

# Material Safety Data Sheets

## 1. IDENTIFICATION

|                     |                                                                                                                        |
|---------------------|------------------------------------------------------------------------------------------------------------------------|
| Product Name        | <b>Tetrahydrofuran</b>                                                                                                 |
| Other Names         | 1,4-epoxybutane; Butylene oxide; Cyclotetramethylene oxide; Diethylene oxide; THF                                      |
| Uses                | Solvent; reaction medium; synthesis; fabrication of articles.                                                          |
| Chemical Family     | No Data Available                                                                                                      |
| Chemical Formula    | C <sub>4</sub> H <sub>8</sub> O                                                                                        |
| Chemical Name       | Furan, tetrahydro-                                                                                                     |
| Product Description | No Data Available                                                                                                      |
| Company             | <b>Arman sina.co</b>                                                                                                   |
| Contact Information | <a href="mailto:info@armansina.com">info@armansina.com</a><br><a href="http://www.armansina.com">www.armansina.com</a> |

## 2. HAZARD IDENTIFICATION

|                          |            |                                                                                                                                                                                |
|--------------------------|------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Hazard Categories        |            | Flammable Liquids - Category 2<br>Serious Eye Damage/Irritation - Category 2A<br>Carcinogenicity - Category 2<br>Specific Target Organ Toxicity (Single Exposure) - Category 3 |
| Signal Word              |            | Danger                                                                                                                                                                         |
| Hazard Statements        | H225       | Highly flammable liquid and vapour.                                                                                                                                            |
|                          | H319       | Causes serious eye irritation.                                                                                                                                                 |
|                          | H335       | May cause respiratory irritation.                                                                                                                                              |
|                          | H351       | Suspected of causing cancer.                                                                                                                                                   |
|                          | AUH019     | May form explosive peroxides                                                                                                                                                   |
| Precautionary Statements | Prevention | P210 Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.                                                                            |
|                          |            | P280 Wear protective gloves/protective clothing/eye protection/face protection.                                                                                                |
|                          |            | P233 Keep container tightly closed.                                                                                                                                            |
|                          |            | P201 Obtain special instructions before use.                                                                                                                                   |
|                          |            | P261 Avoid breathing mist/vapours/spray.                                                                                                                                       |
|                          |            | P240 Ground and bond container and receiving equipment.                                                                                                                        |
|                          |            | P241 Use explosion-proof electrical/ventilating/lighting and all other equipment.                                                                                              |
|                          |            | P242 Use non-sparking tools.                                                                                                                                                   |
|                          |            | P243 Take action to prevent static discharges.                                                                                                                                 |
|                          |            | P271 Use only outdoors or in a well-ventilated area.                                                                                                                           |
|                          | Response   | P370 + P378 In case of fire: Alcohol resistant foam is the preferred fire-fighting medium but, if it is not available, normal foam can be used.                                |
|                          |            | P337 + P313 If eye irritation persists: Get medical advice/attention.                                                                                                          |
|                          |            | P308 + P313 IF exposed or concerned: Get medical advice/ attention.                                                                                                            |
|                          |            | P312 Call a POISON CENTER or doctor if you feel unwell.                                                                                                                        |
|                          |            | P303 + P361 + P353 IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water [or shower].                                                    |
|                          | Storage    | P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.                            |
|                          |            | P304 + P340 IF INHALED: Remove victim to fresh air and keep comfortable for breathing.                                                                                         |
|                          |            | P403 + P235 Store in a well-ventilated place. Keep cool.                                                                                                                       |
|                          | Disposal   | P405 Store locked up.                                                                                                                                                          |
|                          |            | P501 Dispose of contents/container in accordance with local / regional / national / international regulations.                                                                 |

## Symbol



## 3. COMPOSITION/INFORMATION ON INGREDIENTS

### Ingredients

| Chemical Entity                                                                | Formula                         | CAS Number  | Proportion     |
|--------------------------------------------------------------------------------|---------------------------------|-------------|----------------|
| Tetrahydrofuran                                                                | C <sub>4</sub> H <sub>8</sub> O | 109-99-9    | >95 %          |
| Stabilizer (e.g. 2,6-di-tert-butyl-4-methylphenol or p-cresol or hydroquinone) | Unspecified                     | Unspecified | 0.025 - 0.05 % |

