

# 1,3-Dichloro-5,5-dimethylhydantoin

sc-237719



The Power is Question

## Material Safety Data Sheet

Hazard Alert Code  
Key:

EXTREME

HIGH

MODERATE

LOW

## Section 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

### PRODUCT NAME

1,3-Dichloro-5,5-dimethylhydantoin

### STATEMENT OF HAZARDOUS NATURE

CONSIDERED A HAZARDOUS SUBSTANCE ACCORDING TO OSHA 29 CFR 1910.1200.

### NFPA



### SUPPLIER

Santa Cruz Biotechnology, Inc.  
2145 Delaware Avenue  
Santa Cruz, California 95060  
800.457.3801 or 831.457.3800

### EMERGENCY

ChemWatch  
Within the US & Canada: 877-715-9305  
Outside the US & Canada: +800 2436 2255  
(1-800-CHEMCALL) or call +613 9573 3112

### SYNONYMS

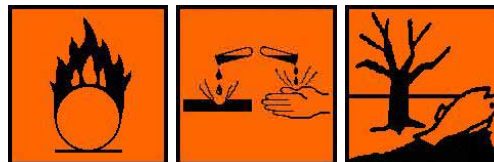
C5-H6-C12-N2-O2, "hydantoin, dichlorodimethyl-", dichlorodimethylhydantoin, "2, 4-imidazolidinedione, 1, 3-dichloro-5, 5-dimethyl-", "1, 3-dichloro-5-5-dimethylhydantoin", Dactin, Daktin, DCA, DDH, Dantoin, Dichlorantin, Halane, Hydan, Omchlor

## Section 2 - HAZARDS IDENTIFICATION

### CHEMWATCH HAZARD RATINGS

	Min	Max
Flammability	1	
Toxicity	2	
Body Contact	3	
Reactivity	2	
Chronic	2	

Min/Nil=0  
Low=1  
Moderate=2  
High=3  
Extreme=4



## CANADIAN WHMIS SYMBOLS



### EMERGENCY OVERVIEW

#### RISK

Contact with combustible material may cause fire.

Harmful if swallowed.

Causes burns.

Risk of serious damage to eyes.

Very toxic to aquatic organisms.

### POTENTIAL HEALTH EFFECTS

#### ACUTE HEALTH EFFECTS

#### SWALLOWED

■ 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.

■ The material can produce chemical burns within the oral cavity and gastrointestinal tract following ingestion.

■ 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.

■ 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.

#### EYE

■ The material can produce chemical burns to the eye following direct contact.

Vapors or mists may be extremely irritating.

■ If applied to the eyes, this material causes severe eye damage.

■ 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.

#### SKIN

■ The material can produce chemical burns following direct contact with the skin.

■ Open cuts, abraded or irritated skin should not be exposed to this material.

■ 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.

■ Solution of material in moisture on the skin, or perspiration, may markedly increase skin corrosion and accelerate tissue destruction.

■ 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.

■ The material may cause severe inflammation of the skin either following direct contact or after a delay of some time.

Repeated exposure can cause contact dermatitis which is characterised by redness, swelling and blistering.

#### INHALED

■ If inhaled, this material can irritate the throat and lungs of some persons.

■ 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.

■ 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.

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.

■ Chlorine vapor 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.

■ Corrosive acids can cause irritation of the respiratory tract, with coughing, choking and mucous membrane damage.

There may be dizziness, headache, nausea and weakness.

### CHRONIC HEALTH EFFECTS

■ Substance accumulation, in the human body, may occur and may cause some concern following repeated or long-term occupational exposure.

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. Prime symptom is breathlessness; lung shadows show on X-ray.

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. Chronic exposure may inflame the skin or conjunctiva.

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).

Delayed effects can include shortness of breath, violent headaches, pulmonary oedema and pneumonia.

## Section 3 - COMPOSITION / INFORMATION ON INGREDIENTS

NAME	CAS RN	%
1,3-dichloro-5,5-dimethylhydantoin	118-52-5	>94
in contact with water liberates		
<a href="#">hypochlorous acid</a>	7790-92-3	2
<a href="#">chlorine</a>	7782-50-5	

## Section 4 - FIRST AID MEASURES

### SWALLOWED

- For advice, contact a Poisons Information Centre or a doctor at once.
- Urgent hospital treatment is likely to be needed.
- If swallowed do NOT induce vomiting.
- If vomiting occurs, lean patient forward or place on left side (head-down position, if possible) to maintain open airway and prevent aspiration.

If swallowed feed bread soaked in milk, followed by cooking oil or olive oil.

### EYE

If this product comes in contact with the eyes

- Immediately hold eyelids apart and flush the eye continuously with running water.
- 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.
- Continue flushing until advised to stop by the Poisons Information Centre or a doctor, or for at least 15 minutes.
- Transport to hospital or doctor without delay.

### SKIN

If skin or hair contact occurs

- Immediately flush body and clothes with large amounts of water, using safety shower if available.
- Quickly remove all contaminated clothing, including footwear.
- Wash skin and hair with running water. Continue flushing with water until advised to stop by the Poisons Information Centre.
- Transport to hospital, or doctor.

