | <b>Value</b> | <b>Source</b> |
|                   | EC50(ECx)   | 96h                       | Algae or other aquatic plants | 7.71mg/l     | 2             |
|                   | LC50  | 96h                       | Fish                          | 24.11mg/l    | 2             |
|                   | EC50  | 96h                       | Algae or other aquatic plants | 7.71mg/l     | 2             |
| <b>Legend:</b>    | <i>Extracted from 1. IUCLID Toxicity Data 2. Europe ECHA Registered Substances - Ecotoxicological Information - Aquatic Toxicity 4. US EPA, Ecotox database - Aquatic Toxicity Data 5. ECETOC Aquatic Hazard Assessment Data 6. NITE (Japan) - Bioconcentration Data 7. METI (Japan) - Bioconcentration Data 8. Vendor Data</i> |                           |                               |              |               |

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

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

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

When spilled this product may act as a typical oil, causing a film, sheen, emulsion or sludge at or beneath the surface of the body of water. The oil film on water surface may physically affect the aquatic organisms, due to the interruption of the oxygen transfer between the air and the water

Oils of any kind can cause:

- drowning of water-fowl due to lack of buoyancy, loss of insulating capacity of feathers, starvation and vulnerability to predators due to lack of mobility
- lethal effects on fish by coating gill surfaces, preventing respiration
- asphyxiation of benthic life forms when floating masses become engaged with surface debris and settle on the bottom and
- adverse aesthetic effects of fouled shoreline and beaches

In case of accidental releases on the soil, a fine film is formed on the soil, which prevents the plant respiration process and the soil particle saturation. It may cause deep water infestation.

When released in the environment, alkanes don't undergo rapid biodegradation, because they have no functional groups (like hydroxyl or carbonyl) that are needed by most organisms in order to metabolize the compound.

However, some bacteria can metabolise some alkanes (especially those linear and short), by oxidizing the terminal carbon atom. The product is an alcohol, that could be next oxidised to an aldehyde, and finally to a carboxylic acid. The resulting fatty acid could be metabolised through the fatty acid degradation pathway.

For petroleum distillates:

Environmental fate:

When petroleum substances are released into the environment, four major fate processes will take place: dissolution in water, volatilization, biodegradation and adsorption. These processes will cause changes in the composition of these UVCB substances. In the case of spills on land or water surfaces, photodegradation-another fate process-can also be significant.

As noted previously, the solubility and vapour pressure of components within a mixture will differ from those of the component alone. These interactions are complex for complex UVCBs such as petroleum hydrocarbons.

Each of the fate processes affects hydrocarbon families differently. Aromatics tend to be more water-soluble than aliphatics of the same carbon number, whereas aliphatics tend to be more volatile. Thus, when a petroleum mixture is released into the environment, the principal water contaminants are likely to be aromatics, whereas aliphatics will be the principal air contaminants. The trend in volatility by component class is as follows: alkenes = alkanes > aromatics = cycloalkanes. The most soluble and volatile components have the lowest molecular weight; thus there is a general shift to higher molecular weight components in residual materials.

Biodegradation:

Biodegradation is almost always operative when petroleum mixtures are released into the environment. It has been widely demonstrated that nearly all soils and sediments have populations of bacteria and other organisms capable of degrading petroleum hydrocarbons. Degradation occurs both in the presence and absence of oxygen. Two key factors that determine degradation rates are oxygen supply and molecular structure. In general, degradation is more rapid under aerobic conditions. Decreasing trends in degradation rates according to structure are as follows:

- (1) n-alkanes, especially in the C10–C25 range, which are degraded readily;
- (2) isoalkanes;
- (3) alkenes;
- (4) benzene, toluene, ethylbenzene, xylenes (BTEX) (when present in concentrations that are not toxic to microorganisms);
- (5) monoaromatics;
- (6) polynuclear (polycyclic) aromatic hydrocarbons (PAHs); and
- (7) higher molecular weight cycloalkanes (which may degrade very slowly).

Three weathering processes-dissolution in water, volatilization and biodegradation-typically result in the depletion of the more readily soluble, volatile and degradable compounds and the accumulation of those most resistant to these processes in residues.