## 4. FIRST AID MEASURES

### Description of necessary measures according to routes of exposure

|                                           |                                                                                                                                                                                                                                                                                                                                                                                                                    |
|-------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Swallowed                                 | IF SWALLOWED: Give water to rinse out mouth, then provide liquid slowly and as much as casualty can comfortably drink. Do not induce vomiting. Get immediate medical advice/attention. If vomiting occurs, lean patient forward or place on left side (head-down position, if possible) to maintain open airway and prevent aspiration. Never give anything by mouth to an unconscious person.                     |
| Eye                                       | IF IN EYES: Immediately flush eyes with running water for several minutes, holding eyelids open and occasionally lifting the upper and lower lids. Remove contact lenses if present and easy to do. Continue rinsing for at least 15 minutes. Get immediate medical advice/attention.<br>*Removal of contact lenses after an eye injury should only be undertaken by skilled personnel.                            |
| Skin                                      | IF ON SKIN (or hair): Remove contaminated clothing and shoes immediately. Flush skin and hair with running water for at least 15 minutes. If skin irritation occurs, get medical advice/attention. Wash contaminated clothing and shoes before reuse.                                                                                                                                                              |
| Inhaled                                   | IF INHALED: Remove victim to fresh air and keep warm and at rest in a position comfortable for breathing. Call a Poison Centre or doctor/physician for advice. Apply resuscitation if victim is not breathing - Do not use direct mouth-to-mouth method if victim ingested or inhaled the substance; use alternative respiratory method or proper respiratory device - Administer oxygen if breathing is difficult |
| Advice to Doctor                          | If exposed or concerned, get medical advice/attention. Treat symptomatically. Keep victim calm and warm - Obtain immediate medical care. Ensure that attending medical personnel are aware of identity and nature of product(s) involved, and take precautions to protect themselves.                                                                                                                              |
| Medical Conditions Aggravated by Exposure | No information available.                                                                                                                                                                                                                                                                                                                                                                                          |

## 5. FIRE FIGHTING MEASURES

|                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|-------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| General Measures        | Alert Fire Brigade and tell them location and nature of hazard. If safe to do so, move undamaged containers from fire area. Cool container with water spray until well after fire is out. Avoid getting water inside containers.<br>*Public Safety Hazard: Effects may spread beyond the immediate vicinity. All non-essential personnel should be instructed to move at least 250 metres away from the incident. People should be warned to stay indoors with all doors and windows closed, preferably in rooms upstairs and facing away from the incident. Ignition sources should be eliminated and any ventilation stopped. The possible need for subsequent evacuation should be considered, but in most cases it will be safer to remain in a building than to evacuate. |
| Flammability Conditions | HIGHLY FLAMMABLE LIQUID & VAPOUR: Low flashpoint – Will be easily ignited by heat, sparks or flames at ambient temperatures. Severe fire hazard when exposed to heat, flame and/or oxidisers.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |

|                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Extinguishing Media                | Use dry chemical, Carbon dioxide (CO <sub>2</sub> ), alcohol-resistant foam or water spray for extinction - Do not use water jets. Alcohol resistant foam is the preferred firefighting medium but, if it is not available, fine water spray can be used.<br>*Caution: Use of water spray when fighting fire may be inefficient.                                                                                                                                                                                                      |
| Fire and Explosion Hazard          | Risk of violent reaction or explosion! Vapours will form explosive mixtures with air. Vapours will travel to source of ignition and flash back. Heating may cause expansion or decomposition leading to violent rupture of containers. Many liquids are lighter than water. Many vapours are heavier than air and will collect in low or confined areas. Vapours from runoff may create an explosion hazard.<br>*WARNING: Long standing in contact with air and light may result in the formation of potentially explosive peroxides. |
| Hazardous Products of Combustion   | Fire may produce irritating, toxic and/or corrosive gases, including carbon dioxide (CO <sub>2</sub> ) and other pyrolysis products typical of burning organic material.                                                                                                                                                                                                                                                                                                                                                              |
| Special Fire Fighting Instructions | Contain runoff from fire control or dilution water - Runoff may pollute waterways; Vapours from runoff may create an explosion hazard.                                                                                                                                                                                                                                                                                                                                                                                                |
| Personal Protective Equipment      | Wear self-contained breathing apparatus (SCBA) and chemical protective clothing. SCBA and structural firefighting uniform provide limited protection.                                                                                                                                                                                                                                                                                                                                                                                 |
| Flash Point                        | -15 ° C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Lower Explosion Limit              | 1.8 %                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Upper Explosion Limit              | 11.8 %                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Auto Ignition Temperature          | 321 ° C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Hazchem Code                       | •2YE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |

