

# 1,3-DICHLORO-5,5-DIMETHYLHYDANTOINE

S D FINE-CHEM LIMITED

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Version No: 7.1.1.1

Safety Data Sheet

## SECTION 1 IDENTIFICATION OF THE SUBSTANCE / MIXTURE AND OF THE COMPANY / UNDERTAKING

### Product Identifier

|                                      |                                                                                                                                                                                                                                           |
|--------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Product name</b>                  | 1,3-DICHLORO-5,5-DIMETHYLHYDANTOINE                                                                                                                                                                                                       |
| <b>Chemical Name</b>                 | 1,3-dichloro-5,5-dimethylhydantoin                                                                                                                                                                                                        |
| <b>Synonyms</b>                      | 1,3-dichloro-5-5-dimethylhydantoin, 2,4-imidazolidinedione, 1,3-dichloro-5,5-dimethyl-, C5-H6-C12-N2-O2, DCA, DDH, Dactin, Daktin, Dantoin, Dichlorantin, Halane, Hydan, Omchlor, dichlorodimethylhydantoin, hydantoin, dichlorodimethyl- |
| <b>Proper shipping name</b>          | OXIDIZING SOLID, CORROSIVE, N.O.S. (contains 1,3-dichloro-5,5-dimethylhydantoin)                                                                                                                                                          |
| <b>Chemical formula</b>              | C5-H6-Cl2-N2-O2                                                                                                                                                                                                                           |
| <b>Other means of identification</b> | Not Available                                                                                                                                                                                                                             |
| <b>CAS number</b>                    | 118-52-5                                                                                                                                                                                                                                  |

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

|                                 |                                                                                                                   |
|---------------------------------|-------------------------------------------------------------------------------------------------------------------|
| <b>Relevant identified uses</b> | Chlorinating agent. Intermediate for amino-acids, drugs and insecticides. Stabiliser for vinyl chloride polymers. |
|---------------------------------|-------------------------------------------------------------------------------------------------------------------|

### Details of the supplier of the safety data sheet

|                                |                                                                  |
|--------------------------------|------------------------------------------------------------------|
| <b>Registered company name</b> | S D FINE-CHEM LIMITED                                            |
| <b>Address</b>                 | 315-317, T.V. INDUSTRIAL ESTATE, 248, WORLI, MUMBAI 400030 India |
| <b>Telephone</b>               | 91-22-24959898                                                   |
| <b>Fax</b>                     | 91-22-24937232                                                   |
| <b>Website</b>                 | www.sdfine.com                                                   |
| <b>Email</b>                   | technical@sdfine.com                                             |

### Emergency telephone number

|                                          |                |
|------------------------------------------|----------------|
| <b>Association / Organisation</b>        | Not Available  |
| <b>Emergency telephone numbers</b>       | 91-22-24959899 |
| <b>Other emergency telephone numbers</b> | Not Available  |

## SECTION 2 HAZARDS IDENTIFICATION

### Classification of the substance or mixture

|                       |                                                                                                                                                                                                 |
|-----------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Classification</b> | Oxidizing Solid Category 2, Metal Corrosion Category 1, Acute Toxicity (Oral) Category 4, Skin Corrosion/Irritation Category 1A, Serious Eye Damage Category 1, Acute Aquatic Hazard Category 1 |
|-----------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

### Label elements

|                           |                                                                                                                                                                                                                                                                                                                                                 |
|---------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>GHS label elements</b> |     |
|---------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

**1,3-DICHLORO-5,5-DIMETHYLHYDANTOINE****Hazard statement(s)**

|             |                                          |
|-------------|------------------------------------------|
| <b>H272</b> | May intensify fire; oxidiser.            |
| <b>H290</b> | May be corrosive to metals.              |
| <b>H302</b> | Harmful if swallowed.                    |
| <b>H314</b> | Causes severe skin burns and eye damage. |
| <b>H318</b> | Causes serious eye damage.               |
| <b>H400</b> | Very toxic to aquatic life.              |

**Precautionary statement(s) Prevention**

|             |                                                                            |
|-------------|----------------------------------------------------------------------------|
| <b>P210</b> | Keep away from heat/sparks/open flames/hot surfaces. No smoking.           |
| <b>P221</b> | Take any precaution to avoid mixing with combustibles/organic material.    |
| <b>P260</b> | Do not breathe dust/fume/gas/mist/vapours/spray.                           |
| <b>P280</b> | Wear protective gloves/protective clothing/eye protection/face protection. |
| <b>P220</b> | Keep/Store away from clothing/organic material/combustible materials.      |
| <b>P234</b> | Keep only in original container.                                           |
| <b>P270</b> | Do not eat, drink or smoke when using this product.                        |
| <b>P273</b> | Avoid release to the environment.                                          |

**Precautionary statement(s) Response**

|                       |                                                                                                                                  |
|-----------------------|----------------------------------------------------------------------------------------------------------------------------------|
| <b>P301+P330+P331</b> | IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.                                                                               |
| <b>P303+P361+P353</b> | IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/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>P310</b>           | Immediately call a POISON CENTER/doctor/physician/first aider.                                                                   |
| <b>P370+P378</b>      | In case of fire: Use alcohol resistant foam or fine spray/water fog to extinguish.                                               |
| <b>P363</b>           | Wash contaminated clothing before reuse.                                                                                         |
| <b>P390</b>           | Absorb spillage to prevent material damage.                                                                                      |
| <b>P391</b>           | Collect spillage.                                                                                                                |
| <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>P405</b> | Store locked up. |
|-------------|------------------|

**Precautionary statement(s) Disposal**

|             |                                                                     |
|-------------|---------------------------------------------------------------------|
| <b>P501</b> | Dispose of contents/container in accordance with local regulations. |
|-------------|---------------------------------------------------------------------|