When large quantities of a hydrocarbon mixture enter the soil compartment, soil organic matter and other sorption sites in soil are fully saturated and the hydrocarbons will begin to form a separate phase (a non-aqueous phase liquid, or NAPL) in the soil. At concentrations below the retention capacity for the hydrocarbon in the soil, the NAPL will be immobile this is referred to as residual NAPL. Above the retention capacity, the NAPL becomes mobile and will move within the soil

Bioaccumulation:

Bioaccumulation potential was characterized based on empirical and/or modelled data for a suite of petroleum hydrocarbons expected to occur in petroleum

## GI-MASK Universal Separator

substances. Bioaccumulation factors (BAFs) are the preferred metric for assessing the bioaccumulation potential of substances, as the bioconcentration factor (BCF) may not adequately account for the bioaccumulation potential of substances via the diet, which predominates for substances with  $\log K_{ow} > -4.5$ . In addition to fish BCF and BAF data, bioaccumulation data for aquatic invertebrate species were also considered. Biota-sediment/soil accumulation factors (BSAFs), trophic magnification factors and biomagnification factors were also considered in characterizing bioaccumulation potential.

Overall, there is consistent empirical and predicted evidence to suggest that the following components have the potential for high bioaccumulation, with BAF/BCF values greater than 5000: C13–C15 isoalkanes, C12 alkenes, C12–C15 one-ring cycloalkanes, C12 and C15 two-ring cycloalkanes, C14 polycycloalkanes, C15 one-ring aromatics, C15 and C20 cycloalkane monoaromatics, C12–C13 diaromatics, C20 cycloalkane diaromatics, and C14 and C20 three-ring PAHs. These components are associated with a slow rate of metabolism and are highly lipophilic. Exposures from water and diet, when combined, suggest that the rate of uptake would exceed that of the total elimination rate. Most of these components are not expected to biomagnify in aquatic or terrestrial foodwebs, largely because a combination of metabolism, low dietary assimilation efficiency and growth dilution allows the elimination rate to exceed the uptake rate from the diet; however,

one study suggests that some alkyl-PAHs may biomagnify. While only BSAFs were found for some PAHs, it is possible that BSAFs will be  $> 1$  for invertebrates, given that they do not have the same metabolic competency as fish.

In general, fish can efficiently metabolize aromatic compounds. There is some evidence that alkylation increases bioaccumulation of naphthalene but it is not known if this can be generalized to larger PAHs or if any potential increase in bioaccumulation due to alkylation will be sufficient to exceed a BAF/BCF of 5000. Some lower trophic level organisms (i.e., invertebrates) appear to lack the capacity to efficiently metabolize aromatic compounds, resulting in high bioaccumulation potential for some aromatic components as compared to fish.

This is the case for the C14 three-ring PAH, which was bioconcentrated to a high level (BCF  $> 5000$ ) by invertebrates but not by fish. There is potential for such bioaccumulative components to reach toxic levels in organisms if exposure is continuous and of sufficient magnitude, though this is unlikely in the water column following a spill scenario due to relatively rapid dispersal.

Bioaccumulation of aromatic compounds might be lower in natural environments than what is observed in the laboratory. PAHs may sorb to organic material suspended in the water column (dissolved humic material), which decreases their overall bioavailability primarily due to an increase in size. This has been observed with fish.

#### Ecotoxicity:

Diesel fuel studies in salt water are available. The values varied greatly for aquatic species such as rainbow trout and *Daphnia magna*, demonstrating the inherent variability of diesel fuel compositions and its effects on toxicity. Most experimental acute toxicity values are above 1 mg/L. The lowest 48-hour LC50 for salmonids was 2.4 mg/L. *Daphnia magna* had a 24-hour LC50 of 1.8 mg/L. The values varied greatly for aquatic species such as rainbow trout and *Daphnia magna*, demonstrating the inherent variability of diesel fuel compositions and its effects on toxicity. Most experimental acute toxicity values are above 1 mg/L. The lowest 48-hour LC50 for salmonids was 2.4 mg/L. *Daphnia magna* had a 24-hour LC50 of 1.8 mg/L.

The tropical mysid *Metamysidopsis insularis* was shown to be very sensitive to diesel fuel, with a 96-hour LC50 value of 0.22 mg/L. This species has been shown to be as sensitive as temperate mysids to toxicants. However, this study used nominal concentrations, and therefore was not considered acceptable. In another study involving diesel fuel, the effect on brown or common shrimp (*Crangon crangon*) a 96-hour LC50 of 22 mg/L was determined. A "gas oil" was also tested and a 96-hour LC50 of 12 mg/L was determined.