## 6. ACCIDENTAL RELEASE MEASURES

|                                      |                                                                                                                                                                                                                                                                                                                                                                                    |
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| General Response Procedure           | Ensure adequate ventilation - Ventilate enclosed spaces before entering. ELIMINATE all ignition sources (no smoking, flares, sparks or flame) within at least 50 m - All equipment used in handling the product must be earthed. Do not touch or walk through spilled material. Clean up all spills immediately! Avoid breathing vapours and contact with eyes, skin and clothing. |
| Clean Up Procedures                  | Absorb spill with earth, sand or other non-combustible material - Use clean, non-sparking tools to collect material and place it in suitable containers for later disposal (see SECTION 13).                                                                                                                                                                                       |
| Containment                          | Stop leak if safe to do so – Prevent entry into waterways, drains or confined areas. Vapour-suppressing foam may be used to control vapours. Water spray may be used to knock down or divert vapour clouds.                                                                                                                                                                        |
| Decontamination                      | Peroxide-containing residues can often be rendered innocuous by pouring into an excess of sodium carbonate solution.                                                                                                                                                                                                                                                               |
| Environmental Precautionary Measures | Spillages and decontamination runoff should be prevented from entering drains and watercourses.                                                                                                                                                                                                                                                                                    |
| Evacuation Criteria                  | Spill or leak area should be isolated immediately. Keep unauthorised personnel away. Keep upwind and to higher ground. Large spill: Immediately contact Police or Fire Brigade; Consider initial downwind evacuation of areas within at least 300 m.                                                                                                                               |
| Personal Precautionary Measures      | Control personal contact with the substance, by using protective equipment (see SECTION 8). SCBA and gas-tight suits should be worn when dealing with damaged or leaking containers and where there is no risk of ignition. SCBA and structural firefighting uniform provide limited protection where there is a risk of ignition.                                                 |

## 7. HANDLING AND STORAGE

|          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
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| Handling | Safety showers and eyewash facilities should be provided within the immediate work area for emergency use. Ensure adequate ventilation - Use only outdoors or in a well-ventilated area. Prevent concentration in hollows and sumps. Obtain special instructions before use - Do not handle until all safety precautions have been read and understood. Avoid breathing mist/vapours and contact with eyes, skin and clothing. Do not ingest. Wear protective gloves/protective clothing/eye protection/face protection (see SECTION 8). HIGHLY FLAMMABLE LIQUID & VAPOUR: Keep away from heat, hot surfaces, sparks, open flames and other ignition sources - No smoking. Ground and bond container and receiving equipment. Use explosion-proof equipment and non-sparking tools. Take action to prevent static discharges. |
| Storage  | Store in a cool, dry and well-ventilated place, out of direct sunlight. Do NOT store in pits, depressions, basements or areas where vapours may be trapped. Rotate all stock to prevent ageing. Use on First In-First Out basis. Keep containers securely sealed. Vent tanks through flame arrestors. Keep away from heat, hot surfaces, sparks, open flames and other ignition sources - No smoking. Keep away from incompatible materials (see SECTION 10). Store locked up.<br>*May form explosive peroxides on standing or following concentration by distillation. Review of stocks and testing for peroxide content at 3-monthly intervals is recommended, together with safe disposal of peroxidic samples.                                                                                                            |

|           |                                                                                                                                                                                                                                                                                                             |
|-----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Container | <p>Store in original containers in approved flame-proof area. Check that containers are clearly labelled and free from leaks.</p> <p>*Containers, even those that have been emptied, may contain explosive vapours. Do NOT cut, drill, grind, weld or perform similar operations on or near containers.</p> |
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## 8. EXPOSURE CONTROLS / PERSONAL PROTECTION