**SECTION 3 COMPOSITION / INFORMATION ON INGREDIENTS****Substances**

| CAS No    | %[weight] | Name                                      | Classification                                                                                                                                                                                                                                                                                                                   |
|-----------|-----------|-------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 118-52-5  | >94       | <u>1,3-dichloro-5,5-dimethylhydantoin</u> | Oxidizing Solid Category 2, Metal Corrosion Category 1, Acute Toxicity (Oral) Category 4, Skin Corrosion/Irritation Category 1A, Serious Eye Damage Category 1, Acute Aquatic Hazard Category 1; H272, H290, H302, H314, H318, H400                                                                                              |
|           |           | in contact with water liberates           |                                                                                                                                                                                                                                                                                                                                  |
| 7790-92-3 | 2         | <u>hypochlorous acid</u>                  | Oxidizing Liquid Category 2, Eye Irritation Category 2A, Acute Aquatic Hazard Category 1; H272, H319, H400                                                                                                                                                                                                                       |
| 7782-50-5 |           | <u>chlorine</u>                           | Simple Asphyxiant, Gas under Pressure (Liquefied gas), Acute Toxicity (Inhalation) Category 3, Skin Corrosion/Irritation Category 2, Eye Irritation Category 2A, Specific target organ toxicity - single exposure Category 3 (respiratory tract irritation), Acute Aquatic Hazard Category 1; H280, H331, H315, H319, H335, H400 |

See section above for composition of Substances

## SECTION 4 FIRST AID MEASURES

### 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.</li> <li>Inhalation of vapours or aerosols (mists, fumes) may cause lung oedema.</li> <li>Corrosive substances may cause lung damage (e.g. lung oedema, fluid in the lungs).</li> <li>As this reaction may be delayed up to 24 hours after exposure, affected individuals need complete rest (preferably in semi-recumbent posture) and must be kept under medical observation even if no symptoms are (yet) manifested.</li> <li>Before any such manifestation, the administration of a spray containing a dexamethasone derivative or beclomethasone derivative may be considered.</li> </ul> <p><b>This must definitely be left to a doctor or person authorised by him/her.</b><br/>(ICSC13719)</p> |
| <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> <p>If swallowed feed bread soaked in milk, followed by cooking oil or olive oil.</p>                                                                                                                                                                                                                                                                                                                                                                                                                  |

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

Excellent warning properties force rapid escape of personnel from chlorine vapour thus most inhalations are mild to moderate. If escape is not possible, exposure to high concentrations for a very short time can result in dyspnea, haemophysis and cyanosis with later complications being tracheobronchopneumonitis and pulmonary oedema. Oxygen, intermittent positive pressure breathing apparatus and aerosolised bronchodilators are of therapeutic value where chlorine inhalation has been light to moderate. Severe inhalation should result in hospitalisation and treatment for a respiratory emergency. Any chlorine inhalation in an individual with compromised pulmonary function (COPD) should be regarded as a severe inhalation and a respiratory emergency. [CCINFO, Dow 1988]

Effects from exposure to chlorine gas include pulmonary oedema which may be delayed. Observation in hospital for 48 hours is recommended. Diagnosed asthmatics and those people suffering from certain types of chronic bronchitis should receive medical approval before being employed in occupations involving chlorine exposure.

If burn is present, treat as any thermal burn, after decontamination.

For acute or short term repeated exposures to strong acids:

- Airway problems may arise from laryngeal edema and inhalation exposure. Treat with 100% oxygen initially.
- Respiratory distress may require cricothyroidotomy if endotracheal intubation is contraindicated by excessive swelling.
- Intravenous lines should be established immediately in all cases where there is evidence of circulatory compromise.
- Strong acids produce a coagulation necrosis characterised by formation of a coagulum (eschar) as a result of the dessicating action of the acid on proteins in specific tissues.

#### INGESTION:

- Immediate dilution (milk or water) within 30 minutes post ingestion is recommended.
- DO NOT attempt to neutralise the acid since exothermic reaction may extend the corrosive injury.**
- Be careful to avoid further vomit since re-exposure of the mucosa to the acid is harmful. Limit fluids to one or two glasses in an adult.
- Charcoal has no place in acid management.

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- Skin lesions require copious saline irrigation. Treat chemical burns as thermal burns with non-adherent gauze and wrapping.
- Deep second-degree burns may benefit from topical silver sulfadiazine.

**EYE:**

- Eye injuries require retraction of the eyelids to ensure thorough irrigation of the conjunctival cul-de-sacs. Irrigation should last at least 20-30 minutes.  
**DO NOT use neutralising agents or any other additives.** Several litres of saline are required.
- Cycloplegic drops, (1% cyclopentolate for short-term use or 5% homatropine for longer term use) antibiotic drops, vasoconstrictive agents or artificial tears may be indicated dependent on the severity of the injury.
- Steroid eye drops should only be administered with the approval of a consulting ophthalmologist).

[Ellenhorn and Barceloux: Medical Toxicology]

Depending on the degree of exposure, periodic medical examination is indicated. The symptoms of lung oedema often do not manifest until a few hours have passed and they are aggravated by physical effort. Rest and medical observation is therefore essential. Immediate administration of an appropriate spray, by a doctor or a person authorised by him/her should be considered.

(ICSC24419/24421)

**SECTION 5 FIREFIGHTING MEASURES****Extinguishing media****FOR SMALL FIRE:**

- USE FLOODING QUANTITIES OF WATER.
- **DO NOT use dry chemical, CO<sub>2</sub>, foam or halogenated-type extinguishers.**

**FOR LARGE FIRE**

- Flood fire area with water from a protected position

Do NOT use ammonium phosphate extinguishers.

**Special hazards arising from the substrate or mixture**

|                             |                                                                                                                                                                                                                   |
|-----------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Fire Incompatibility</b> | <ul style="list-style-type: none"> <li>▸ Avoid storage with reducing agents.</li> <li>▸ Avoid any contamination of this material as it is very reactive and any contamination is potentially hazardous</li> </ul> |
|-----------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

**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 body protective clothing with breathing apparatus.</li> <li>▸ Prevent, by any means available, spillage from entering drains or water courses.</li> </ul>                                                                                                                                                                                               |
| <b>Fire/Explosion Hazard</b> | <ul style="list-style-type: none"> <li>▸ Combustible.</li> <li>▸ Slight fire hazard when exposed to heat or flame.</li> <li>▸ Acids may react with metals to produce hydrogen, a highly flammable and explosive gas.</li> <li>▸ Heating may cause expansion or decomposition leading to violent rupture of containers.</li> </ul> <p>Combustion products include: amp;43cw, carbon dioxide (CO<sub>2</sub>) hydrogen chloride, phosgene, nitrogen oxides (NO<sub>x</sub>) other pyrolysis products typical of burning organic material</p> |