The steady state cell density of marine phytoplankton decreased with increasing concentrations of diesel fuel, with different sensitivities between species. The diatom *Phaeodactylum tricornutum* showed a 20% decrease in cell density in 24 hours following a 3 mg/L exposure with a 24-hour no-observed effect concentration (NOEC) of 2.5 mg/L. The microalga *Isochrysis galbana* was more tolerant to diesel fuel, with a 24-hour lowest-observed-effect concentration (LOEC) of 26 mg/L (14% decrease in cell density), and a NOEC of 25 mg/L.

Finally, the green algae *Chlorella salina* was relatively insensitive to diesel fuel contamination, with a 24-hour LOEC of 170 mg/L (27% decrease in cell density), and a NOEC of 160 mg/L. All populations of phytoplankton returned to a steady state within 5 days of exposure.

In sandy soils, earthworm (*Eisenia fetida*) mortality only occurred at diesel fuel concentrations greater than 10 000 mg/kg, which was also the concentration at which sub-lethal weight loss was recorded.

Nephrotoxic effects of diesel fuel have been documented in several animal and human studies. Some species of birds (mallard ducks in particular) are generally resistant to the toxic effects of petrochemical ingestion, and large amounts of petrochemicals are needed in order to cause direct mortality.

For *n*-hexane:

$\log K_{ow}$ : 3.17-3.94

BOD 5 if unstated: 2.21

COD: 0.04

ThOD: 3.52

#### Environmental fate:

**Transport and Partitioning:** The physical properties of *n*-hexane that affect its transport and partitioning in the environment are: water solubility of 9.5 mg/L;  $\log[K_{ow}]$  (octanol/water partition coefficient), estimated as 3.29; Henry's law constant, 1.69 atm-m<sup>3</sup> mol; vapor pressure, 150 mm Hg at 25 °C; and  $\log[K_{oc}]$  in the range of 2.90 to 3.61. As with many alkanes, experimental methods for the estimation of the  $K_{oc}$  parameter are lacking, so that estimates must be made based on theoretical considerations.

The dominant transport process from water is volatilization. Based on mathematical models the half-life for *n*-hexane in bodies of water with any degree of turbulent mixing (e.g., rivers) would be less than 3 hours. For standing bodies of water (e.g. small ponds), a half-life no longer than one week (6.8 days) is estimated. Based on the  $\log$  octanol/water partition coefficient (i.e.  $\log[K_{oc}]$ ) and the estimated  $\log$  sorption coefficient (i.e.  $\log[K_{oc}]$ ) *n*-hexane is not expected to become concentrated in biota. A calculated bioconcentration factor (BCF) of 453 for a fathead minnow further suggests a low potential for *n*-hexane to bioconcentrate or bioaccumulate in trophic food chains.

In soil, the dominant transport mechanism for *n*-hexane present near the surface probably is volatilisation (based on its Henry's law constant, water solubility, vapor pressure, and  $K_{oc}$ ). While its estimated  $K_{oc}$  values suggest a moderate ability to sorb to soil particles, *n*-hexane has a density (0.6603 g/mL at 20 °C) well below that of water and a very low water solubility of 9.5 mg/L. *n*-Hexane would, therefore, be viewed as a light nonaqueous phase liquid (LNAPL), which would suggest a low potential for leaching into the lower soil depths since the *n*-hexane would tend to float on the top of the saturated zone of the water table. *n*-Hexane would generally stay near the soil surface and, if not appreciably sorbed into the soil matrix, would be expected eventually to volatilise to the atmosphere.

Exceptions would involve locations with shallow groundwater tables where there were large spills of hexane products. In such cases, the *n*-hexane could spread out to contaminate a large volume of soil materials.