|                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
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| General                       | <p>For Tetrahydrofuran (CAS No. 109-99-9):</p> <ul style="list-style-type: none"> <li>- Safe Work Australia Exposure Standard: TWA = 100 ppm (295 mg/m<sup>3</sup>); Absorption through the skin may be a significant source of exposure (Sk).</li> <li>- New Zealand Workplace Exposure Standard [Next review 2021]: TWA = 100 ppm (295 mg/m<sup>3</sup>); Suspected carcinogen (6.7B); Skin absorption (skin).</li> </ul> <p>*Tetrahydrofuran (THF) Odour Threshold Value: 30.5 ppm (detection); 61 ppm (recognition).</p> <p>THF is an upper respiratory irritant at concentrations exceeding 400 ppm. At concentrations in the order of 25,000 ppm THF is narcotic to both animals and humans. The TLV-TWA is thought to minimise the potential for upper respiratory tract irritation and to provide a sufficient margin of safety against THF-induced systemic injury.</p> <p>STABILIZER: 2,6-di-tert-butyl-4-methylphenol (CAS No. 128-37-0):</p> <ul style="list-style-type: none"> <li>- Safe Work Australia Exposure Standard: TWA = 10 mg/m<sup>3</sup></li> <li>- New Zealand Workplace Exposure Standard: TWA = 10 mg/m<sup>3</sup>; Dermal sensitiser (dsen).</li> </ul> <p>STABILIZER: p-cresol (CAS No. 106-44-5):</p> <ul style="list-style-type: none"> <li>- Safe Work Australia Exposure Standard for Cresol, all isomers: TWA = 5 ppm (22 mg/m<sup>3</sup>); Absorption through the skin may be a significant source of exposure (Sk).</li> <li>- New Zealand Workplace Exposure Standard for Cresol, all isomers [Next review 2022]: TWA = 5 ppm (22 mg/m<sup>3</sup>); Skin absorption (skin).</li> </ul> <p>STABILIZER: Hydroquinone (CAS No. 123-31-9):</p> <ul style="list-style-type: none"> <li>- Safe Work Australia Exposure Standard: TWA = 2 mg/m<sup>3</sup>; Suspected human carcinogen (Carc. 2).</li> <li>- New Zealand Workplace Exposure Standard [Adopted 2020]: TWA = 1 mg/m<sup>3</sup>; Skin absorption (skin); Dermal sensitiser (dsen).</li> </ul> |
| Exposure Limits               | No Data Available                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Biological Limits             | No information available.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Engineering Measures          | A system of local and/or general exhaust is recommended to keep employee exposures as low as possible. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Personal Protection Equipment | <ul style="list-style-type: none"> <li>- Respiratory protection: Where the concentration of gas/particulates in the breathing zone approaches or exceeds the Exposure Standard, respiratory protection is required. Recommended: Type A Filter of sufficient capacity (refer to AS/NZS 1715 &amp; 1716). 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.</li> <li>- Eye/face protection: Wear appropriate eye protection to avoid eye contact. Recommended: Safety glasses with side shields; Chemical goggles.</li> <li>- Hand protection: Wear protective gloves. Recommended: Wear chemical protective gloves, e.g. PVC.</li> <li>- Skin/body protection: Wear appropriate personal protective clothing to avoid skin contact. Recommended: Overalls; PVC Apron; PVC protective suit may be required if exposure severe. For large scale or continuous use wear tight-weave non-static clothing (no metallic fasteners, cuffs or pockets). Wear safety footwear or safety gumboots, e.g. Rubber.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Special Hazards Precautions   | Purchases of peroxidisable chemicals should be restricted to ensure that the chemical is used completely before it can become peroxidised. A responsible person should maintain an inventory of peroxidisable chemicals or annotate the general chemical inventory to indicate which chemicals are subject to peroxidation.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Work Hygienic Practices       | Handle in accordance with good industrial hygiene and safety practice. Do not eat, drink or smoke when using this product. Do NOT allow clothing wet with material to stay in contact with skin.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |

## 9. PHYSICAL AND CHEMICAL PROPERTIES

|                 |                     |
|-----------------|---------------------|
| Physical State  | Liquid              |
| Appearance      | Mobile liquid       |
| Odour           | Ether-like          |
| Colour          | Colourless          |
| pH              | 5 (20% aqueous)     |
| Vapour Pressure | 19.1 kPa (@ 20 ° C) |