**SECTION 6 ACCIDENTAL RELEASE MEASURES****Personal precautions, protective equipment and emergency procedures**

|                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|---------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Minor Spills</b> | <ul style="list-style-type: none"> <li>▸ Drains for storage or use areas should have retention basins for pH adjustments and dilution of spills before discharge or disposal of material.</li> <li>▸ Check regularly for spills and leaks.</li> <li>▸ Clean up all spills immediately.</li> <li>▸ No smoking, naked lights, ignition sources.</li> <li>▸ Avoid all contact with any organic matter including fuel, solvents, sawdust, paper or cloth and other incompatible materials, as ignition may result.</li> <li>▸ Avoid breathing dust or vapours and all contact with skin and eyes.</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>▸ May be violently or explosively reactive.</li> <li>▸ Wear full body protective clothing with breathing apparatus.</li> </ul>                                                                                                                                                                                                                                                                                                     |

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

**SECTION 7 HANDLING AND STORAGE****Precautions for safe handling**

|  |                                                                                                                     |
|--|---------------------------------------------------------------------------------------------------------------------|
|  | <ul style="list-style-type: none"> <li>▸ Avoid personal contact and inhalation of dust, mist or vapours.</li> </ul> |
|--|---------------------------------------------------------------------------------------------------------------------|

## 1,3-DICHLORO-5,5-DIMETHYLHYDANTOINE

|                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|-------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                   | <ul style="list-style-type: none"> <li>Keep material away from light, heat, flammables or combustibles.</li> <li>Organic powders when finely divided over a range of concentrations regardless of particulate size or shape and suspended in air or some other oxidizing medium may form explosive dust-air mixtures and result in a fire or dust explosion (including secondary explosions)</li> <li>Minimise airborne dust and eliminate all ignition sources. Keep away from heat, hot surfaces, sparks, and flame.</li> <li>Establish good housekeeping practices.</li> <li>Remove dust accumulations on a regular basis by vacuuming or gentle sweeping to avoid creating dust clouds.</li> </ul>                                                                                                                                                                                                                               |
| Other information | <ul style="list-style-type: none"> <li>Store in original containers.</li> <li>Keep containers securely sealed as supplied.</li> <li>Store in a cool, well ventilated area.</li> <li>Keep dry.</li> </ul> <p>In addition, Goods of Class 5.1, packing group II should be:</p> <ul style="list-style-type: none"> <li>stored in piles so that</li> <li>the height of the pile does not exceed 1 metre</li> <li>the maximum quantity in a pile or building does not exceed 1000 tonnes unless the area is provided with automatic fire extinguishers</li> <li>the maximum height of a pile does not exceed 3 metres where the room is provided with automatic fire extinguishers or 2 meters if not.</li> <li>the minimum distance between piles is not less than 2 metres where the room is provided with automatic fire extinguishers or 3 meters if not.</li> <li>the minimum distance to walls is not less than 1 metre.</li> </ul> |

## Conditions for safe storage, including any incompatibilities

|                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|-------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Suitable container      | <ul style="list-style-type: none"> <li><b>DO NOT repack.</b> Use containers supplied by manufacturer only.</li> </ul> <p>For low viscosity materials</p> <ul style="list-style-type: none"> <li>Drums and jerricans must be of the non-removable head type.</li> <li>Where a can is to be used as an inner package, the can must have a screwed enclosure.</li> </ul> <p>For materials with a viscosity of at least 2680 cSt. (23 deg. C) and solids:</p> <ul style="list-style-type: none"> <li>Removable head packaging and</li> <li>cans with friction closures may be used.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Storage incompatibility | <p>For 1,3-dichloro-5,5-dimethylhydantoin:</p> <ul style="list-style-type: none"> <li>Avoid contact with ammonia, urea, or other nitrogen containing compounds.</li> <li>An attempt to chlorinate xylene with the dichlorohydantoin caused a violent explosion. The haloimide undergoes immediate self-accelerating decomposition in presence of solvents. Safe conditions (including lower temperatures and progressive addition of reagent to match its consumption) can be developed for its use.</li> </ul> <p>Chlorine:</p> <ul style="list-style-type: none"> <li>is a strong oxidiser</li> <li>reacts explosively with acetylene, boron, diborane, or other boron hydrides at ordinary temperatures</li> <li>forms easily ignited, sensitive explosive mixtures with gases and vapours such as anhydrous ammonia, benzene, butane, ethane, ethylene, fluorine, hydrocarbons, formaldehyde, hydrogen, hydrogen bromide, hydroxylamine, iridium, lithium, lithium acetylide, magnesium, magnesium oxide, magnesium phosphide, mercury sulfide, methyl vinyl ether, metal carbides, molybdenum trioxide, potassium acetylide, sodium acetylide, sulfamic, sulfur dioxide, triethylborane and many other substances</li> <li>forms explosive mixtures with gasoline and petroleum products, such as mineral oil, greases, phosphorus, silicones, turpentine, finely divided metals, organic compounds</li> <li>in its liquid form reacts explosively with carbon disulfide, linseed oil, propylene, rubber, wax, white phosphorus</li> <li>attacks some plastics and coatings</li> <li>may cause dangerous fires in contact with hot solid metals (especially steel - iron/ chlorine fire can cause the bursting of storage containers)</li> <li>when moist (150 ppm in water) is extremely corrosive to most metals especially in the presence of heat.</li> <li>reacts with water to give hydrogen chloride, with carbon monoxide to form phosgene, and with sulfur dioxide to give sulfuryl chloride</li> </ul> <p>Chlorine storage areas shall be separated from anhydrous ammonia storage areas by a vapour path of at least 10 meters</p> <ul style="list-style-type: none"> <li>Many compounds containing more than one N-halogen bond are unstable and exhibit explosive properties.</li> </ul> <p>BREITHERICK L.: Handbook of Reactive Chemical Hazards</p> <ul style="list-style-type: none"> <li>Reacts with mild steel, galvanised steel / zinc producing hydrogen gas which may form an explosive mixture with air.</li> <li>Avoid any contamination of this material as it is very reactive and any contamination is potentially hazardous</li> <li>Segregate from alcohol, water.</li> <li>Avoid strong bases.</li> <li>Inorganic reducing agents react with oxidizing agents to generate heat and products that may be flammable, combustible, or otherwise reactive. Their reactions with oxidizing agents may be violent.</li> <li>Avoid storage with reducing agents.</li> </ul> |

