

## 9-Borabicyclo[3.3.1]nonane, 0.5M solution in THF

### Apollo Scientific

Chemwatch Hazard Alert Code: 4

Part Number: OR72396

Version No: 2.2

Safety Data Sheet (Conforms to Annex II of REACH (1907/2006) - Regulation 2020/878)

Issue Date: 23/06/2023

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S.REACH.GB-NIR.EN

## SECTION 1 Identification of the substance / mixture and of the company / undertaking

### 1.1. Product Identifier

|                                      |   |
|--------------------------------------|---|
| <b>Product name</b>                  | 9-Borabicyclo[3.3.1]nonane, 0.5M solution in THF            |
| <b>Synonyms</b>                      | Not Available   |
| <b>Proper shipping name</b>          | ORGANOMETALLIC SUBSTANCE, LIQUID, WATER-REACTIVE, FLAMMABLE |
| <b>Other means of identification</b> | Not Available   |

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

|                                 |   |
|---------------------------------|---|
| <b>Relevant identified uses</b> | Epoxides (oxiranes) have long been recognised as valuable building blocks which allow derivatization either by forming C-X bonds (through reactions with alcohols, ammonia, amines, phenolates, etc.) or by forming new C-C bonds (through reactions with cyanide, malonates, allyl silyl reagents, or metal-organic reagents).<br>Cyclic ethers have ring structure where the oxygen has become part of the ring. The term of epoxide indicate three membered cyclic ether (also called oxirane); four membered cyclic ether is called oxetane; five membered cyclic ether, furan (or oxolane); six membered cyclic ether, pyran (also called oxane) respectively. Their unhindered oxygen atom carries two unshared pairs of electrons - a structure which favours the formation of coordination complexes and the solvation of cations. Cyclic ethers are used as important solvents, as chemical intermediate and as monomer for ring-opening polymerization. |
| <b>Uses advised against</b>     | No specific uses advised against are identified.  |

### 1.3. Details of the manufacturer or supplier of the safety data sheet

|                                |   |
|--------------------------------|---|
| <b>Registered company name</b> | Apollo Scientific   |
| <b>Address</b>                 | Whitefield Road, Bredbury SK62QR United Kingdom                                     |
| <b>Telephone</b>               | 01614060505   |
| <b>Fax</b>                     | 0161 406 0506   |
| <b>Website</b>                 | <a href="http://www.apolloscientific.co.uk/">http://www.apolloscientific.co.uk/</a> |
| <b>Email</b>                   | sales@apolloscientific.co.uk  |

### 1.4. Emergency telephone number

|  |               |
|--|---------------|
| <b>Association / Organisation</b>        | Not Available |
| <b>Emergency telephone numbers</b>       | Not Available |
| <b>Other emergency telephone numbers</b> | Not Available |

## SECTION 2 Hazards identification

### 2.1. Classification of the substance or mixture

|  |  |
|--|--|
| <b>Classification according to regulation (EC) No 1272/2008 [CLP] and amendments [1]</b> | H225 - Flammable Liquids Category 2, H261 - Substances and Mixtures which in Contact with Water Emit Flammable Gases Category 2, H302 - Acute Toxicity (Oral) Category 4, H314 - Skin Corrosion/Irritation Category 1B, H318 - Serious Eye Damage/Eye Irritation Category 1, H335 - Specific Target Organ Toxicity - Single Exposure (Respiratory Tract Irritation) Category 3, H336 - Specific Target Organ Toxicity - Single Exposure (Narcotic Effects) Category 3, H351 - Carcinogenicity Category 2 |
| <b>Legend:</b>   | 1. Classified by Chemwatch; 2. Classification drawn from Regulation (EU) No 1272/2008 - Annex VI   |

### 2.2. Label elements

**9-Borabicyclo[3.3.1]nonane, 0.5M solution in THF**

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

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

**Hazard statement(s)**

|             |   |
|-------------|---|
| <b>H225</b> | Highly flammable liquid and vapour.             |
| <b>H261</b> | In contact with water releases flammable gases. |
| <b>H302</b> | Harmful if swallowed.                           |
| <b>H314</b> | Causes severe skin burns and eye damage.        |
| <b>H335</b> | May cause respiratory irritation.               |
| <b>H336</b> | May cause drowsiness or dizziness.              |
| <b>H351</b> | Suspected of causing cancer.                    |

**Supplementary statement(s)**

Not Applicable

**Precautionary statement(s) Prevention**

|                  |  |
|------------------|--|
| <b>P201</b>      | Obtain special instructions before use.  |
| <b>P210</b>      | Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking. |
| <b>P231+P232</b> | Handle and store contents under inert gas. Protect from moisture.                              |
| <b>P260</b>      | Do not breathe mist/vapours/spray.   |
| <b>P264</b>      | Wash all exposed external body areas thoroughly after handling.                                |
| <b>P271</b>      | Use only outdoors or in a well-ventilated area.  |
| <b>P280</b>      | Wear protective gloves, protective clothing, eye protection and face protection.               |
| <b>P240</b>      | Ground and bond container and receiving equipment.   |
| <b>P241</b>      | Use explosion-proof electrical/ventilating/lighting/intrinsically safe equipment.              |
| <b>P242</b>      | Use non-sparking tools.  |
| <b>P243</b>      | Take action to prevent static discharges.  |
| <b>P270</b>      | Do not eat, drink or smoke when using this product.  |
| <b>P223</b>      | Do not allow contact with water.   |

**Precautionary statement(s) Response**

|                       |  |
|-----------------------|--|
| <b>P301+P330+P331</b> | IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.   |
| <b>P302+P335+P334</b> | IF ON SKIN: Brush off loose particles from skin. Immerse in cool water [or wrap in wet bandages].                                |
| <b>P303+P361+P353</b> | IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water [or shower].                         |
| <b>P305+P351+P338</b> | IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. |
| <b>P308+P313</b>      | IF exposed or concerned: Get medical advice/ attention.  |
| <b>P310</b>           | Immediately call a POISON CENTER/doctor/physician/first aider.   |
| <b>P370+P378</b>      | In case of fire: Use alcohol resistant foam or normal protein foam to extinguish.  |
| <b>P363</b>           | Wash contaminated clothing before reuse.   |
| <b>P301+P312</b>      | IF SWALLOWED: Call a POISON CENTER/doctor/physician/first aider if you feel unwell.  |
| <b>P304+P340</b>      | IF INHALED: Remove person to fresh air and keep comfortable for breathing.   |

**Precautionary statement(s) Storage**

|                  |  |
|------------------|--|
| <b>P403+P235</b> | Store in a well-ventilated place. Keep cool.       |
| <b>P405</b>      | Store locked up.                                   |
| <b>P402+P404</b> | Store in a dry place. Store in a closed container. |

**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. |
|-------------|--|

**2.3. Other hazards**

Inhalation and/or skin contact may produce health damage\*.

Cumulative effects may result following exposure\*.

Limited evidence of a carcinogenic effect\*.

May be harmful to the foetus/ embryo\*.

|                        |   |
|------------------------|---|
| <b>tetrahydrofuran</b> | Listed in the Europe Regulation (EC) No 1907/2006 - Annex XVII (Restrictions may apply) |
|------------------------|---|

## SECTION 3 Composition / information on ingredients

### 3.1.Substances

See 'Composition on ingredients' in Section 3.2

### 3.2.Mixtures

| 1. CAS No<br>2.EC No<br>3.Index No<br>4.REACH No                             | %[weight] | Name                              | Classification according to regulation (EC) No 1272/2008 [CLP] and amendments  | SCL / M-Factor   | Nanoform Particle Characteristics |
|--|-----------|-----------------------------------|--|--|-----------------------------------|
| 1. Not Available<br>2. Not Available<br>3. Not Available<br>4. Not Available | 8         | <u>9-Borabicyclo[3.3.1]nonane</u> | Pyrophoric Solids Category 1, Substances and Mixtures which in Contact with Water Emit<br>Flammable Gases Category 1, Skin<br>Corrosion/Irritation Category 1B, Serious Eye<br>Damage/Eye Irritation Category 1; H250, H260,<br>H314, H318 [1] | Not Available  | Not Available                     |
| 1. 109-99-9<br>2. 203-726-8<br>3. 603-025-00-0<br>4. Not Available           | 92        | <u>tetrahydrofuran</u> *          | Flammable Liquids Category 2, Serious Eye<br>Damage/Eye Irritation Category 2, Carcinogenicity<br>Category 2, Specific Target Organ Toxicity - Single<br>Exposure (Respiratory Tract Irritation) Category 3;<br>H225, H319, H351, H335 [2]     | STOT SE 3;<br>H335: C ≥ 25 %<br>  Eye Irrit.2;<br>H319: C ≥ 25 % | Not Available                     |