|                                                                |                                                                                                                                                                                               |
|----------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Relative Vapour Density                                        | 2.5 Air = 1                                                                                                                                                                                   |
| Boiling Point                                                  | 66 ° C                                                                                                                                                                                        |
| Melting Point                                                  | -108.5 ° C                                                                                                                                                                                    |
| Freezing Point                                                 | -108.5 ° C                                                                                                                                                                                    |
| Solubility                                                     | Miscible with water, alcohols, ketones, esters and hydrocarbons                                                                                                                               |
| Specific Gravity                                               | 0.891 (Water = 1)                                                                                                                                                                             |
| Flash Point                                                    | -15 ° C                                                                                                                                                                                       |
| Auto Ignition Temp                                             | 321 ° C                                                                                                                                                                                       |
| Evaporation Rate                                               | 8.0 (BuAc = 1)                                                                                                                                                                                |
| Bulk Density                                                   | No Data Available                                                                                                                                                                             |
| Corrosion Rate                                                 | No Data Available                                                                                                                                                                             |
| Decomposition Temperature                                      | No Data Available                                                                                                                                                                             |
| Density                                                        | No Data Available                                                                                                                                                                             |
| Specific Heat                                                  | No Data Available                                                                                                                                                                             |
| Molecular Weight                                               | 72.11 g/mol                                                                                                                                                                                   |
| Net Propellant Weight                                          | No Data Available                                                                                                                                                                             |
| Octanol Water Coefficient                                      | No Data Available                                                                                                                                                                             |
| Particle Size                                                  | No Data Available                                                                                                                                                                             |
| Partition Coefficient                                          | No Data Available                                                                                                                                                                             |
| Saturated Vapour Concentration                                 | No Data Available                                                                                                                                                                             |
| Vapour Temperature                                             | No Data Available                                                                                                                                                                             |
| Viscosity                                                      | No Data Available                                                                                                                                                                             |
| Volatile Percent                                               | 100 %                                                                                                                                                                                         |
| VOC Volume                                                     | No Data Available                                                                                                                                                                             |
| Additional Characteristics                                     | WARNING: Long standing in contact with air and light may result in the formation of potentially explosive peroxides.                                                                          |
| Potential for Dust Explosion                                   | Not applicable.                                                                                                                                                                               |
| Fast or Intensely Burning Characteristics                      | Risk of violent reaction or explosion! May form explosive peroxides.                                                                                                                          |
| Flame Propagation or Burning Rate of Solid Materials           | No information available.                                                                                                                                                                     |
| Non-Flammables That Could Contribute Unusual Hazards to a Fire | Caution: Use of water spray when fighting fire may be inefficient.                                                                                                                            |
| Properties That May Initiate or Contribute to Fire Intensity   | HIGHLY FLAMMABLE LIQUID & VAPOUR: Low flashpoint – Will be easily ignited by heat, sparks or flames at ambient temperatures. Severe fire hazard when exposed to heat, flame and/or oxidisers. |
| Reactions That Release Gases or Vapours                        | Fire/decomposition may produce irritating, toxic and/or corrosive gases, including carbon dioxide (CO <sub>2</sub> ) and other pyrolysis products typical of burning organic material.        |
| Release of Invisible Flammable Vapours and Gases               | Vapours will form explosive mixtures with air.                                                                                                                                                |

## 10. STABILITY AND REACTIVITY

|                                  |                                                                                                                                                                                                                                         |
|----------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| General Information              | Presence of a stabilising inhibitor prevents/retards peroxide formation. Forms potentially explosive peroxides upon long standing in air. These peroxides may explode if concentrated by evaporation or distillation.                   |
| Chemical Stability               | Product is considered stable; Unstable in the presence of incompatible materials. May form explosive peroxides.<br>*Product is considered stable under normal handling and storage conditions when it is inhibited and properly stored. |
| Conditions to Avoid              | Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. Avoid prolonged storage. Do not store in unsealed containers.                                                                                        |
| Materials to Avoid               | Incompatible/reactive with strong acids, bases, oxidising agents.                                                                                                                                                                       |
| Hazardous Decomposition Products | Fire/decomposition may produce irritating, toxic and/or corrosive gases, including carbon dioxide (CO <sub>2</sub> ) and other pyrolysis products typical of burning organic material.                                                  |
| Hazardous Polymerisation         | Hazardous polymerisation will not occur.                                                                                                                                                                                                |