## 1,3-DICHLORO-5,5-DIMETHYLHYDANTOINE



X                      X                      X                      O                      O                      X                      O

**X** — Must not be stored together

**O** — May be stored together with specific preventions

**+** — May be stored together

## SECTION 8 EXPOSURE CONTROLS / PERSONAL PROTECTION

## Control parameters

## OCCUPATIONAL EXPOSURE LIMITS (OEL)

## INGREDIENT DATA

| Source                                                                      | Ingredient | Material name | TWA             | STEL            | Peak          | Notes         |
|-----------------------------------------------------------------------------|------------|---------------|-----------------|-----------------|---------------|---------------|
| India Permissible Levels of Certain Chemical Substances in Work Environment | chlorine   | Chlorine      | 3 mg/m3 / 1 ppm | 9 mg/m3 / 3 ppm | Not Available | Not Available |

## EMERGENCY LIMITS

| Ingredient | Material name                    | TEEL-1        | TEEL-2        | TEEL-3        |
|------------|----------------------------------|---------------|---------------|---------------|
| chlorine   | Chlorine                         | Not Available | Not Available | Not Available |
| chlorine   | Chlorine Hi dry granular (as Cl) | 1 ppm         | 2.52 ppm      | 30 ppm        |

| Ingredient                         | Original IDLH               | Revised IDLH  |
|------------------------------------|-----------------------------|---------------|
| 1,3-dichloro-5,5-dimethylhydantoin | Unknown mg/m3 / Unknown ppm | 5 mg/m3       |
| hypochlorous acid                  | Not Available               | Not Available |
| chlorine                           | 30 ppm                      | 10 ppm        |

## Exposure controls

|                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|-----------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Appropriate engineering controls</b> | <p>Engineering controls are used to remove a hazard or place a barrier between the worker and the hazard. Well-designed engineering controls can be highly effective in protecting workers and will typically be independent of worker interactions to provide this high level of protection.</p> <p>The basic types of engineering controls are:</p> <p>Process controls which involve changing the way a job activity or process is done to reduce the risk.</p> <p>Enclosure and/or isolation of emission source which keeps a selected hazard "physically" away from the worker and ventilation that strategically "adds" and "removes" air in the work environment.</p>                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Personal protection</b>              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Eye and face protection</b>          | <ul style="list-style-type: none"> <li>Chemical goggles.</li> <li>Full face shield may be required for supplementary but never for primary protection of eyes.</li> <li>Contact lenses may pose a special hazard; soft contact lenses may absorb and concentrate irritants. A written policy document, describing the wearing of lenses or restrictions on use, should be created for each workplace or task.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Skin protection</b>                  | See Hand protection below                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Hands/feet protection</b>            | <ul style="list-style-type: none"> <li>Wear chemical protective gloves, e.g. PVC.</li> <li>Wear safety footwear or safety gumboots, e.g. Rubber</li> </ul> <p>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.</p> <p>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.</p> <p>Suitability and durability of glove type is dependent on usage.</p> <ul style="list-style-type: none"> <li><b>DO NOT wear cotton or cotton-backed gloves.</b></li> <li><b>DO NOT wear leather gloves.</b></li> <li>Promptly hose all spills off leather shoes or boots or ensure that such footwear is protected with PVC over-shoes.</li> </ul> |
| <b>Body protection</b>                  | See Other protection below                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |

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

## Recommended material(s)

## GLOVE SELECTION INDEX

Glove selection is based on a modified presentation of the:

**"Forsberg Clothing Performance Index".**

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

1,3-DICHLORO-5,5-DIMETHYLHYDANTOIN

| Material       | CPI |
|----------------|-----|
| BUTYL/NEOPRENE | A   |
| NEOPRENE       | A   |
| NITRILE        | A   |
| SARANEX-23     | A   |
| VITON/NEOPRENE | A   |
| PE             | B   |

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

Where the concentration of gas/particulates in the breathing zone, approaches or exceeds the "Exposure Standard" (or ES), respiratory protection is required.

Degree of protection varies with both face-piece and Class of filter; the nature of protection varies with Type of filter.

| Required Minimum Protection Factor | Half-Face Respirator | Full-Face Respirator | Powered Air Respirator   |
|------------------------------------|----------------------|----------------------|--------------------------|
| up to 10 x ES                      | AB-AUS P2            | -                    | AB-PAPR-AUS / Class 1 P2 |
| up to 50 x ES                      | -                    | AB-AUS / Class 1 P2  | -                        |
| up to 100 x ES                     | -                    | AB-2 P2              | AB-PAPR-2 P2 ^           |

^ - 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(SO2), G = Agricultural chemicals, K = Ammonia(NH3), Hg = Mercury, NO = Oxides of nitrogen, MB = Methyl bromide, AX = Low boiling point organic compounds(below 65 degC)

## SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES

## Information on basic physical and chemical properties

|                                              |                                                                                                                                                                                                                            |                                         |                |
|----------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------|----------------|
| Appearance                                   | White powder with mild chlorine odour; does not mix well with water (0.21 g/100 g at 25 C.). Soluble in chlorinated and highly polar solvents. Available chlorine; minimum 66% by weight. Decomposes completely at pH 9.0. |                                         |                |
| Physical state                               | Divided Solid                                                                                                                                                                                                              | Relative density (Water = 1)            | Not Available  |
| Odour                                        | Not Available                                                                                                                                                                                                              | Partition coefficient n-octanol / water | Not Available  |
| Odour threshold                              | Not Available                                                                                                                                                                                                              | Auto-ignition temperature (°C)          | Not Available  |
| pH (as supplied)                             | Not Applicable                                                                                                                                                                                                             | Decomposition temperature               | Not Available  |
| Melting point / freezing point (°C)          | 134-136                                                                                                                                                                                                                    | Viscosity (cSt)                         | Not Applicable |
| Initial boiling point and boiling range (°C) | Not Available                                                                                                                                                                                                              | Molecular weight (g/mol)                | 197.03         |
| Flash point (°C)                             | Not Available                                                                                                                                                                                                              | Taste                                   | Not Available  |
| Evaporation rate                             | Not Available                                                                                                                                                                                                              | Explosive properties                    | Not Available  |
| Flammability                                 | Not Available                                                                                                                                                                                                              | Oxidising properties                    | Not Available  |
| Upper Explosive Limit                        | Not Available                                                                                                                                                                                                              | Surface Tension                         | Not Available  |