**Air:** *n*-Hexane does not absorb ultraviolet (UV) light at 290 nm and is thus not expected to undergo direct photolysis reactions. The dominant tropospheric removal mechanism for *n*-hexane is generally regarded to be decomposition by hydroxyl radicals. Calculations assuming typical hydroxyl radical concentrations suggest a half-life of approximately 2.9 days. While *n*-hexane can react with nitrogen oxides to produce ozone precursors under controlled laboratory conditions, the

## GI-MASK Universal Separator

smog-producing potential of *n*-hexane is very low compared to that of other alkanes or chlorinated VOCs. Hydroxyl ion reactions in the upper troposphere, therefore, are probably the primary mechanisms for *n*-hexane degradation in the atmosphere. As with most alkanes, *n*-hexane is resistant to hydrolysis

**Water:** Although few data are available dealing explicitly with the biodegradation of *n*-hexane in water, neither hydrolysis nor biodegradation in surface waters appears to be rapid compared with volatilization. In surface waters, as in the atmosphere, alkanes such as *n*-hexane would be resistant to hydrolysis.

Biodegradation is probably the most significant degradation mechanism in groundwater. The ability of *Pseudomonas mendocina* bacteria to metabolise *n*-hexane in laboratory microcosms simulating groundwater conditions has been documented. Mixed bacterial cultures as well as pure cultures are documented as capable of metabolizing *n*-hexane under aerobic conditions. In general, linear alkanes (such as *n*-hexane) are viewed as the most readily biodegradable fractions in petroleum, particularly when oxygen is present in solution. Once introduced into groundwater, *n*-hexane may be fairly persistent since its degradation by chemical hydrolysis is slow and opportunities for biodegradation may be limited under anoxic conditions or where nutrients such as nitrogen or phosphorus are in limited supply.

**Sediment and Soil:** The most important biodegradation processes involve the conversion of the *n*-hexane to primary alcohols, aldehydes and, ultimately, into fatty acids. Similar processes are encountered with other light hydrocarbons such as heptane. In general, unless the *n*-hexane is buried at some depth within a soil or sediment, volatilization is generally assumed to occur at a much more rapid rate than chemical or biochemical degradation processes. Once introduced into deeper sediments, *n*-hexane may be fairly persistent.

**Ecotoxicity:**

Fish LC50 (96 h): Oncorhynchus mykiss 4.14 mg/l; Pimephales promelus 2.5 mg/l (flow through); Lepomis macrochirus 4.12 mg/l

Daphnia EC50 (48 h): 3.87 mg/l

For butane:

log Kow: 2.89

Koc: 450-900

BCF: 1.9

**Environmental Fate**

**Terrestrial Fate:** An estimated Koc value of 900, determined from a log Kow of 2.89 indicates that *n*-butane is expected to have low mobility in soil. Volatilization of *n*-butane from moist soil surfaces is expected to be an important fate process given an estimated Henry's Law constant of 0.95 atm-cu m/mole, derived from its vapor pressure, 1820 mm Hg and water solubility, 61.2 mg/l. The potential for volatilization of *n*-butane from dry soil surfaces may exist based upon its vapor pressure. While volatilization from soil surfaces is expected to be the predominant fate process of *n*-butane released to soil, this compound is also susceptible to biodegradation. In one soil, a biodegradation rate of 1.8 mgC/day/kg dry soil was reported.

**Aquatic fate:** The estimated Koc value indicates that *n*-butane may adsorb to suspended solids and sediment. Volatilization from water surfaces is expected based upon an estimated Henry's Law constant. Using this Henry's Law constant volatilization half-lives for a model river and model lake are estimated to be 2.2 hours and 3 days, respectively. An estimated BCF of 33 derived from the log Kow suggests the potential for bioconcentration in aquatic organisms is moderate. While volatilization from water surfaces is expected to be the major fate process for *n*-butane released to water, biodegradation of this compound is also expected to occur. In a screening study, complete biodegradation was reported in 34 days. In a second study using a defined microbial culture, it was reported that *n*-butane was degraded to 2-butanone and 2-butanol. Photolysis or hydrolysis of *n*-butane in aquatic systems is not expected to be important.