## 11. TOXICOLOGICAL INFORMATION

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| General Information | <ul style="list-style-type: none"><li>- Acute toxicity: May be harmful if swallowed. 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. The intake of alcoholic beverages may enhance the toxic effects of tetrahydrofuran. Skin contact with the material may damage the health of the individual; systemic effects may result following absorption.</li><li>- Skin corrosion/irritation: Skin contact with tetrahydrofuran may produce smarting and reddening of the skin and after prolonged exposures, contact (non-allergic) dermatitis may result due to the degreasing effect of the substance.</li><li>- Eye damage/irritation: Causes serious eye irritation. Eye contact may cause significant inflammation with pain. Corneal injury may occur; permanent impairment of vision may result unless treatment is prompt and adequate. Repeated or prolonged exposure to irritants may cause inflammation, characterised by a temporary redness of the conjunctiva; temporary impairment of vision and/or other transient eye damage/ulceration may occur.</li><li>- Respiratory/skin sensitisation: There was no contact dermatitis or sensitisation observed in 196 volunteers exposed to the chemical dermally (exposure concentration not reported) [NICNAS].</li><li>- Germ cell mutagenicity: Based on the data available, the chemical is not genotoxic.</li><li>- Carcinogenicity: Suspected of causing cancer. Tetrahydrofuran (CAS No. 109-99-9) is classified by the IARC Monographs as "Possibly carcinogenic to humans" (Group 2B). The chemical showed some evidence of carcinogenicity in rodents, when exposed through inhalation. However, the evidence is not conclusive as to the human relevance of the observed tumours [NICNAS].</li><li>- Reproductive toxicity: Based on the data available, the chemical is not considered a reproductive or developmental toxin.</li><li>- STOT (single exposure): May cause respiratory irritation. Inhalation of vapours or aerosols (mists, fumes), generated by the material during the course of normal handling, may be damaging to the health of the individual. Overexposure to tetrahydrofuran, by inhalation, may result in irritation of the mucous membranes and may produce coughing, chest pains, nausea, dizziness, headache and narcosis. Exposure to high concentrations can affect the central nervous system due to the strong narcotic effect of the material.</li><li>- STOT (repeated exposure): Based on the data available, the chemical is not considered to cause serious damage to health by repeated exposure. Repeated exposure to tetrahydrofuran (THF) and its congeners has been associated with cytolytic hepatitis and fatty degeneration of the liver.</li><li>- Aspiration toxicity: No information available.</li></ul> |
| Acute               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Ingestion           | <p>Acute toxicity (Oral):</p> <ul style="list-style-type: none"><li>- LD50, Rat: 1,650 mg/kg bw [Supplier's SDS].</li><li>- LD50, Rat: &gt;2,000 mg/kg bw (2,050 - 6,210 mg/kg bw) [NICNAS].</li></ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Other               | <p>Acute toxicity (Dermal):</p> <ul style="list-style-type: none"><li>- LD50, Rat: &gt;2,000 mg/kg [Supplier's SDS].</li></ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Inhalation          | <p>Acute toxicity (Inhalation):</p> <ul style="list-style-type: none"><li>- LC50, Rat: &gt;22.05 mg/l (6 h) [Supplier's SDS].</li></ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Carcinogen Category | Cat. 2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |

## 12. ECOLOGICAL INFORMATION

|                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|---------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Ecotoxicity               | <p>For Tetrahydrofuran (THF):</p> <ul style="list-style-type: none"><li>- LC50, Fish: 2 - 160 mg/L (96 h).</li><li>- EC50, Algae/aquatic plants: 310.515 mg/L (96 h).</li><li>- NOEC, Fish: &gt;=5 mg/L (24 h).</li></ul>                                                                                                                                                                                                                                                                                         |
| Persistence/Degradability | <p>For Tetrahydrofuran (THF):</p> <ul style="list-style-type: none"><li>- Persistence: Low (Water/Soil); Low (Air).</li></ul>                                                                                                                                                                                                                                                                                                                                                                                     |
| Mobility                  | <p>For Tetrahydrofuran (THF):</p> <ul style="list-style-type: none"><li>- Mobility in soil: Low (KOC = 4.881).</li></ul>                                                                                                                                                                                                                                                                                                                                                                                          |
| Environmental Fate        | <p>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 behaviour in exposed animals. These effects have been seen long after the first exposure(s).<br/>*Do NOT discharge into sewer or waterways.</p> |
| Bioaccumulation Potential | <p>For Tetrahydrofuran (THF):</p> <ul style="list-style-type: none"><li>- Bioaccumulative potential: Low (LogKOW = 0.46).</li></ul>                                                                                                                                                                                                                                                                                                                                                                               |
| Environmental Impact      | No Data Available                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |

### 13. DISPOSAL CONSIDERATIONS

General Information                      This material may be recycled if unused, or if it has not been contaminated so as to make it unsuitable for its intended use. Recycle, wherever possible, or dispose of by burial in a land-fill specifically licensed to accept chemical and/or pharmaceutical wastes or incineration in a licensed apparatus. Do NOT allow wash water from cleaning or process equipment to enter drains. It may be necessary to collect all wash water for treatment before disposal. In all cases, disposal to sewer may be subject to local laws and regulations and these should be considered first.