## 1,3-DICHLORO-5,5-DIMETHYLHYDANTOINE

|                                  |                 |                                  |                |
|----------------------------------|-----------------|----------------------------------|----------------|
| <b>Lower Explosive Limit (%)</b> | Not Available   | <b>Volatile Component (%vol)</b> | Not Available  |
| <b>Vapour pressure (kPa)</b>     | Negligible      | <b>Gas group</b>                 | Not Available  |
| <b>Solubility in water (g/L)</b> | Partly miscible | <b>pH as a solution (1%)</b>     | Not Applicable |
| <b>Vapour density (Air = 1)</b>  | Not Available   | <b>VOC g/L</b>                   | Not Available  |

## SECTION 10 STABILITY AND REACTIVITY

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

## SECTION 11 TOXICOLOGICAL INFORMATION

## Information on toxicological effects

|                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|---------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Inhaled</b>      | <p>The material is not thought to produce adverse health effects following inhalation (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 and that suitable control measures be used in an occupational setting.</p> <p>Persons with impaired respiratory function, airway diseases and conditions such as emphysema or chronic bronchitis, may incur further disability if excessive concentrations of particulate are inhaled.</p> <p>If prior damage to the circulatory or nervous systems has occurred or if kidney damage has been sustained, proper screenings should be conducted on individuals who may be exposed to further risk if handling and use of the material result in excessive exposures.</p> <p>Chlorine vapour is extremely irritating to the airways and lungs, causing coughing, choking, breathing difficulty, chest pain, headache, vomiting, fluid accumulation in the lungs, chest infection and loss of consciousness. Effects may be delayed. Long term exposure (at workplace) may lead to corrosion of the teeth, irritate the linings of the nose and may increase the likelihood of developing tuberculosis. Recent studies have not confirmed these findings.</p> <p>Corrosive acids can cause irritation of the respiratory tract, with coughing, choking and mucous membrane damage. There may be dizziness, headache, nausea and weakness.</p> <p> An operator at a reactor station exposed at above the TLV-TWA experienced cough and chest discomfort.</p> |
| <b>Ingestion</b>    | <p>Accidental ingestion of the material may be harmful; animal experiments indicate that ingestion of less than 150 gram may be fatal or may produce serious damage to the health of the individual.</p> <p>The material can produce chemical burns within the oral cavity and gastrointestinal tract following ingestion.</p> <p>Ingestion of acidic corrosives may produce burns around and in the mouth, the throat and oesophagus. Immediate pain and difficulties in swallowing and speaking may also be evident.</p> <p>Hydantoin derivatives may damage the stem cell which acts as the precursor to components of the blood, thus producing disorders in blood cell distribution. Most blood cells originate from a single "common" stem cell.</p> <p>A reduction in granular white cells develops within days, and loss of platelets within 1-2 weeks.</p> <p> Haemorrhage of the gastrointestinal tract was found in rats within 48 hours of being fed lethal doses of 1,3-dichloro-5,5-dimethylhydantoin. Rats were able to tolerate solutions maintained at 20 ppm available chlorine given orally over a 30-day test period.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Skin Contact</b> | <p>The material can produce chemical burns following direct contact with the skin.</p> <p>Open cuts, abraded or irritated skin should not be exposed to this material</p> <p>Skin contact with acidic corrosives may result in pain and burns; these may be deep with distinct edges and may heal slowly with the formation of scar tissue.</p> <p>Solution of material in moisture on the skin, or perspiration, may markedly increase skin corrosion and accelerate tissue destruction</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>The material may cause severe inflammation of the skin either following direct contact or after a delay of some time.</p> <p>Repeated exposure can cause contact dermatitis which is characterised by redness, swelling and blistering.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |

## 1,3-DICHLORO-5,5-DIMETHYLHYDANTOINE

|                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                  |
|-------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------|
| <b>Eye</b>                                | <p>The material can produce chemical burns to the eye following direct contact. Vapours or mists may be extremely irritating. If applied to the eyes, this material causes severe eye damage.</p> <p>Direct eye contact with acid corrosives may produce pain, tears, sensitivity to light and burns. Mild burns of the epithelia generally recover rapidly and completely.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                  |
| <b>Chronic</b>                            | <p>Substance accumulation, in the human body, may occur and may cause some concern following repeated or long-term occupational exposure.</p> <p>Long term exposure to high dust concentrations may cause changes in lung function i.e. pneumoconiosis, caused by particles less than 0.5 micron penetrating and remaining in the lung.</p> <p>Repeated or prolonged exposure to acids may result in the erosion of teeth, swelling and/or ulceration of mouth lining. Irritation of airways to lung, with cough, and inflammation of lung tissue often occurs.</p> <p>Reduced respiratory capacity may result from chronic low level exposure to chlorine gas. Chronic poisoning may result in coughing, severe chest pains, sore throat and haemoptysis (bloody sputum). Moderate to severe exposures over 3 years produced decreased lung capacity in a number of workers.</p> <p>Delayed effects can include shortness of breath, violent headaches, pulmonary oedema and pneumonia.</p> |                                  |
| <b>1,3-dichloro-5,5-dimethylhydantoin</b> | <b>TOXICITY</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | <b>IRRITATION</b>                |
|                                           | Dermal (rabbit) LD50: >20000 mg/kg <sup>[2]</sup>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Skin (rabbit): 100 mg/24h-SEVERE |
|                                           | Oral (rat) LD50: 524 mg/kgE <sup>[2]</sup>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Skin (rabbit): 500 mg/24h-SEVERE |
| <b>hypochlorous acid</b>                  | <b>TOXICITY</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | <b>IRRITATION</b>                |
|                                           | Not Available                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Not Available                    |
| <b>chlorine</b>                           | <b>TOXICITY</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | <b>IRRITATION</b>                |
|                                           | Dermal (rabbit) LD50: >10000 mg/kg <sup>[1]</sup>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Not Available                    |
|                                           | Inhalation (rat) LC50: 293 ppm/1H <sup>[2]</sup>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                  |
|                                           | Oral (rat) LD50: >237 mg/kg <sup>[1]</sup>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                  |
| <b>Legend:</b>                            | <p>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</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                  |