**Atmospheric fate:** According to a model of gas/particle partitioning of semivolatile organic compounds in the atmosphere and the vapour pressure, *n*-butane, is expected to exist solely as a gas in the ambient atmosphere. Gas-phase *n*-butane is degraded in the atmosphere by reaction with photochemically-produced hydroxyl radicals; the half-life for this reaction in air is estimated to be 6.3 days, calculated from its rate constant of  $2.54 \times 10^{-12}$  cu cm/molecule-sec at 25 deg. Based on data for iso-octane and *n*-hexane, *n*-butane is not expected to absorb UV light in the environmentally significant range, >290 nm and probably will not undergo direct photolysis in the atmosphere. Experimental data showed that 7.7% of the *n*-butane fraction in a dark chamber reacted with nitrogen oxide to form the corresponding alkyl nitrate, suggesting nighttime reactions with radical species and nitrogen oxides may contribute to the atmospheric transformation of *n*-butane.

For isobutane:

Refrigerant Gas: Saturated Hydrocarbons have zero ozone depletion potential (ODP) and will photodegrade under atmospheric conditions. [Calor Gas]

**Environmental Fate**

**Terrestrial fate:** An estimated Koc value of 35 suggests that isobutane will have very high mobility in soil. Its very high Henry's Law constant, 4.08 atm-cu m/mole, (calculated from its vapor pressure and water solubility, high vapor pressure, 2611 mm Hg at 25 deg C, and low adsorptivity to soil indicate that volatilization will be an important fate process from both moist and dry soil surfaces. Isobutane is biodegradable, especially under acclimated conditions, and may biodegrade in soil.

**Aquatic fate:** The estimated Koc value suggests that isobutane would not adsorb to sediment and particulate matter in the water column. Additional evidence that isobutane is not removed to sediment has been obtained from microcosm experiments. Isobutane will readily volatilise from water based on its estimated Henry's Law constant of 4.08 atm-cu m/mole. Estimated half-lives for a model river and model lake are 2.2 hr and 3.0 days, respectively. An estimated BCF value of 74 based on the log Kow suggests that isobutane will not bioconcentrate in aquatic organisms.

Results indicate that gas exchange is the dominant removal mechanism for isobutane gases from the water column following a hypothetical input. The volatilization half-lives for isobutane from the water columns in natural estuaries are estimated to be 4.4 and 6.8 days at 20 and 10 deg C, respectively. Isobutane also biodegrades in the microcosm at a rate that is slower than for *n*-butane and falls between propane and ethane in susceptibility. Biodegradation of isobutane initially occurs with a half-lives of 16-26 days at 20 deg C and 33-139 days at 10 deg C, significantly slower than the loss predicted by gas exchange from typical natural estuaries. However, after a lag of 2-4 weeks, the biodegradation rate increases markedly so that in the case of chronic inputs, biodegradation can become the dominant removal mechanism.

**Atmospheric fate:** Isobutane is a gas at ordinary temperatures. It is degraded in the atmosphere by reaction with photochemically-produced hydroxyl radicals; the half-life for this reaction in air is 6.9 days, assuming a hydroxyl radical concn of  $5 \times 10^5$  radicals per cubic cm. When isobutane was exposed to sunlight for 6 hr in a tedlar bag filled with Los Angeles air, 6% of the isobutane degraded. The air contained 4529 ppb-C hydrocarbons and 870 ppb of NOX. The tropospheric loss of volatile hydrocarbons such as isobutane by wet and dry deposition are believed to be of minor importance. Indeed, isobutane assimilated into precipitation may evaporate during transport as well as being reemitted into the atmosphere after deposition. Isobutane is a contributor to the production of PAN (peroxyacyl nitrates) under photochemical smog conditions

For Propane: Koc 460. log

Kow 2.36.

Henry's Law constant of  $7.07 \times 10^{-1}$  atm-cu m/mole, derived from its vapour pressure, 7150 mm Hg, and water solubility, 62.4 mg/L. Estimated BCF: 13.1.

**Terrestrial Fate:** Propane is expected to have moderate mobility in soil. Volatilization from moist soil surfaces is expected to be an important fate process.

Volatilization from dry soil surfaces is based vapor pressure. Biodegradation may be an important fate process in soil and sediment.

**Aquatic Fate:** Propane is expected to adsorb to suspended solids and sediment. Volatilization from water surfaces is expected and half-lives for a model river and

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model lake are estimated to be 41 minutes and 2.6 days, respectively. Biodegradation may not be an important fate process in water.

Ecotoxicity: The potential for bioconcentration in aquatic organisms is low.