**Legend:** 1. Classified by Chemwatch; 2. Classification drawn from Regulation (EU) No 1272/2008 - Annex VI; 3. Classification drawn from C&L; \* EU IOELVs available; [e] Substance identified as having endocrine disrupting properties

## SECTION 4 First aid measures

### 4.1. Description of first aid measures

|                     |  |
|---------------------|--|
| <b>Eye Contact</b>  | <p>If this product comes in contact with the eyes:</p> <ul style="list-style-type: none"> <li>▶ Immediately hold eyelids apart and flush the eye continuously with 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>▶ Continue flushing until advised to stop by the Poisons Information Centre or a doctor, or for at least 15 minutes.</li> <li>▶ Transport to hospital or doctor without delay.</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 skin or hair contact occurs:</p> <ul style="list-style-type: none"> <li>▶ Immediately flush body and clothes with large amounts of water, using safety shower if available.</li> <li>▶ Quickly remove all contaminated clothing, including footwear.</li> <li>▶ Wash skin and hair with running water. Continue flushing with water until advised to stop by the Poisons Information Centre.</li> <li>▶ Transport to hospital, or doctor.</li> </ul>   |
| <b>Inhalation</b>   | <ul style="list-style-type: none"> <li>▶ If fumes or combustion products are inhaled remove from contaminated area.</li> <li>▶ Lay patient down. Keep warm and rested.</li> <li>▶ Prostheses such as false teeth, which may block airway, should be removed, where possible, prior to initiating first aid procedures.</li> <li>▶ Apply artificial respiration if not breathing, preferably with a demand valve resuscitator, bag-valve mask device, or pocket mask as trained. Perform CPR if necessary.</li> <li>▶ Transport to hospital, or doctor, without delay.</li> </ul>   |
| <b>Ingestion</b>    | <ul style="list-style-type: none"> <li>▶ For advice, contact a Poisons Information Centre or a doctor at once.</li> <li>▶ Urgent hospital treatment is likely to be needed.</li> <li>▶ <b>If swallowed do NOT induce vomiting.</b></li> <li>▶ If vomiting occurs, lean patient forward or place on left side (head-down position, if possible) to maintain open airway and prevent aspiration.</li> <li>▶ Observe the patient carefully.</li> <li>▶ Never give liquid to a person showing signs of being sleepy or with reduced awareness; i.e. becoming unconscious.</li> <li>▶ Give water to rinse out mouth, then provide liquid slowly and as much as casualty can comfortably drink.</li> <li>▶ Transport to hospital or doctor without delay.</li> </ul> |

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

See Section 11

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

Treat symptomatically.

## SECTION 5 Firefighting measures

### 5.1. Extinguishing media

**DO NOT USE WATER, CO2 OR FOAM ON SUBSTANCE ITSELF**

For **SMALL FIRES:**

- ▶ Dry chemical, soda ash or lime.

For **LARGE FIRES:**

- ▶ DRY sand, dry chemical, soda ash;
- ▶ OR withdraw and allow fire to burn itself out.

### 5.2. 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> <li>▶ Keep dry</li> <li>▶ <b>NOTE:</b> May develop pressure in containers; open carefully. Vent periodically.</li> </ul> |
|-----------------------------|---|

## 9-Borabicyclo[3.3.1]nonane, 0.5M solution in THF

## 5.3. Advice for firefighters

|                              |  |
|------------------------------|--|
| <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 full protective clothing plus breathing apparatus.</li> <li>▶ Prevent, by any means available, spillage from entering drains or water course.</li> <li>▶ Consider evacuation (or protect in place)</li> <li>▶ <b>DO NOT</b> use water on fires.</li> </ul> <p><b>CAUTION:</b> If only water available, use flooding quantities of water or withdraw personnel.</p> <ul style="list-style-type: none"> <li>▶ <b>DO NOT</b> allow water to enter containers.</li> <li>▶ <b>DO NOT</b> approach containers suspected to be hot.</li> <li>▶ Cool fire exposed containers with flooding quantities of water from a protected location until well after fire is out.</li> <li>▶ If safe to do so, remove undamaged containers from path of fire.</li> <li>▶ If fire gets out of control withdraw personnel and warn against entry.</li> <li>▶ Equipment should be thoroughly decontaminated after use.</li> <li>▶ Fight fire from a protected position or use unmanned hose holders or monitor nozzles.</li> <li>▶ Withdraw immediately in case of rising sound from venting safety devices or discolouration of tanks.</li> <li>▶ ALWAYS stay away from tank ends.</li> </ul> |
| <b>Fire/Explosion Hazard</b> | <ul style="list-style-type: none"> <li>▶ May ignite on contact with air, moist air or water.</li> <li>▶ May react vigorously or explosively on contact with water.</li> <li>▶ May decompose explosively when heated or involved in fire.</li> <li>▶ May <b>REIGNITE</b> after fire is extinguished.</li> <li>▶ Gases generated after contact with water or moist air may be poisonous, corrosive or irritating.</li> <li>▶ Gases generated in fire may be poisonous, corrosive or irritating.</li> <li>▶ Containers may explode on heating.</li> <li>▶ Runoff may create multiple fire or explosion hazard.</li> </ul> <p>Combustion products include:<br/>carbon monoxide (CO)<br/>carbon dioxide (CO<sub>2</sub>)<br/>other pyrolysis products typical of burning organic material.</p> <p><b>WARNING:</b> Long standing in contact with air and light may result in the formation of potentially explosive peroxides.</p>   |

## SECTION 6 Accidental release measures

## 6.1. Personal precautions, protective equipment and emergency procedures

See section 8

## 6.2. Environmental precautions

See section 12

## 6.3. Methods and material for containment and cleaning up

|                     |  |
|---------------------|--|
| <b>Minor Spills</b> | <ul style="list-style-type: none"> <li>▶ Material from spill may be contaminated with water resulting in generation of gas which subsequently may pressure closed containers.</li> <li>▶ Hold spill material in vented containers only and plan for prompt disposal</li> <li>▶ Eliminate all ignition sources.</li> <li>▶ Cover with <b>DRY</b> earth, sand or other non-combustible material.</li> <li>▶ Then cover with plastic sheet to minimise spreading and to prevent exposure to rain or other sources of water.</li> <li>▶ Use clean, non-sparking tools to collect absorbed material and place into loosely-covered metal or plastic containers ready for disposal.</li> <li>▶ Wear gloves and safety glasses as appropriate.</li> </ul>   |
| <b>Major Spills</b> | <ul style="list-style-type: none"> <li>▶ Clear area of personnel and move upwind.</li> <li>▶ Alert Fire Brigade and tell them location and nature of hazard.</li> <li>▶ Wear full protective clothing and breathing apparatus.</li> <li>▶ Prevent, by any means available, spillage from entering drains or water courses.</li> <li>▶ No smoking, naked lights or ignition sources.</li> <li>▶ Increase ventilation.</li> <li>▶ Stop leak if safe to do so.</li> <li>▶ <b>DO NOT USE WATER OR NEUTRALISING AGENTS INDISCRIMINATELY ON LARGE SPILLS.</b></li> <li>▶ Absorb or cover spill with sand, earth, inert material or vermiculite and cover with white mineral oil.</li> <li>▶ Collect recoverable product into labelled containers for recycling.</li> <li>▶ Collect residues and seal in labelled drums for disposal.</li> <li>▶ Wash spill area with detergent and water.</li> <li>▶ After clean up operations, decontaminate and launder all protective clothing and equipment before storing and re-using.</li> <li>▶ If contamination of drains or waterways occurs as a result of the above actions, advise emergency services.</li> </ul> |

## 6.4. Reference to other sections

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

## SECTION 7 Handling and storage

## 7.1. Precautions for safe handling

|                      |   |
|----------------------|---|
| <b>Safe handling</b> | <p>The substance accumulates peroxides which may become hazardous only if it evaporates or is distilled or otherwise treated to concentrate the peroxides. The substance may concentrate around the container opening for example.</p> <p>Purchases of peroxidisable chemicals should be restricted to ensure that the chemical is used completely before it can become peroxidised.</p> <ul style="list-style-type: none"> <li>▶ A responsible person should maintain an inventory of peroxidisable chemicals or annotate the general chemical inventory to indicate which chemicals are subject to peroxidation. An expiration date should be determined. The chemical should either be treated to remove peroxides or disposed of before this date.</li> <li>▶ The person or laboratory receiving the chemical should record a receipt date on the bottle. The individual opening the container should add an opening date.</li> </ul> |
|----------------------|---|