|                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |  |
|-------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| <b>1,3-DICHLORO-5,5-DIMETHYLHYDANTOIN</b> | <p>No significant acute toxicological data identified in literature search.</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> <p>Asthma-like symptoms may continue for months or even years after exposure to the material ceases. This may be due to a non-allergenic condition known as reactive airways dysfunction syndrome (RADS) which can occur following exposure to high levels of highly irritating compound. Key criteria for the diagnosis of RADS include the absence of preceding respiratory disease, in a non-atopic individual, with abrupt onset of persistent asthma-like symptoms within minutes to hours of a documented exposure to the irritant. A reversible airflow pattern, on spirometry, with the presence of moderate to severe bronchial hyperreactivity on methacholine challenge testing and the lack of minimal lymphocytic inflammation, without eosinophilia, have also been included in the criteria for diagnosis of RADS.</p> <p>for halohydantoins</p> <p><b>Acute toxicity:</b> The halohydantoins were shown to be of low toxicity by the oral and dermal routes of exposure. Acute toxicity by the inhalation route is more significant. The halohydantoins are significant eye and skin irritants. Dermal sensitization has also been observed for some of the halohydantoin compounds.</p> <p>Bacterial mutagen Somnolence, tremour, withdrawal, dyspnea, respiratory stimulation, changes in the structure/ function of the salivary glands recorded.</p> |  |
|                                           | <b>HYPOCHLOROUS ACID</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |  |
|                                           | No significant acute toxicological data identified in literature search.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |  |
| <b>CHLORINE</b>                           | <p>Asthma-like symptoms may continue for months or even years after exposure to the material ceases. This may be due to a non-allergenic condition known as reactive airways dysfunction syndrome (RADS) which can occur following exposure to high levels of highly irritating compound. Key criteria for the diagnosis of RADS include the absence of preceding respiratory disease, in a non-atopic individual, with abrupt onset of persistent asthma-like symptoms within minutes to hours of a documented exposure to the irritant. A reversible airflow pattern, on spirometry, with the presence of moderate to severe bronchial hyperreactivity on methacholine challenge testing and the lack of minimal lymphocytic inflammation, without eosinophilia, have also been included in the criteria for diagnosis of RADS.</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> | ⊘ |

## 1,3-DICHLORO-5,5-DIMETHYLHYDANTOINE

|                                   |   |                          |   |
|-----------------------------------|---|--------------------------|---|
| Respiratory or Skin sensitisation | ⊘ | STOT - Repeated Exposure | ⊘ |
| Mutagenicity                      | ⊘ | Aspiration Hazard        | ⊘ |

**Legend:** ✖ – Data available but does not fill the criteria for classification

✔ – Data required to make classification available

⊘ – Data Not Available to make classification

## SECTION 12 ECOLOGICAL INFORMATION

## Toxicity

| Ingredient                         | Endpoint | Test Duration (hr) | Species                       | Value               | Source |
|------------------------------------|----------|--------------------|-------------------------------|---------------------|--------|
| 1,3-dichloro-5,5-dimethylhydantoin | EC50     | 48                 | Crustacea                     | 0.47mg/L            | 4      |
| 1,3-dichloro-5,5-dimethylhydantoin | EC50     | 48                 | Crustacea                     | 0.50mg/L            | 4      |
| 1,3-dichloro-5,5-dimethylhydantoin | LC50     | 96                 | Fish                          | 0.58mg/L            | 4      |
| chlorine                           | EC50     | 24                 | Crustacea                     | 0.0186mg/L          | 4      |
| chlorine                           | LC50     | 96                 | Fish                          | 0.014mg/L           | 4      |
| chlorine                           | EC50     | 48                 | Crustacea                     | 0.026mg/L           | 2      |
| chlorine                           | NOEC     | 504                | Crustacea                     | 0.01mg/L            | 2      |
| chlorine                           | EC50     | 96                 | Algae or other aquatic plants | ca.0.1 - ca.0.4mg/L | 2      |

**Legend:**

Extracted from 1. IUCLID Toxicity Data 2. Europe ECHA Registered Substances - Ecotoxicological Information - Aquatic Toxicity 3. EPIWIN Suite V3.12 - Aquatic Toxicity Data (Estimated) 4. US EPA, Ecotox database - Aquatic Toxicity Data 5. ECETOC Aquatic Hazard Assessment Data 6. NITE (Japan) - Bioconcentration Data 7. METI (Japan) - Bioconcentration Data 8. Vendor Data

Very toxic to aquatic organisms.

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

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

For Chlorine:

Atmospheric Fate: Atmospheric chlorine forms hydrochloric or hypochlorous acid in the atmosphere, either through reactions with hydroxyl radicals or, other trace species, such as hydrocarbons. These acids are believed to be removed from the atmosphere primarily through precipitation washout/dry deposition. When chlorine, hypochlorous acid or hydrogen chloride mixes in the atmosphere with water vapor, dilute solutions of strong mineral acids form which fall to earth as acid rain, snow, fog, or acidified dry particles.

Terrestrial Fate: Soil - Chlorine may react with soil components to form chlorides; depending on their water solubility, these chlorides are easily washed out from the soil.

**Ecotoxicity:**

The tolerance of water organisms towards pH margin and variation is diverse. Recommended pH values for test species listed in OECD guidelines are between 6.0 and almost 9. Acute testing with fish showed 96h-LC50 at about pH 3.5

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

for halohydantoins:

Structurally, the halohydantoins consist of a central organic hydantoin ring moiety (either dimethylhydantoin or ethylmethylhydantoin) to which halogen atoms (bromine and/or chlorine) can be attached at both the 1 and 3 positions on the hydantoin ring.