Special Precautions for Land Fill Decontaminate empty containers. Flush containers with water immediately on emptying to prevent formation of peroxides.

### 14. TRANSPORT INFORMATION

#### Land Transport

|                      |                               |
|----------------------|-------------------------------|
| Proper Shipping Name | TETRAHYDROFURAN               |
| Class                | 3 Flammable Liquids           |
| Subsidiary Risk(s)   | No Data Available             |
| EPG                  | 14 Liquids - Highly Flammable |
| UN Number            | 2056                          |
| Hazchem              | •2YE                          |
| Pack Group           | II                            |
| Special Provision    | No Data Available             |

#### Sea Transport

|                      |                     |
|----------------------|---------------------|
| Proper Shipping Name | TETRAHYDROFURAN     |
| Class                | 3 Flammable Liquids |
| Subsidiary Risk(s)   | No Data Available   |
| UN Number            | 2056                |
| Hazchem              | 2YE                 |
| Pack Group           | II                  |
| Special Provision    | No Data Available   |
| EMS                  | F-E, S-D            |
| Marine Pollutant     | No                  |

#### Air Transport

|                      |                     |
|----------------------|---------------------|
| Proper Shipping Name | TETRAHYDROFURAN     |
| Class                | 3 Flammable Liquids |
| Subsidiary Risk(s)   | No Data Available   |
| UN Number            | 2056                |
| Hazchem              | 2YE                 |
| Pack Group           | II                  |
| Special Provision    | No Data Available   |

## 15. OTHER INFORMATION

Revision

2

Key/Legend

< Less Than  
 > Greater Than  
 atm Atmosphere  
 CAS Chemical Abstracts Service (Registry Number)  
 cm² Square Centimetres  
 CO2 Carbon Dioxide  
 COD Chemical Oxygen Demand  
 deg C (° C) Degrees Celcius  
  
 deg F (° F) Degrees Farenheit  
 g Grams  
 g/cm³ Grams per Cubic Centimetre  
 g/l Grams per Litre  
 HSNO Hazardous Substance and New Organism  
 IDLH Immediately Dangerous to Life and Health  
 immiscible Liquids are insoluable in each other.  
 inHg Inch of Mercury  
 inH2O Inch of Water  
 K Kelvin  
 kg Kilogram  
 kg/m³ Kilograms per Cubic Metre  
 lb Pound  
  
 LC50 LC stands for lethal concentration. LC50 is the concentration of a material in air which causes the death of 50% (one half) of a group of test animals. The material is inhaled over a set period of time, usually 1 or 4 hours.  
 LD50 LD stands for Lethal Dose. LD50 is the amount of a material, given all at once, which causes the death of 50% (one half) of a group of test animals.  
 ltr or L Litre  
 m³ Cubic Metre  
 mbar Millibar  
 mg Milligram  
 mg/24H Milligrams per 24 Hours  
 mg/kg Milligrams per Kilogram  
 mg/m³ Milligrams per Cubic Metre  
 Misc or Miscible Liquids form one homogeneous liquid phase regardless of the amount of either component present.  
 mm Millimetre  
 mmH2O Millimetres of Water  
 mPa.s Millipascals per Second  
 N/A Not Applicable  
 NIOSH National Institute for Occupational Safety and Health  
 NOHSC National Occupational Heath and Safety Commission  
 OECD Organisation for Economic Co-operation and Development  
 Oz Ounce  
 PEL Permissible Exposure Limit  
 Pa Pascal  
 ppb Parts per Billion  
 ppm Parts per Million  
 ppm/2h Parts per Million per 2 Hours  
 ppm/6h Parts per Million per 6 Hours  
 psi Pounds per Square Inch  
 R Rankine  
 RCP Reciprocal Calculation Procedure  
 STEL Short Term Exposure Limit  
 TLV Threshold Limit Value  
 tne Tonne  
 TWA Time Weighted Average  
 ug/24H Micrograms per 24 Hours  
 UN United Nations  
 wt Weight