## 9-Borabicyclo[3.3.1]nonane, 0.5M solution in THF

|                                      |   |
|--------------------------------------|---|
|                                      | <ul style="list-style-type: none"> <li>▶ Unopened containers received from the supplier should be safe to store for 18 months.</li> <li>▶ Opened containers should not be stored for more than 12 months.</li> <li>▶ Avoid all personal contact, including inhalation.</li> <li>▶ Wear protective clothing when risk of overexposure occurs.</li> <li>▶ Use in a well-ventilated area.</li> <li>▶ Avoid contact with moisture.</li> <li>▶ Avoid smoking, naked lights or ignition sources.</li> <li>▶ Avoid contact with incompatible materials.</li> <li>▶ <b>When handling, DO NOT eat, drink or smoke.</b></li> <li>▶ Keep containers securely sealed when not in use.</li> <li>▶ Avoid physical damage to containers.</li> <li>▶ Always wash hands with soap and water after handling.</li> <li>▶ Work clothes should be laundered separately and before re-use</li> <li>▶ Use good occupational work practice.</li> <li>▶ Observe manufacturer's storage and handling recommendations contained within this SDS.</li> <li>▶ Atmosphere should be regularly checked against established exposure standards to ensure safe working conditions are maintained.</li> <li>▶ Containers, even those that have been emptied, may contain explosive vapours.</li> <li>▶ Do NOT cut, drill, grind, weld or perform similar operations on or near containers.</li> <li>▶ <b>DO NOT allow clothing wet with material to stay in contact with skin</b></li> </ul>  |
| <b>Fire and explosion protection</b> | See section 5   |
| <b>Other information</b>             | <p><b>KEEP DRY!</b> Packages must be protected from water ingress.</p> <p><b>FOR MINOR QUANTITIES:</b></p> <ul style="list-style-type: none"> <li>▶ Store in an indoor fireproof cabinet or in a room of noncombustible construction and</li> <li>▶ provide adequate portable fire-extinguishers in or near the storage area.</li> </ul> <p><b>FOR PACKAGE STORAGE:</b></p> <ul style="list-style-type: none"> <li>▶ Store in original containers in approved flame-proof area.</li> <li>▶ No smoking, naked lights, heat or ignition sources.</li> <li>▶ <b>DO NOT store in pits, depressions, basements or areas where vapours may be trapped.</b></li> <li>▶ Keep containers securely sealed.</li> <li>▶ Store away from incompatible materials in a cool, dry well ventilated area.</li> <li>▶ Protect containers against physical damage and check regularly for leaks.</li> <li>▶ Protect containers from exposure to weather and from direct sunlight unless: (a) the packages are of metal or plastic construction; (b) the packages are securely closed are not opened for any purpose while in the area where they are stored; (c) adequate precautions are taken to ensure that rain water, which might become contaminated by the dangerous goods, is collected and disposed of safely.</li> <li>▶ Ensure proper stock-control measures are maintained to prevent prolonged storage of dangerous goods.</li> <li>▶ Automatic fire-sprinklers <b>MUST NOT</b> be installed in room or space.</li> <li>▶ The room or space must be located at least five metres from the boundaries of the premises and from other buildings unless separated by a wall with a fire resistance of at least four hours.</li> <li>▶ Observe manufacturer's storage and handling recommendations contained within this SDS.</li> </ul> |

## 7.2. Conditions for safe storage, including any incompatibilities

|                                |   |
|--------------------------------|---|
| <b>Suitable container</b>      | <p>For low viscosity materials and solids:<br/>Drums and jerricans must be of the non-removable head type.<br/>Where a can is to be used as an inner package, the can must have a screwed enclosure.</p> <p>For materials with a viscosity of at least 2680 cSt. (23 deg. C):</p> <ul style="list-style-type: none"> <li>▶ Removable head packaging and</li> <li>▶ cans with friction closures may be used.</li> </ul> <p>-</p> <p>Where combination packages are used, there must be sufficient inert absorbent material to absorb completely any leakage that may occur, unless the outer packaging is a close fitting moulded plastic box and the substances are not incompatible with the plastic.<br/>All combination packages for Packing group I and II must contain cushioning material.</p>  |
| <b>Storage incompatibility</b> | <p>For tetrahydrofuran (THF)</p> <ul style="list-style-type: none"> <li>▶ Avoid contact with oxygen, air, light and heat</li> <li>▶ Contact with lithium aluminium hydride or with sodium or potassium hydroxide can be hazardous when peroxides are present. THF may polymerise in the presence of cationic initiators such as Lewis acids or strong proton acids.</li> <li>▶ Segregate from lithium aluminium hydride, sodium or potassium hydroxide, cationic initiators such as Lewis acids or strong proton acids.</li> <li>▶ In the absence of inhibitors tetrahydrofuran is subject to auto-oxidation with the formation of 2-tetrahydrofuryl hydroperoxide . When heated this tends to decompose smoothly but if allowed to accumulate over a considerable period it transforms to other peroxidic species, such as unstable and explosive polyalkylidene peroxide, which violently decompose.</li> <li>▶ Copper(I) chloride has been recommended to remove trace amounts of peroxide. An attempt to remove peroxides by shaking with solid ferrous sulfate, prior to distillation, did not prevent explosion of the distillation residue. Alkali treatment does not appear to be safe.</li> <li>▶ Peroxides may be destroyed by passage through activated carbon at 20-66 C with contact time in excess of 2 min.</li> <li>▶ is incompatible with borane, calcium hydride, lithium tetrahydroaluminate, sodium aluminium tetrahydride</li> <li>▶ reacts violently with strong oxidisers, bromine, oxygen, magnesium tetrahydroaluminate, metal halides, peroxyacetic acid, potassium hydride</li> <li>▶ attacks some plastics and coatings</li> <li>▶ may accumulate static charges that can result in ignition of its vapours</li> </ul> <p>Storage tanks and other equipment should be absolutely dry and free from air, ammonia, acetylene, hydrogen sulfide, rust and other contaminants.</p> <ul style="list-style-type: none"> <li>▶ Avoid strong acids, bases.</li> <li>▶ The unhindered oxygen atom found on cyclic ethers such as the epoxides, oxetanes, furans, dioxanes and pyrans, carries two unshared pairs of electrons - a structure which favors the formation of coordination complexes and the solvation of cations.</li> <li>▶ Cyclic ethers are used as important solvents, as chemical intermediate and as monomers for ring-opening polymerization.</li> <li>▶ They are unstable at room temperature due to possibility of peroxide formation; stabiliser is sometimes needed for storage and transportation.</li> </ul> <p>NOTE: Ethers lacking non-methyl hydrogen atoms adjacent to the ether link are thought to be relatively safe</p> <ul style="list-style-type: none"> <li>▶ Avoid reaction with oxidising agents</li> <li>▶ Keep dry</li> <li>▶ <b>NOTE:</b> May develop pressure in containers; open carefully. Vent periodically.</li> </ul> <p>Organometallics:</p> <ul style="list-style-type: none"> <li>▶ are incompatible with acids and bases,</li> <li>▶ are good reducing agents and therefore incompatible with oxidising agents,</li> <li>▶ often react with water to generate toxic or flammable gases,</li> </ul> |

## 9-Borabicyclo[3.3.1]nonane, 0.5M solution in THF

|  |   |
|--|---|
|  | ▶ containing halogens (fluorine, chlorine, bromine, iodine) bonded to the metal typically will generate gaseous hydrohalic acids (HF, HCl, HBr, HI) with water. |
| <b>Hazard categories in accordance with Regulation (EC) No 1272/2008</b>   | P5a: Flammable Liquids, P5b: Flammable Liquids, P5c: Flammable Liquids  |
| <b>Qualifying quantity (tonnes) of dangerous substances as referred to in Article 3(10) for the application of</b> | P5a Lower- / Upper-tier requirements: 10 / 50<br>P5b Lower- / Upper-tier requirements: 50 / 200<br>P5c Lower- / Upper-tier requirements: 5 000 / 50 000         |