Environmental Fate: In concentrated form, the halohydantoins are very stable. Upon usage, which involves dilution in water or a water system, the halohydantoins rapidly decompose to release chlorine and/or bromine and dimethylhydantoin (DMH) and, for certain products, ethylmethylhydantoin (EMH). These released halogens react with water to form either hypochlorous or hypobromous acid, which is the actual biocidal agent.

## Persistence and degradability

| Ingredient                         | Persistence: Water/Soil | Persistence: Air |
|------------------------------------|-------------------------|------------------|
| 1,3-dichloro-5,5-dimethylhydantoin | HIGH                    | HIGH             |

## Bioaccumulative potential

| Ingredient                         | Bioaccumulation        |
|------------------------------------|------------------------|
| 1,3-dichloro-5,5-dimethylhydantoin | LOW (LogKOW = -0.9441) |

## Mobility in soil

## 1,3-DICHLORO-5,5-DIMETHYLHYDANTOINE

|                                        |                   |
|----------------------------------------|-------------------|
| 1,3-dichloro-<br>5,5-dimethylhydantoin | LOW (KOC = 23.14) |
|----------------------------------------|-------------------|

## SECTION 13 DISPOSAL CONSIDERATIONS

## Waste treatment methods

|                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Product / Packaging disposal | <ul style="list-style-type: none"> <li>Containers may still present a chemical hazard/ danger when empty.</li> <li>Return to supplier for reuse/ recycling if possible.</li> </ul> <p>Otherwise:</p> <ul style="list-style-type: none"> <li>If container can not be cleaned sufficiently well to ensure that residuals do not remain or if the container cannot be used to store the same product, then puncture containers, to prevent re-use, and bury at an authorised landfill.</li> <li>Where possible retain label warnings and SDS and observe all notices pertaining to the product.</li> </ul> <p>Legislation addressing waste disposal requirements may differ by country, state and/ or territory. Each user must refer to laws operating in their area. In some areas, certain wastes must be tracked.</p> <p>A Hierarchy of Controls seems to be common - the user should investigate:</p> <ul style="list-style-type: none"> <li>Reduction</li> <li>Reuse</li> <li>Recycling</li> <li>Disposal (if all else fails)</li> </ul> <p>This material may be recycled if unused, or if it has not been contaminated so as to make it unsuitable for its intended use.</p> <ul style="list-style-type: none"> <li><b>DO NOT allow wash water from cleaning or process equipment to enter drains.</b></li> <li>It may be necessary to collect all wash water for treatment before disposal.</li> <li>In all cases disposal to sewer may be subject to local laws and regulations and these should be considered first.</li> <li>Where in doubt contact the responsible authority.</li> </ul> <p>Recycle wherever possible.</p> <ul style="list-style-type: none"> <li>Consult manufacturer for recycling options or consult local or regional waste management authority for disposal if no suitable treatment or disposal facility can be identified.</li> <li>Treat and neutralise at an approved treatment plant. Treatment should involve: Mixing or slurring in water; Neutralisation with soda-lime or soda-ash followed by: burial in a land-fill specifically licenced to accept chemical and / or pharmaceutical wastes or Incineration in a licenced apparatus (after admixture with suitable combustible material)</li> <li>Decontaminate empty containers with 5% aqueous sodium hydroxide or soda ash, followed by water.</li> </ul> <p>For small quantities of oxidising agent:</p> <ul style="list-style-type: none"> <li>Cautiously acidify a 3% solution to pH 2 with sulfuric acid.</li> <li>Gradually add a 50% excess of sodium bisulfite solution with stirring.</li> <li>Add a further 10% sodium bisulfite.</li> <li>If no further reaction occurs (as indicated by a rise in temperature) cautiously add more acid.</li> </ul> |
|                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |

## SECTION 14 TRANSPORT INFORMATION

## Labels Required

|                  |                                                                                                                                                                         |
|------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                  |   |
| Marine Pollutant |                                                                                      |

## Land transport (UN)

|                              |                                                                                  |
|------------------------------|----------------------------------------------------------------------------------|
| UN number                    | 3085                                                                             |
| Packing group                | II                                                                               |
| UN proper shipping name      | OXIDIZING SOLID, CORROSIVE, N.O.S. (contains 1,3-dichloro-5,5-dimethylhydantoin) |
| Environmental hazard         | Not Applicable                                                                   |
| Transport hazard class(es)   | Class 5.1                                                                        |
|                              | Subrisk 8                                                                        |
| Special precautions for user | Special provisions 274                                                           |
|                              | Limited quantity 1 kg                                                            |

**1,3-DICHLORO-5,5-DIMETHYLHYDANTOINE****Air transport (ICAO-IATA / DGR)**

|                                     |                                                                                    |     |        |
|-------------------------------------|------------------------------------------------------------------------------------|-----|--------|
| <b>UN number</b>                    | 3085                                                                               |     |        |
| <b>Packing group</b>                | II                                                                                 |     |        |
| <b>UN proper shipping name</b>      | Oxidizing solid, corrosive, n.o.s. * (contains 1,3-dichloro-5,5-dimethylhydantoin) |     |        |
| <b>Environmental hazard</b>         | Not Applicable                                                                     |     |        |
| <b>Transport hazard class(es)</b>   | ICAO/IATA Class                                                                    | 5.1 |        |
|                                     | ICAO / IATA Subrisk                                                                | 8   |        |
|                                     | ERG Code                                                                           | 5C  |        |
| <b>Special precautions for user</b> | Special provisions                                                                 |     | A3     |
|                                     | Cargo Only Packing Instructions                                                    |     | 562    |
|                                     | Cargo Only Maximum Qty / Pack                                                      |     | 25 kg  |
|                                     | Passenger and Cargo Packing Instructions                                           |     | 558    |
|                                     | Passenger and Cargo Maximum Qty / Pack                                             |     | 5 kg   |
|                                     | Passenger and Cargo Limited Quantity Packing Instructions                          |     | Y544   |
|                                     | Passenger and Cargo Limited Maximum Qty / Pack                                     |     | 2.5 kg |