Atmospheric Fate: Propane is expected to exist solely as a gas in the ambient atmosphere. Gas-phase propane is degraded in the atmosphere by reaction with photochemically-produced hydroxyl radicals; the half-life for this reaction in air is estimated to be 14 days and is not expected to be susceptible to direct photolysis by sunlight.

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

### Persistence and degradability

| Ingredient        | Persistence: Water/Soil | Persistence: Air |
|-------------------|-------------------------|------------------|
| 2-methylpentane   | LOW                     | LOW              |
| isopropyl acetate | LOW                     | LOW              |
| propane           | LOW                     | LOW              |
| butane            | LOW                     | LOW              |
| iso-butane        | HIGH                    | HIGH             |

### Bioaccumulative potential

| Ingredient        | Bioaccumulation       |
|-------------------|-----------------------|
| 2-methylpentane   | LOW (LogKOW = 3.2145) |
| isopropyl acetate | LOW (BCF = 1.8)       |
| propane           | LOW (LogKOW = 2.36)   |
| butane            | LOW (LogKOW = 2.89)   |
| iso-butane        | LOW (BCF = 1.97)      |

### Mobility in soil

| Ingredient        | Mobility          |
|-------------------|-------------------|
| 2-methylpentane   | LOW (KOC = 124.9) |
| isopropyl acetate | LOW (KOC = 9.479) |
| propane           | LOW (KOC = 23.74) |
| butane            | LOW (KOC = 43.79) |
| iso-butane        | LOW (KOC = 35.04) |



## SECTION 13 Disposal considerations

### Waste treatment methods

|                                     |   |
|-------------------------------------|---|
| <b>Product / Packaging disposal</b> | <p>Dispose of waste according to applicable legislation. Special country-specific regulations may apply. Can be disposed together with household waste in compliance with official regulations in contact with approved waste disposal companies and with authorities in charge. (Only dispose of completely emptied packages.)</p> <ul style="list-style-type: none"> <li>▶ <b>DO NOT</b> allow wash water from cleaning or process equipment to enter drains.</li> <li>▶ It may be necessary to collect all wash water for treatment before disposal.</li> <li>▶ In all cases disposal to sewer may be subject to local laws and regulations and these should be considered first.</li> <li>▶ Where in doubt contact the responsible authority.</li> <li>▶ Consult State Land Waste Management Authority for disposal.</li> <li>▶ Discharge contents of damaged aerosol cans at an approved site.</li> <li>▶ Allow small quantities to evaporate.</li> <li>▶ <b>DO NOT</b> incinerate or puncture aerosol cans.</li> <li>▶ Bury residues and emptied aerosol cans at an approved site.</li> </ul> |
|-------------------------------------|---|

## SECTION 14 Transport information

### Labels Required

|  |   |
|--|---|
|  |   |
|--|---|

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Marine Pollutant



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

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

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

|                                     |                    |                            |
|-------------------------------------|--------------------|----------------------------|
| <b>UN number</b>                    | 1950               |                            |
| <b>UN proper shipping name</b>      | AEROSOLS           |                            |
| <b>Transport hazard class(es)</b>   | IMDG Class         | 2.1                        |
|                                     | IMDG Subrisk       | 6.1                        |
| <b>Packing group</b>                | Not Applicable     |                            |
| <b>Environmental hazard</b>         | Marine Pollutant   |                            |
| <b>Special precautions for user</b> | EMS Number         | F-D, S-U                   |
|                                     | Special provisions | 63 190 277 327 344 381 959 |
|                                     | Limited Quantities | 120 ml                     |

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

Not Applicable

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

| Product name      | Group         |
|-------------------|---------------|
| 2-methylpentane   | Not Available |
| isopropyl acetate | Not Available |
| propane           | Not Available |
| butane            | Not Available |
| iso-butane        | Not Available |

**Transport in bulk in accordance with the ICG Code**

| Product name      | Ship Type     |
|-------------------|---------------|
| 2-methylpentane   | Not Available |
| isopropyl acetate | Not Available |
| propane           | Not Available |
| butane            | Not Available |
| iso-butane        | Not Available |

## SECTION 15 Regulatory information

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

This product has been classified in accordance with the hazard criteria of the Hazardous Products Regulations and the SDS contains all the information required by the Hazardous Products Regulations.