## 7.3. Specific end use(s)

See section 1.2

## SECTION 8 Exposure controls / personal protection

## 8.1. Control parameters

| Ingredient      | DNELs<br>Exposure Pattern Worker  | PNECs<br>Compartment   |
|-----------------|---|--|
| tetrahydrofuran | Dermal 12.6 mg/kg bw/day (Systemic, Chronic)<br>Inhalation 72.4 mg/m <sup>3</sup> (Systemic, Chronic)<br>Inhalation 150 mg/m <sup>3</sup> (Local, Chronic)<br>Inhalation 96 mg/m <sup>3</sup> (Systemic, Acute)<br>Inhalation 300 mg/m <sup>3</sup> (Local, Acute)<br>Dermal 1.5 mg/kg bw/day (Systemic, Chronic) *<br>Inhalation 13 mg/m <sup>3</sup> (Systemic, Chronic) *<br>Oral 1.5 mg/kg bw/day (Systemic, Chronic) *<br>Inhalation 75 mg/m <sup>3</sup> (Local, Chronic) *<br>Inhalation 52 mg/m <sup>3</sup> (Systemic, Acute) *<br>Inhalation 150 mg/m <sup>3</sup> (Local, Acute) * | 4.32 mg/L (Water (Fresh))<br>0.432 mg/L (Water - Intermittent release)<br>21.6 mg/L (Water (Marine))<br>23.3 mg/kg sediment dw (Sediment (Fresh Water))<br>2.33 mg/kg sediment dw (Sediment (Marine))<br>2.13 mg/kg soil dw (Soil)<br>4.6 mg/L (STP)<br>67 mg/kg food (Oral) |

\* Values for General Population

## Occupational Exposure Limits (OEL)

## INGREDIENT DATA

| Source   | Ingredient      | Material name   | TWA                            | STEL                            | Peak          | Notes |
|--|-----------------|-----------------|--------------------------------|---------------------------------|---------------|-------|
| EU Consolidated List of Indicative Occupational Exposure Limit Values (IOELVs) | tetrahydrofuran | Tetrahydrofuran | 50 ppm / 150 mg/m <sup>3</sup> | 300 mg/m <sup>3</sup> / 100 ppm | Not Available | Skin  |
| UK Workplace Exposure Limits (WELs)  | tetrahydrofuran | Tetrahydrofuran | 50 ppm / 150 mg/m <sup>3</sup> | 300 mg/m <sup>3</sup> / 100 ppm | Not Available | Sk    |

## Emergency Limits

| Ingredient      | TEEL-1        | TEEL-2        | TEEL-3        |
|-----------------|---------------|---------------|---------------|
| tetrahydrofuran | Not Available | Not Available | Not Available |

| Ingredient                 | Original IDLH | Revised IDLH  |
|----------------------------|---------------|---------------|
| 9-Borabicyclo[3.3.1]nonane | Not Available | Not Available |
| tetrahydrofuran            | 2,000 ppm     | Not Available |

## Occupational Exposure Banding

| Ingredient                 | Occupational Exposure Band Rating | Occupational Exposure Band Limit    |
|----------------------------|-----------------------------------|-------------------------------------|
| 9-Borabicyclo[3.3.1]nonane | C                                 | > 1 to ≤ 10 parts per million (ppm) |

## Notes:

Occupational exposure banding is a process of assigning chemicals into specific categories or bands based on a chemical's potency and the adverse health outcomes associated with exposure. The output of this process is an occupational exposure band (OEB), which corresponds to a range of exposure concentrations that are expected to protect worker health.

## 8.2. Exposure controls

|  |  |                      |            |  |
|--|--|----------------------|------------|--|
| 8.2.1. Appropriate engineering controls                                  | <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. 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.</p> <p>Employers may need to use multiple types of controls to prevent employee overexposure.</p> |                      |            |  |
|  | <p>Local exhaust ventilation usually required. If risk of overexposure exists, wear approved respirator. Correct fit is essential to obtain adequate protection. Supplied-air type respirator may be required in special circumstances. Correct fit is essential to ensure adequate protection. An approved self contained breathing apparatus (SCBA) may be required in some situations.</p> <p>Provide adequate ventilation in warehouse or closed storage area. 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"> <tr> <td>Type of Contaminant:</td> <td>Air Speed:</td> </tr> <tr> <td>solvent, vapours, degreasing etc., evaporating from tank (in still air).</td> <td>0.25-0.5 m/s<br/>(50-100 f/min.)</td> </tr> </table>                                     | Type of Contaminant: | Air Speed: | solvent, vapours, degreasing etc., evaporating from tank (in still air). |
| Type of Contaminant:   | Air Speed:   |                      |            |  |
| solvent, vapours, degreasing etc., evaporating from tank (in still air). | 0.25-0.5 m/s<br>(50-100 f/min.)  |                      |            |  |

Continued...

## 9-Borabicyclo[3.3.1]nonane, 0.5M solution in THF

|   |                              |
|---|------------------------------|
| aerosols, fumes from pouring operations, intermittent container filling, low speed conveyer transfers, welding, spray drift, plating acid fumes, pickling (released at low velocity into zone of active generation) | 0.5-1 m/s (100-200 f/min.)   |
| direct spray, spray painting in shallow booths, drum filling, conveyer loading, crusher dusts, gas discharge (active generation into zone of rapid air motion)  | 1-2.5 m/s (200-500 f/min.)   |
| grinding, abrasive blasting, tumbling, high speed wheel generated dusts (released at high initial velocity into zone of very high rapid air motion).  | 2.5-10 m/s (500-2000 f/min.) |

Within each range the appropriate value depends on:

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

Simple theory shows that air velocity falls rapidly with distance away from the opening of a simple extraction pipe. Velocity generally decreases with the square of distance from the extraction point (in simple cases). Therefore the air speed at the extraction point should be adjusted, accordingly, after reference to distance from the contaminating source. The air velocity at the extraction fan, for example, should be a minimum of 1-2 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.

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.

The basic types of engineering controls are:

Process controls which involve changing the way a job activity or process is done to reduce the risk.

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.

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The basic types of engineering controls are:

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- ▶ 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

### 8.2.2. Individual protection measures, such as personal protective equipment



#### Eye and face protection

- ▶ Chemical goggles. [AS/NZS 1337.1, EN166 or national equivalent]
- ▶ Full face shield may be required for supplementary but never for primary protection of eyes.
- ▶ Contact lenses may pose a special hazard; soft contact lenses may absorb and concentrate irritants. A written policy document, describing the wearing of lenses or restrictions on use, should be created for each workplace or task. This should include a review of lens absorption and adsorption for the class of chemicals in use and an account of injury experience. Medical and first-aid personnel should be trained in their removal and suitable equipment should be readily available. In the event of chemical exposure, begin eye irrigation immediately and remove contact lens as soon as practicable. Lens should be removed at the first signs of eye redness or irritation - lens should be removed in a clean environment only after workers have washed hands thoroughly. [CDC NIOSH Current Intelligence Bulletin 59].

#### Skin protection

See Hand protection below

#### Hands/feet protection

- ▶ Wear chemical protective gloves, e.g. PVC.
  - ▶ Wear safety footwear or safety gumboots, e.g. Rubber
  - ▶ When handling corrosive liquids, wear trousers or overalls outside of boots, to avoid spills entering boots.
- The selection of suitable gloves does not only depend on the material, but also on further marks of quality which vary from manufacturer to manufacturer. Where the chemical is a preparation of several substances, the resistance of the glove material can not be calculated in advance and has therefore to be checked prior to the application.
- The exact break through time for substances has to be obtained from the manufacturer of the protective gloves and has to be observed when making a final choice.
- Personal hygiene is a key element of effective hand care. Gloves must only be worn on clean hands. After using gloves, hands should be washed and dried thoroughly. Application of a non-perfumed moisturiser is recommended.
- Suitability and durability of glove type is dependent on usage. Important factors in the selection of gloves include:
- frequency and duration of contact,
  - chemical resistance of glove material,
  - glove thickness and
  - dexterity
- Select gloves tested to a relevant standard (e.g. Europe EN 374, US F739, AS/NZS 2161.1 or national equivalent).
- When prolonged or frequently repeated contact may occur, a glove with a protection class of 5 or higher (breakthrough time greater than 240 minutes according to EN 374, AS/NZS 2161.10.1 or national equivalent) is recommended.
  - When only brief contact is expected, a glove with a protection class of 3 or higher (breakthrough time greater than 60 minutes according to EN 374, AS/NZS 2161.10.1 or national equivalent) is recommended.
  - Some glove polymer types are less affected by movement and this should be taken into account when considering gloves for long-term use.
  - Contaminated gloves should be replaced.
- As defined in ASTM F-739-96 in any application, gloves are rated as:
- Excellent when breakthrough time > 480 min
  - Good when breakthrough time > 20 min
  - Fair when breakthrough time < 20 min
  - Poor when glove material degrades
- For general applications, gloves with a thickness typically greater than 0.35 mm, are recommended.
- It should be emphasised that glove thickness is not necessarily a good predictor of glove resistance to a specific chemical, as the permeation