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

|                                     |                                                                                  |          |  |
|-------------------------------------|----------------------------------------------------------------------------------|----------|--|
| <b>UN number</b>                    | 3085                                                                             |          |  |
| <b>Packing group</b>                | II                                                                               |          |  |
| <b>UN proper shipping name</b>      | OXIDIZING SOLID, CORROSIVE, N.O.S. (contains 1,3-dichloro-5,5-dimethylhydantoin) |          |  |
| <b>Environmental hazard</b>         | Marine Pollutant                                                                 |          |  |
| <b>Transport hazard class(es)</b>   | IMDG Class                                                                       | 5.1      |  |
|                                     | IMDG Subrisk                                                                     | 8        |  |
| <b>Special precautions for user</b> | EMS Number                                                                       | F-A, S-Q |  |
|                                     | Special provisions                                                               | 274      |  |
|                                     | Limited Quantities                                                               | 1 kg     |  |

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

Not Applicable

**SECTION 15 REGULATORY INFORMATION****Safety, health and environmental regulations / legislation specific for the substance or mixture****1,3-DICHLORO-5,5-DIMETHYLHYDANTOIN(118-52-5) IS FOUND ON THE FOLLOWING REGULATORY LISTS**

Not Applicable

**HYPOCHLOROUS ACID(7790-92-3) IS FOUND ON THE FOLLOWING REGULATORY LISTS**

International Air Transport Association (IATA) Dangerous Goods Regulations  
 - Prohibited List Passenger and Cargo Aircraft

**CHLORINE(7782-50-5) IS FOUND ON THE FOLLOWING REGULATORY LISTS**

India Permissible Levels of Certain Chemical Substances in Work  
 Environment

International Air Transport Association (IATA) Dangerous Goods Regulations  
 - Prohibited List Passenger and Cargo Aircraft

**ECHA SUMMARY**

| Ingredient                         | CAS number | Index No      | ECHA Dossier  |
|------------------------------------|------------|---------------|---------------|
| 1,3-dichloro-5,5-dimethylhydantoin | 118-52-5   | Not Available | Not Available |

## 1,3-DICHLORO-5,5-DIMETHYLHYDANTOINE

|   |                                                                                                                                                                                         |                                      |                                          |
|---|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|------------------------------------------|
| 1 | Acute Tox. 4, Skin Irrit. 2, Eye Irrit. 2, STOT SE 3                                                                                                                                    | GHS07, Wng                           | H302, H315, H319, H335                   |
| 2 | Acute Tox. 4, Skin Irrit. 2, Eye Irrit. 2, STOT SE 3, Ox. Sol. 2, Skin Corr. 1B, Resp. Sens. 1, Aquatic Acute 1, Skin Corr. 1C, Skin Sens. 1, Ox. Sol. 3, Eye Dam. 1, Aquatic Chronic 1 | Wng, GHS09, GHS05, GHS08, GHS03, Dgr | H302, H335, H272, H314, H334, H317, H318 |

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

| Ingredient        | CAS number | Index No      | ECHA Dossier  |
|-------------------|------------|---------------|---------------|
| hypochlorous acid | 7790-92-3  | Not Available | Not Available |

| Harmonisation (C&L Inventory) | Hazard Class and Category Code(s) | Pictograms Signal Word Code(s) | Hazard Statement Code(s) |
|-------------------------------|-----------------------------------|--------------------------------|--------------------------|
| Not Available                 | Not Available                     | Not Available                  | Not Available            |

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

| Ingredient | CAS number | Index No     | ECHA Dossier                                                        |
|------------|------------|--------------|---------------------------------------------------------------------|
| chlorine   | 7782-50-5  | 017-001-00-7 | 01-2119444722-41-XXXX, 01-2119486560-35-XXXX, 01-2119896635-20-XXXX |

| Harmonisation (C&L Inventory) | Hazard Class and Category Code(s)                                                                                                                                 | Pictograms Signal Word Code(s)                | Hazard Statement Code(s)                 |
|-------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------|------------------------------------------|
| 1                             | Ox. Gas 1, Press. Gas., Skin Irrit. 2, Eye Irrit. 2, Acute Tox. 1, STOT SE 3, Aquatic Acute 1                                                                     | GHS07, GHS09, GHS06, GHS04, GHS03, Dgr        | H270, H280, H315, H319, H330, H335       |
| 2                             | Ox. Gas 1, Liq. Gas, Skin Irrit. 2, Eye Irrit. 2, Acute Tox. 2, STOT SE 3, Aquatic Acute 1, Aquatic Chronic 1, Acute Tox. 3, Press. Gas., Acute Tox. 1, STOT RE 2 | GHS09, GHS06, GHS04, GHS03, Dgr, GHS05, GHS08 | H270, H280, H315, H319, H330, H335, H373 |

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

| National Inventory            | Status                                                                                                                                                                                   |
|-------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Australia - AICS              | N (hypochlorous acid)                                                                                                                                                                    |
| Canada - DSL                  | N (hypochlorous acid)                                                                                                                                                                    |
| Canada - NDSL                 | N (chlorine; 1,3-dichloro-5,5-dimethylhydantoin)                                                                                                                                         |
| China - IECSC                 | N (hypochlorous acid)                                                                                                                                                                    |
| Europe - EINEC / ELINCS / NLP | Y                                                                                                                                                                                        |
| Japan - ENCS                  | N (chlorine; hypochlorous acid)                                                                                                                                                          |
| Korea - KECI                  | Y                                                                                                                                                                                        |
| New Zealand - NZIoC           | N (hypochlorous acid)                                                                                                                                                                    |
| Philippines - PICCS           | N (hypochlorous acid)                                                                                                                                                                    |
| USA - TSCA                    | Y                                                                                                                                                                                        |
| <b>Legend:</b>                | Y = All ingredients are on the inventory<br>N = Not determined or one or more ingredients are not on the inventory and are not exempt from listing(see specific ingredients in brackets) |

## SECTION 16 OTHER INFORMATION

### CONTACT POINT

The above information is believed to be accurate and represent the best information currently available to us, but does not represent any warranty expressed or implied of the properties of the product. User should make their own investigation to determine the suitability of the information for their particular purpose.

### Other information

Classification of the preparation and its individual components has drawn on official and authoritative sources as well as independent review by the 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.

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