#### 2-methylpentane is found on the following regulatory lists

Canada Categorization decisions for all DSL substances  
Canada Domestic Substances List (DSL)

Canada Toxicological Index Service - Workplace Hazardous Materials Information System - WHMIS GHS

#### isopropyl acetate is found on the following regulatory lists

Canada Categorization decisions for all DSL substances  
Canada Domestic Substances List (DSL)

Canada Toxicological Index Service - Workplace Hazardous Materials Information System - WHMIS GHS

#### propane is found on the following regulatory lists

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Canada Categorization decisions for all DSL substances  
Canada Domestic Substances List (DSL)

Canada Toxicological Index Service - Workplace Hazardous Materials  
Information System - WHMIS GHS

**butane is found on the following regulatory lists**

Canada Categorization decisions for all DSL substances  
Canada Domestic Substances List (DSL)

Canada Toxicological Index Service - Workplace Hazardous Materials  
Information System - WHMIS GHS  
Chemical Footprint Project - Chemicals of High Concern List

**iso-butane is found on the following regulatory lists**

Canada Categorization decisions for all DSL substances  
Canada Domestic Substances List (DSL)

Canada Toxicological Index Service - Workplace Hazardous Materials  
Information System - WHMIS GHS  
Chemical Footprint Project - Chemicals of High Concern List

**National Inventory Status**

| National Inventory                               | Status  |
|--|---|
| Australia - AIIIC / Australia Non-Industrial Use | Yes   |
| Canada - DSL                                     | Yes   |
| Canada - NDSL                                    | No (2-methylpentane; isopropyl acetate; propane; butane; iso-butane)  |
| China - IECSC                                    | Yes   |
| Europe - EINEC / ELINCS / NLP                    | Yes   |
| Japan - ENCS                                     | Yes   |
| Korea - KECI                                     | Yes   |
| New Zealand - NZIoC                              | Yes   |
| Philippines - PICCS                              | Yes   |
| USA - TSCA                                       | Yes   |
| Taiwan - TCSI                                    | Yes   |
| Mexico - INSQ                                    | Yes   |
| Vietnam - NCI                                    | Yes   |
| Russia - FBEPH                                   | Yes   |
| <b>Legend:</b>                                   | Yes = All CAS declared ingredients are on the inventory<br>No = One or more of the CAS listed ingredients are not on the inventory. These ingredients may be exempt or will require registration. |

**SECTION 16 Other information**

|                      |            |
|----------------------|------------|
| <b>Revision Date</b> | 21/04/2022 |
| <b>Initial Date</b>  | 08/02/2022 |

**Other information**

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

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

**Definitions and abbreviations**

PC—TWA: Permissible Concentration-Time Weighted Average  
 PC—STEL: Permissible Concentration-Short Term Exposure Limit  
 IARC: International Agency for Research on Cancer  
 ACGIH: American Conference of Governmental Industrial Hygienists  
 STEL: Short Term Exposure Limit  
 TEEL: Temporary Emergency Exposure Limit.  
 IDLH: Immediately Dangerous to Life or Health Concentrations  
 ES: Exposure Standard  
 OSF: Odour Safety Factor  
 NOAEL :No Observed Adverse Effect Level  
 LOAEL: Lowest Observed Adverse Effect Level

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TLV: Threshold Limit Value  
LOD: Limit Of Detection  
OTV: Odour Threshold Value  
BCF: BioConcentration Factors  
BEI: Biological Exposure Index  
AII: Australian Inventory of Industrial Chemicals  
DSL: Domestic Substances List  
NDSL: Non-Domestic Substances List  
IECSC: Inventory of Existing Chemical Substance in China  
EINECS: European INventory of Existing Commercial chemical Substances  
ELINCS: European List of Notified Chemical Substances  
NLP: No-Longer Polymers  
ENCS: Existing and New Chemical Substances Inventory  
KECI: Korea Existing Chemicals Inventory  
NZIoC: New Zealand Inventory of Chemicals  
PICCS: Philippine Inventory of Chemicals and Chemical Substances  
TSCA: Toxic Substances Control Act  
TCSI: Taiwan Chemical Substance Inventory  
INSQ: Inventario Nacional de Sustancias Químicas  
NCI: National Chemical Inventory  
FBEPH: Russian Register of Potentially Hazardous Chemical and Biological Substances

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