## 9-Borabicyclo[3.3.1]nonane, 0.5M solution in THF

|                         |   |
|-------------------------|---|
|                         | <p>efficiency of the glove will be dependent on the exact composition of the glove material. Therefore, glove selection should also be based on consideration of the task requirements and knowledge of breakthrough times.</p> <p>Glove thickness may also vary depending on the glove manufacturer, the glove type and the glove model. Therefore, the manufacturers technical data should always be taken into account to ensure selection of the most appropriate glove for the task.</p> <p>Note: Depending on the activity being conducted, gloves of varying thickness may be required for specific tasks. For example:</p> <ul style="list-style-type: none"> <li>· Thinner gloves (down to 0.1 mm or less) may be required where a high degree of manual dexterity is needed. However, these gloves are only likely to give short duration protection and would normally be just for single use applications, then disposed of.</li> <li>· Thicker gloves (up to 3 mm or more) may be required where there is a mechanical (as well as a chemical) risk i.e. where there is abrasion or puncture potential</li> </ul> <p>Gloves must only be worn on clean hands. After using gloves, hands should be washed and dried thoroughly. Application of a non-perfumed moisturiser is recommended.</p> |
| <b>Body protection</b>  | See Other protection below  |
| <b>Other protection</b> | <ul style="list-style-type: none"> <li>▶ Overalls.</li> <li>▶ Eyewash unit.</li> <li>▶ Barrier cream.</li> <li>▶ Skin cleansing cream.</li> <li>▶ Some plastic personal protective equipment (PPE) (e.g. gloves, aprons, overshoes) are not recommended as they may produce static electricity.</li> <li>▶ For large scale or continuous use wear tight-weave non-static clothing (no metallic fasteners, cuffs or pockets).</li> <li>▶ Non sparking safety or conductive footwear should be considered. Conductive footwear describes a boot or shoe with a sole made from a conductive compound chemically bound to the bottom components, for permanent control to electrically ground the foot an shall dissipate static electricity from the body to reduce the possibility of ignition of volatile compounds. Electrical resistance must range between 0 to 500,000 ohms. Conductive shoes should be stored in lockers close to the room in which they are worn. Personnel who have been issued conductive footwear should not wear them from their place of work to their homes and return.</li> </ul>   |

## Recommended material(s)

## GLOVE SELECTION INDEX

Glove selection is based on a modified presentation of the:

**"Forsberg Clothing Performance Index".**

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

9-Borabicyclo[3.3.1]nonane, 0.5M solution in THF

| Material          | CPI |
|-------------------|-----|
| PE/EVAL/PE        | A   |
| PVA               | B   |
| TEFLON            | B   |
| BUTYL             | C   |
| CPE               | C   |
| NEOPRENE          | C   |
| VITON/CHLOROBUTYL | C   |

\* CPI - Chemwatch Performance Index

A: Best Selection

B: Satisfactory; may degrade after 4 hours continuous immersion

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

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

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

## Respiratory protection

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 5 x ES                       | A-AUS / Class 1      | -                    | A-PAPR-AUS / Class 1   |
| up to 25 x ES                      | Air-line*            | A-2                  | A-PAPR-2               |
| up to 50 x ES                      | -                    | A-3                  | -                      |
| 50+ x ES                           | -                    | Air-line**           | -                      |

^ - 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

## 8.2.3. Environmental exposure controls

See section 12

## SECTION 9 Physical and chemical properties

## 9.1. Information on basic physical and chemical properties

|  |               |  |               |
|--|---------------|--|---------------|
| <b>Appearance</b>                          | Not Available |  |               |
| <b>Physical state</b>                      | Liquid        | <b>Relative density (Water = 1)</b>            | 0.884         |
| <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 (°C)</b>          | Not Available |
| <b>Melting point / freezing point (°C)</b> | -105          | <b>Viscosity (cSt)</b>                         | Not Available |

Continued...



## 9-Borabicyclo[3.3.1]nonane, 0.5M solution in THF

|  |                   |                                   |               |
|--|-------------------|-----------------------------------|---------------|
| Initial boiling point and boiling range (°C) | Not Available     | Molecular weight (g/mol)          | Not Available |
| Flash point (°C)                             | -17               | 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                          | Not Available     | pH as a solution (1%)             | Not Available |
| Vapour density (Air = 1)                     | Not Available     | VOC g/L                           | Not Available |
| Nanoform Solubility                          | Not Available     | Nanoform Particle Characteristics | Not Available |
| Particle Size                                | Not Available     |                                   |               |

## 9.2. Other information

Not Available

## SECTION 10 Stability and reactivity

|  |  |
|--|--|
| 10.1.Reactivity                          | See section 7.2  |
| 10.2. Chemical stability                 | <p>Presence of a stabilising inhibitor prevents/retards peroxide formation.</p> <ul style="list-style-type: none"> <li>▶ May heat spontaneously</li> <li>▶ Identify and remove sources of ignition and heating.</li> <li>▶ Incompatible material, especially oxidisers, and/or other sources of oxygen may produce unstable product(s).</li> <li>▶ Avoid sources of water contamination (e.g. rain water, moisture, high humidity).</li> <li>▶ Avoid contact with oxygenated solvents/ reagents such as alcohols.</li> </ul> |
| 10.3. Possibility of hazardous reactions | See section 7.2  |
| 10.4. Conditions to avoid                | See section 7.2  |
| 10.5. Incompatible materials             | See section 7.2  |
| 10.6. Hazardous decomposition products   | See section 5.3  |

## SECTION 11 Toxicological information

## 11.1. Information on toxicological effects

|              |  |
|--------------|--|
| Inhaled      | <p>Inhalation of vapours or aerosols (mists, fumes), generated by the material during the course of normal handling, may be harmful. The material can cause respiratory irritation in some persons. The body's response to such irritation can cause further lung damage. Inhalation of vapours may cause drowsiness and dizziness. This may be accompanied by sleepiness, reduced alertness, loss of reflexes, lack of co-ordination, and vertigo.</p> <p>Overexposure to tetrahydrofuran by inhalation may result in irritation of the mucous membrane, and may produce coughing, chest pains, nausea, dizziness, headache and stupor. High concentrations affect the central nervous system.</p>  |
| Ingestion    | <p>The material can produce chemical burns within the oral cavity and gastrointestinal tract following ingestion. The material is not thought to produce adverse health effects following ingestion (as classified by EC Directives using animal models). Nevertheless, adverse systemic effects have been produced following exposure of animals by at least one other route and good hygiene practice requires that exposure be kept to a minimum.</p> <p>Ingestion of tetrahydrofuran may not, in itself, produce internal injury, however, contaminating levels of furan, present in certain grades of commercial product, may produce liver and kidney injury exacerbated by the intake of alcoholic beverages.</p> <p>Accidental ingestion of the material may be damaging to the health of the individual.</p>  |
| Skin Contact | <p>The material can produce chemical burns following direct contact with the skin.</p> <p>Skin contact with the material may damage the health of the individual; systemic effects may result following absorption.</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 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>Skin contact with tetrahydrofuran may produce smarting and reddening of the skin and after prolonged exposures; skin inflammation may result because the substance removes skin oils (has a degreasing effect).</p> <p>The material may cause severe inflammation of the skin either following direct contact or after a delay of some time. Repeated exposure can cause contact dermatitis which is characterised by redness, swelling and blistering.</p> |
| Eye          | <p>The material can produce chemical burns to the eye following direct contact. Vapours or mists may be extremely irritating.</p> <p>If applied to the eyes, this material causes severe eye damage.</p> <p>Application of a 20% solution of tetrahydrofuran in water in animals to the eye, produced irritation.</p>  |

Continued...

## 9-Borabicyclo[3.3.1]nonane, 0.5M solution in THF

|                |  |
|----------------|--|
| <b>Chronic</b> | <p>Repeated or prolonged exposure to corrosives may result in the erosion of teeth, inflammatory and ulcerative changes in the mouth and necrosis (rarely) of the jaw. Bronchial irritation, with cough, and frequent attacks of bronchial pneumonia may ensue.</p> <p>Long-term exposure to respiratory irritants may result in airways disease, involving difficulty breathing and related whole-body problems.</p> <p>There has been concern that this material can cause cancer or mutations, but there is not enough data to make an assessment.</p> <p>Toxic: danger of serious damage to health by prolonged exposure through inhalation, in contact with skin and if swallowed.</p> <p>This material can cause serious damage if one is exposed to it for long periods. It can be assumed that it contains a substance which can produce severe defects.</p> <p>Ample evidence from experiments exists that there is a suspicion this material directly reduces fertility.</p> <p>Substance accumulation, in the human body, may occur and may cause some concern following repeated or long-term occupational exposure. Cyclic ethers can cause cancers, especially of the liver.</p> <p>Repeated exposure to tetrahydrofuran (THF) and related compounds has been associated with liver inflammation and fatty degeneration of the liver. Animal testing suggests that this group of compounds can cause liver damage, irritation of the skin and airway, metabolic imbalance, gynaecological disturbance, damage to the adrenal glands and may increase the rate of cancer.</p> |
|----------------|--|

|   |  |  |
|---|--|--|
| <b>9-Borabicyclo[3.3.1]nonane,<br/>0.5M solution in THF</b> | <b>TOXICITY</b>                                | <b>IRRITATION</b>  |
|   | Not Available                                  | Not Available  |
| <b>9-Borabicyclo[3.3.1]nonane</b>                           | <b>TOXICITY</b>                                | <b>IRRITATION</b>  |
|   | Not Available                                  | Not Available  |
| <b>tetrahydrofuran</b>                                      | <b>TOXICITY</b>                                | <b>IRRITATION</b>  |
|   | dermal (rat) LD50: >2000 mg/kg <sup>[1]</sup>  | Eye: adverse effect observed (irritating) <sup>[1]</sup>         |
|   | Inhalation(Rat) LC50: 45 mg/l4h <sup>[2]</sup> | Skin: no adverse effect observed (not irritating) <sup>[1]</sup> |
|   | Oral (Rat) LD50: 2816 mg/kg <sup>[2]</sup>     |  |

**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

|   |  |
|---|--|
| <b>TETRAHYDROFURAN</b>  | <p>Oral (human) LDLo: 50 mg/kg* [CCINFO]* Nil reported</p> <p>The material may produce severe irritation to the eye causing pronounced inflammation. Repeated or prolonged exposure to irritants may produce conjunctivitis.</p> <p>The material may cause severe skin irritation after prolonged or repeated exposure and may produce on contact skin redness, swelling, the production of vesicles, scaling and thickening of the skin. Repeated exposures may produce severe ulceration.</p>  |
| <b>9-Borabicyclo[3.3.1]nonane,<br/>0.5M solution in THF &amp;<br/>TETRAHYDROFURAN</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> |

|  |   |                                 |   |
|--|---|---------------------------------|---|
| <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

## 11.2 Information on other hazards

## 11.2.1. Endocrine disrupting properties

No evidence of endocrine disrupting properties were found in the current literature.

## 11.2.2. Other information

See Section 11.1

## SECTION 12 Ecological information

## 12.1. Toxicity

|   |                 |                           |                |               |               |
|---|-----------------|---------------------------|----------------|---------------|---------------|
| <b>9-Borabicyclo[3.3.1]nonane,<br/>0.5M solution in THF</b> | <b>Endpoint</b> | <b>Test Duration (hr)</b> | <b>Species</b> | <b>Value</b>  | <b>Source</b> |
|   | Not Available   | Not Available             | Not Available  | Not Available | Not Available |
| <b>9-Borabicyclo[3.3.1]nonane</b>                           | <b>Endpoint</b> | <b>Test Duration (hr)</b> | <b>Species</b> | <b>Value</b>  | <b>Source</b> |
|   | Not Available   | Not Available             | Not Available  | Not Available | Not Available |

## 9-Borabicyclo[3.3.1]nonane, 0.5M solution in THF

| tetrahydrofuran | Endpoint  | Test Duration (hr) | Species | Value         | Source |
|-----------------|-----------|--------------------|---------|---------------|--------|
|                 | LC50      | 96h                | Fish    | 1970-2360mg/l | 4      |
|                 | NOEC(ECx) | 24h                | Fish    | >=5mg/l       | 1      |

**Legend:** *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*

For Tetrahydrofuran (THF): Koc: 23 and 18; Henry's Law Constant: 7.1X10<sup>-5</sup> atm-m<sup>3</sup>/mole; Vapor pressure: 162 mm Hg at 25 deg C.

Atmospheric Fate: Tetrahydrofuran exists only as a vapor in the ambient atmosphere. Vapor-phase tetrahydrofuran will be degraded in the atmosphere by reaction with photochemically-produced hydroxyl and nitrate radicals; the half-life for these reactions in air is about 1 and 3 days, respectively. Tetrahydrofuran is moderately reactive in photochemical smog conditions where nitrogen oxides are present; reactions occur in hours under these conditions. Acrolein and formaldehyde have been reported as reaction products.

Terrestrial Fate: Tetrahydrofuran is expected to have very high mobility in soil. Volatilization from moist soil surfaces is expected to be an important fate process. Tetrahydrofuran may also volatilize from dry soil surfaces. Tetrahydrofuran added to surface soil had an abiotic half-life of 5.7 days. Tetrahydrofuran is expected to biodegrade under aerobic conditions but may be resistant to biodegradation in anaerobic environments.

Aquatic Fate: Tetrahydrofuran is slightly persistent in water with a half-life of between 2 to 20 days. If tetrahydrofuran should contact the water table, aquifer or navigable waterway, time is of the essence. It is highly soluble in water and total remediation may not be possible. A comprehensive emergency response or disaster preparedness / recovery plan should be in place prior to use. Volatilization from water surfaces is expected to be an important fate process. Hydrolysis is not expected to occur. Tetrahydrofuran is not expected to adsorb to suspended solids and sediment.

Ecotoxicity: The potential for bioaccumulation of THF in aquatic organisms is considered to be low and it is not expected to bioaccumulate in aquatic organisms. The concentration of tetrahydrofuran in edible fish tissue is expected to be negligible as compared to the levels found in the water from which the fish were taken. Acute short term toxic environmental effects of THF may include the death of animals, birds, fish and death or low growth rate in plants. Acute effects are seen 2 to 4 days after animals or plants are exposed to tetrahydrofuran. Chronic toxic effects include shortened life span, reproductive problems, lowered fertility, and changes in appearance or behavior in exposed animals. These effects have been seen long after the first exposure(s).

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

## 12.2. Persistence and degradability

| Ingredient      | Persistence: Water/Soil | Persistence: Air |
|-----------------|-------------------------|------------------|
| tetrahydrofuran | LOW                     | LOW              |

## 12.3. Bioaccumulative potential

| Ingredient      | Bioaccumulation     |
|-----------------|---------------------|
| tetrahydrofuran | LOW (LogKOW = 0.46) |

## 12.4. Mobility in soil

| Ingredient      | Mobility          |
|-----------------|-------------------|
| tetrahydrofuran | LOW (KOC = 4.881) |

## 12.5. Results of PBT and vPvB assessment

|                         | P             | B             | T             |
|-------------------------|---------------|---------------|---------------|
| Relevant available data | Not Available | Not Available | Not Available |
| PBT                     | ✗             | ✗             | ✗             |
| vPvB                    | ✗             | ✗             | ✗             |
| PBT Criteria fulfilled? | No            |               |               |
| vPvB                    | No            |               |               |

## 12.6. Endocrine disrupting properties

No evidence of endocrine disrupting properties were found in the current literature.

## 12.7. Other adverse effects

No evidence of ozone depleting properties were found in the current literature.

## SECTION 13 Disposal considerations

### 13.1. Waste treatment methods

|                                     |   |
|-------------------------------------|---|
| <b>Product / Packaging disposal</b> | <ul style="list-style-type: none"> <li>▶ Containers may still present a chemical hazard/ danger when empty.</li> <li>▶ Return to supplier for reuse/ recycling if possible.</li> </ul> <p>Otherwise:</p> <ul style="list-style-type: none"> <li>▶ If container can not be cleaned sufficiently well to ensure that residuals do not remain or if the container cannot be used to store the same product, then puncture containers, to prevent re-use, and bury at an authorised landfill.</li> <li>▶ Where possible retain label warnings and SDS and observe all notices pertaining to the product.</li> </ul> <p>Legislation addressing waste disposal requirements may differ by country, state and/ or territory. Each user must refer to laws operating in their area. In some areas, certain wastes must be tracked.</p> <p>A Hierarchy of Controls seems to be common - the user should investigate:</p> <ul style="list-style-type: none"> <li>▶ Reduction</li> <li>▶ Reuse</li> <li>▶ Recycling</li> <li>▶ Disposal (if all else fails)</li> </ul> <p>This material may be recycled if unused, or if it has not been contaminated so as to make it unsuitable for its intended use. If it has been contaminated, it may be possible to reclaim the product by filtration, distillation or some other means. Shelf life considerations should also be applied in making decisions of this type. Note that properties of a material may change in use, and recycling or reuse may not always be appropriate.</p> |
|-------------------------------------|---|

## 9-Borabicyclo[3.3.1]nonane, 0.5M solution in THF

|                                |  |
|--------------------------------|--|
|                                | <p>Empty containers retain product residues and can be dangerous</p> <ul style="list-style-type: none"> <li>· Dispose of unused product</li> <li>· DO NOT expose opened/ empty containers to moisture/ water, heat, flame, sparks, static electricity, or other sources of ignition.</li> <li>· They may explode and cause injury or death <ul style="list-style-type: none"> <li>▶ <b>DO NOT allow wash water from cleaning or process equipment to enter drains.</b></li> <li>▶ It may be necessary to collect all wash water for treatment before disposal.</li> <li>▶ In all cases disposal to sewer may be subject to local laws and regulations and these should be considered first.</li> <li>▶ Where in doubt contact the responsible authority.</li> <li>▶ Recycle wherever possible or consult manufacturer for recycling options.</li> <li>▶ Consult State Land Waste Authority for disposal.</li> <li>▶ Bury or incinerate residue at an approved site.</li> <li>▶ Recycle containers if possible, or dispose of in an authorised landfill.</li> </ul> </li> </ul> |
| <b>Waste treatment options</b> | Not Available  |
| <b>Sewage disposal options</b> | Not Available  |

## SECTION 14 Transport information

## Labels Required

|                         |   |
|-------------------------|---|
|                         |   |
| <b>Marine Pollutant</b> | NO  |
| <b>HAZCHEM</b>          | 4W  |

## Land transport (ADR-RID)

|                                    |   |                                |     |                     |     |              |        |                    |     |                  |        |                         |         |
|------------------------------------|---|--------------------------------|-----|---------------------|-----|--------------|--------|--------------------|-----|------------------|--------|-------------------------|---------|
| 14.1. UN number or ID number       | 3399  |                                |     |                     |     |              |        |                    |     |                  |        |                         |         |
| 14.2. UN proper shipping name      | ORGANOMETALLIC SUBSTANCE, LIQUID, WATER-REACTIVE, FLAMMABLE   |                                |     |                     |     |              |        |                    |     |                  |        |                         |         |
| 14.3. Transport hazard class(es)   | <table border="1"> <tr> <td>Class</td> <td>4.3</td> </tr> <tr> <td>Subsidiary risk</td> <td>3</td> </tr> </table>   | Class                          | 4.3 | Subsidiary risk     | 3   |              |        |                    |     |                  |        |                         |         |
| Class                              | 4.3   |                                |     |                     |     |              |        |                    |     |                  |        |                         |         |
| Subsidiary risk                    | 3   |                                |     |                     |     |              |        |                    |     |                  |        |                         |         |
| 14.4. Packing group                | II  |                                |     |                     |     |              |        |                    |     |                  |        |                         |         |
| 14.5. Environmental hazard         | Not Applicable  |                                |     |                     |     |              |        |                    |     |                  |        |                         |         |
| 14.6. Special precautions for user | <table border="1"> <tr> <td>Hazard identification (Kemler)</td> <td>323</td> </tr> <tr> <td>Classification code</td> <td>WF1</td> </tr> <tr> <td>Hazard Label</td> <td>4.3 +3</td> </tr> <tr> <td>Special provisions</td> <td>274</td> </tr> <tr> <td>Limited quantity</td> <td>500 ml</td> </tr> <tr> <td>Tunnel Restriction Code</td> <td>0 (D/E)</td> </tr> </table> | Hazard identification (Kemler) | 323 | Classification code | WF1 | Hazard Label | 4.3 +3 | Special provisions | 274 | Limited quantity | 500 ml | Tunnel Restriction Code | 0 (D/E) |
| Hazard identification (Kemler)     | 323   |                                |     |                     |     |              |        |                    |     |                  |        |                         |         |
| Classification code                | WF1   |                                |     |                     |     |              |        |                    |     |                  |        |                         |         |
| Hazard Label                       | 4.3 +3  |                                |     |                     |     |              |        |                    |     |                  |        |                         |         |
| Special provisions                 | 274   |                                |     |                     |     |              |        |                    |     |                  |        |                         |         |
| Limited quantity                   | 500 ml  |                                |     |                     |     |              |        |                    |     |                  |        |                         |         |
| Tunnel Restriction Code            | 0 (D/E)   |                                |     |                     |     |              |        |                    |     |                  |        |                         |         |

## Air transport (ICAO-IATA / DGR)

|   |  |                    |         |                                 |     |                               |     |  |     |  |     |   |           |  |           |
|---|--|--------------------|---------|---------------------------------|-----|-------------------------------|-----|--|-----|--|-----|---|-----------|--|-----------|
| 14.1. UN number   | 3399   |                    |         |                                 |     |                               |     |  |     |  |     |   |           |  |           |
| 14.2. UN proper shipping name                             | Organometallic substance, liquid, water-reactive, flammable *  |                    |         |                                 |     |                               |     |  |     |  |     |   |           |  |           |
| 14.3. Transport hazard class(es)                          | <table border="1"> <tr> <td>ICAO/IATA Class</td> <td>4.3</td> </tr> <tr> <td>ICAO / IATA Subrisk</td> <td>3</td> </tr> <tr> <td>ERG Code</td> <td>4FW</td> </tr> </table>  | ICAO/IATA Class    | 4.3     | ICAO / IATA Subrisk             | 3   | ERG Code                      | 4FW |  |     |  |     |   |           |  |           |
| ICAO/IATA Class   | 4.3  |                    |         |                                 |     |                               |     |  |     |  |     |   |           |  |           |
| ICAO / IATA Subrisk                                       | 3  |                    |         |                                 |     |                               |     |  |     |  |     |   |           |  |           |
| ERG Code  | 4FW  |                    |         |                                 |     |                               |     |  |     |  |     |   |           |  |           |
| 14.4. Packing group                                       | II   |                    |         |                                 |     |                               |     |  |     |  |     |   |           |  |           |
| 14.5. Environmental hazard                                | Not Applicable   |                    |         |                                 |     |                               |     |  |     |  |     |   |           |  |           |
| 14.6. Special precautions for user                        | <table border="1"> <tr> <td>Special provisions</td> <td>A3 A803</td> </tr> <tr> <td>Cargo Only Packing Instructions</td> <td>494</td> </tr> <tr> <td>Cargo Only Maximum Qty / Pack</td> <td>5 L</td> </tr> <tr> <td>Passenger and Cargo Packing Instructions</td> <td>493</td> </tr> <tr> <td>Passenger and Cargo Maximum Qty / Pack</td> <td>1 L</td> </tr> <tr> <td>Passenger and Cargo Limited Quantity Packing Instructions</td> <td>Forbidden</td> </tr> <tr> <td>Passenger and Cargo Limited Maximum Qty / Pack</td> <td>Forbidden</td> </tr> </table> | Special provisions | A3 A803 | Cargo Only Packing Instructions | 494 | Cargo Only Maximum Qty / Pack | 5 L | Passenger and Cargo Packing Instructions | 493 | Passenger and Cargo Maximum Qty / Pack | 1 L | Passenger and Cargo Limited Quantity Packing Instructions | Forbidden | Passenger and Cargo Limited Maximum Qty / Pack | Forbidden |
| Special provisions  | A3 A803  |                    |         |                                 |     |                               |     |  |     |  |     |   |           |  |           |
| Cargo Only Packing Instructions                           | 494  |                    |         |                                 |     |                               |     |  |     |  |     |   |           |  |           |
| Cargo Only Maximum Qty / Pack                             | 5 L  |                    |         |                                 |     |                               |     |  |     |  |     |   |           |  |           |
| Passenger and Cargo Packing Instructions                  | 493  |                    |         |                                 |     |                               |     |  |     |  |     |   |           |  |           |
| Passenger and Cargo Maximum Qty / Pack                    | 1 L  |                    |         |                                 |     |                               |     |  |     |  |     |   |           |  |           |
| Passenger and Cargo Limited Quantity Packing Instructions | Forbidden  |                    |         |                                 |     |                               |     |  |     |  |     |   |           |  |           |
| Passenger and Cargo Limited Maximum Qty / Pack            | Forbidden  |                    |         |                                 |     |                               |     |  |     |  |     |   |           |  |           |

## Sea transport (IMDG-Code / GGVSee)

|                               |   |
|-------------------------------|---|
| 14.1. UN number               | 3399  |
| 14.2. UN proper shipping name | ORGANOMETALLIC SUBSTANCE, LIQUID, WATER-REACTIVE, FLAMMABLE |

|                                    |                    |          |
|------------------------------------|--------------------|----------|
| 14.3. Transport hazard class(es)   | IMDG Class         | 4.3      |
|                                    | IMDG Subrisk       | 3        |
| 14.4. Packing group                | II                 |          |
| 14.5. Environmental hazard         | Not Applicable     |          |
| 14.6. Special precautions for user | EMS Number         | F-G, S-N |
|                                    | Special provisions | 274      |
|                                    | Limited Quantities | 500 mL   |

**Inland waterways transport (ADN)**

|                                    |   |           |
|------------------------------------|---|-----------|
| 14.1. UN number                    | 3399  |           |
| 14.2. UN proper shipping name      | ORGANOMETALLIC SUBSTANCE, LIQUID, WATER REACTIVE, FLAMMABLE |           |
| 14.3. Transport hazard class(es)   | 4.3   | 3         |
| 14.4. Packing group                | II  |           |
| 14.5. Environmental hazard         | Not Applicable  |           |
| 14.6. Special precautions for user | Classification code   | WF1       |
|                                    | Special provisions  | 274       |
|                                    | Limited quantity  | 500 ml    |
|                                    | Equipment required  | PP, EX, A |
|                                    | Fire cones number   | 1         |

**14.7. Maritime transport in bulk according to IMO instruments****14.7.1. Transport in bulk according to Annex II of MARPOL and the IBC code**

Not Applicable

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

| Product name               | Group         |
|----------------------------|---------------|
| 9-Borabicyclo[3.3.1]nonane | Not Available |
| tetrahydrofuran            | Not Available |

**14.7.3. Transport in bulk in accordance with the IGC Code**

| Product name               | Ship Type     |
|----------------------------|---------------|
| 9-Borabicyclo[3.3.1]nonane | Not Available |
| tetrahydrofuran            | Not Available |

**SECTION 15 Regulatory information****15.1. Safety, health and environmental regulations / legislation specific for the substance or mixture****9-Borabicyclo[3.3.1]nonane is found on the following regulatory lists**

Not Applicable

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

Chemical Footprint Project - Chemicals of High Concern List

EU Consolidated List of Indicative Occupational Exposure Limit Values (IOELVs)

EU European Chemicals Agency (ECHA) Community Rolling Action Plan (CoRAP) List of Substances

EU REACH Regulation (EC) No 1907/2006 - Annex XVII - Restrictions on the manufacture, placing on the market and use of certain dangerous substances, mixtures and articles

Europe EC Inventory

European Union - European Inventory of Existing Commercial Chemical Substances (EINECS)

European Union (EU) Regulation (EC) No 1272/2008 on Classification, Labelling and Packaging of Substances and Mixtures - Annex VI

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

International Agency for Research on Cancer (IARC) - Agents Classified by the IARC Monographs - Group 2B: Possibly carcinogenic to humans

This safety data sheet is in compliance with the following EU legislation and its adaptations - as far as applicable - : Directives 98/24/EC, - 92/85/EEC, - 94/33/EC, - 2008/98/EC, - 2010/75/EU; Commission Regulation (EU) 2020/878; Regulation (EC) No 1272/2008 as updated through ATPs.

**Information according to 2012/18/EU (Seveso III):**

|                 |               |
|-----------------|---------------|
| Seveso Category | P5a, P5b, P5c |
|-----------------|---------------|

**15.2. Chemical safety assessment**

No Chemical Safety Assessment has been carried out for this substance/mixture by the supplier.

**ECHA SUMMARY**

| Ingredient      | CAS number | Index No     | ECHA Dossier  |
|-----------------|------------|--------------|---------------|
| tetrahydrofuran | 109-99-9   | 603-025-00-0 | Not Available |

## 9-Borabicyclo[3.3.1]nonane, 0.5M solution in THF

| Harmonisation (C&L Inventory) | Hazard Class and Category Code(s)   | Pictograms Signal Word Code(s) | Hazard Statement Code(s)                                   |
|-------------------------------|---|--------------------------------|--|
| 1                             | Flam. Liq. 2; Eye Irrit. 2; STOT SE 3   | GHS07; GHS02; Dgr              | H225; H319; H335   |
| 2                             | Acute Tox. 4; STOT SE 3; Carc. 2; Eye Dam. 1; STOT SE 3; STOT SE 3; Flam. Liq. 1; Acute Tox. 4; Skin Corr. 1B; Acute Tox. 4 | GHS08; Dgr; GHS05; GHS01       | H302; H335; H336; H351; H318; H370; H312; H224; H314; H332 |

Harmonisation Code 1 = The most prevalent classification. Harmonisation Code 2 = The most severe classification.

## National Inventory Status

| National Inventory                               | Status  |
|--|---|
| Australia - AIIIC / Australia Non-Industrial Use | Yes   |
| Canada - DSL                                     | Yes   |
| Canada - NDSL                                    | No (tetrahydrofuran)  |
| 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> | 23/06/2023 |
| <b>Initial Date</b>  | 23/06/2023 |

## Full text Risk and Hazard codes

|             |  |
|-------------|--|
| <b>H224</b> | Extremely flammable liquid and vapour.   |
| <b>H250</b> | Catches fire spontaneously if exposed to air.                                  |
| <b>H260</b> | In contact with water releases flammable gases which may ignite spontaneously. |
| <b>H312</b> | Harmful in contact with skin.  |
| <b>H318</b> | Causes serious eye damage.   |
| <b>H319</b> | Causes serious eye irritation.   |
| <b>H332</b> | Harmful if inhaled.  |
| <b>H370</b> | Causes damage to organs.   |

## SDS Version Summary

| Version | Date of Update | Sections Updated  |
|---------|----------------|---|
| 1.2     | 23/06/2023     | Hazards identification - Classification, Composition / information on ingredients - Ingredients |

## 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.

For detailed advice on Personal Protective Equipment, refer to the following EU CEN Standards:

EN 166 Personal eye-protection

EN 340 Protective clothing

EN 374 Protective gloves against chemicals and micro-organisms

EN 13832 Footwear protecting against chemicals

EN 133 Respiratory protective devices

## 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  
 TLV: Threshold Limit Value  
 LOD: Limit Of Detection  
 OTV: Odour Threshold Value  
 BCF: BioConcentration Factors  
 BEI: Biological Exposure Index  
 AIIC: 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

**Classification and procedure used to derive the classification for mixtures according to Regulation (EC) 1272/2008 [CLP]**

| <b>Classification according to regulation (EC) No 1272/2008 [CLP] and amendments</b>              | <b>Classification Procedure</b> |
|---|---------------------------------|
| Flammable Liquids Category 2, H225  | Expert judgement                |
| Substances and Mixtures which in Contact with Water Emit Flammable Gases Category 2, H261         | Expert judgement                |
| Acute Toxicity (Oral) Category 4, H302  | Expert judgement                |
| Skin Corrosion/Irritation Category 1B, H314   | Expert judgement                |
| Serious Eye Damage/Eye Irritation Category 1, H318  | Minimum classification          |
| Specific Target Organ Toxicity - Single Exposure (Respiratory Tract Irritation) Category 3 , H335 | Minimum classification          |
| Specific Target Organ Toxicity - Single Exposure (Narcotic Effects) Category 3, H336              | Expert judgement                |
| Carcinogenicity Category 2, H351  | Calculation method              |

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