### INHALED

- If fumes or combustion products are inhaled remove from contaminated area.

- Lay patient down. Keep warm and rested.
- Prostheses such as false teeth, which may block airway, should be removed, where possible, prior to initiating first aid procedures.
- 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.
- Inhalation of vapors or aerosols (mists, fumes) may cause lung oedema.
- Corrosive substances may cause lung damage (e.g. lung oedema, fluid in the lungs).
- 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.
- Before any such manifestation, the administration of a spray containing a dexamethasone derivative or beclomethasone derivative may be considered.

#### NOTES TO PHYSICIAN

■ Excellent warning properties force rapid escape of personnel from chlorine vapor 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 tracheobroncho-pneumonitis and pulmonary oedema.

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 desiccating action of the acid on proteins in specific tissues.

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.

### Section 5 - FIRE FIGHTING MEASURES

Vapor Pressure (mmHG)	Negligible
Upper Explosive Limit (%)	Not available
Specific Gravity (water=1)	Not available
Lower Explosive Limit (%)	Not available

#### 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.

#### FIRE FIGHTING

- Alert Fire Brigade and tell them location and nature of hazard.
- May be violently or explosively reactive.
- Wear full body protective clothing with breathing apparatus.
- Prevent, by any means available, spillage from entering drains or water courses.

When any large container (including road and rail tankers) is involved in a fire, consider evacuation by 500 metres in all directions.

#### GENERAL FIRE HAZARDS/HAZARDOUS COMBUSTIBLE PRODUCTS

- Combustible.
- Slight fire hazard when exposed to heat or flame.
- Acids may react with metals to produce hydrogen, a highly flammable and explosive gas.

- Heating may cause expansion or decomposition leading to violent rupture of containers.
- Combustion products include carbon monoxide (CO), carbon dioxide (CO<sub>2</sub>), hydrogen chloride, phosgene, nitrogen oxides (NO<sub>x</sub>), other pyrolysis products typical of burning organic material.

#### **FIRE INCOMPATIBILITY**

- Avoid storage with reducing agents.
- Avoid any contamination of this material as it is very reactive and any contamination is potentially hazardous

### **Section 6 - ACCIDENTAL RELEASE MEASURES**

#### **MINOR SPILLS**

- Drains for storage or use areas should have retention basins for pH adjustments and dilution of spills before discharge or disposal of material.
- Check regularly for spills and leaks.
- Clean up all spills immediately.
- No smoking, naked lights, ignition sources.
- Avoid all contact with any organic matter including fuel, solvents, sawdust, paper or cloth and other incompatible materials, as ignition may result.
- Avoid breathing dust or vapors and all contact with skin and eyes.

#### **MAJOR SPILLS**

- Clear area of personnel and move upwind.
- Alert Fire Brigade and tell them location and nature of hazard.
- May be violently or explosively reactive.
- Wear full body protective clothing with breathing apparatus.

### **Section 7 - HANDLING AND STORAGE**

#### **PROCEDURE FOR HANDLING**

- Avoid personal contact and inhalation of dust, mist or vapors.
- Provide adequate ventilation.
- Always wear protective equipment and wash off any spillage from clothing.
- Keep material away from light, heat, flammables or combustibles.

Empty containers may contain residual dust which has the potential to accumulate following settling. Such dusts may explode in the presence of an appropriate ignition source.

- Do NOT cut, drill, grind or weld such containers.
- In addition ensure such activity is not performed near full, partially empty or empty containers without appropriate workplace safety authorisation or permit.

#### **RECOMMENDED STORAGE METHODS**

- DO NOT repack. Use containers supplied by manufacturer only.

For low viscosity materials

- Drums and jerricans must be of the non-removable head type.
- Where a can is to be used as an inner package, the can must have a screwed enclosure.

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#### **STORAGE REQUIREMENTS**

In addition, Goods of Class 5.1, packing group II should be

- stored in piles so that
- the height of the pile does not exceed 1 metre
- the maximum quantity in a pile or building does not exceed 1000 tonnes unless the area is provided with automatic fire extinguishers
- 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.

### **Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION**

## EXPOSURE CONTROLS

Source	Material	TWA ppm	TWA mg/m <sup>3</sup>	STEL ppm	STEL mg/m <sup>3</sup>	Peak ppm	Peak mg/m <sup>3</sup>	TWA F/CC	Notes
Canada - Alberta Occupational Exposure Limits	1,3-dichloro- 5,5-dimethylhydantoin (1,3-Dichloro- 5,5-dimethyl hydantoin)		0.2		0.4				
Canada - British Columbia Occupational Exposure Limits	1,3-dichloro- 5,5-dimethylhydantoin (1,3-Dichloro- 5,5-dimethyl hydantoin)		0.2		0.4				
US NIOSH Recommended Exposure Limits (RELs)	1,3-dichloro- 5,5-dimethylhydantoin (1,3-Dichloro- 5,5-dimethylhydantoin)		0.2		0.4				
US OSHA Permissible Exposure Levels (PELs) - Table Z1	1,3-dichloro- 5,5-dimethylhydantoin (1,3-Dichloro- 5,5-dimethyl hydantoin)		0.2						
US ACGIH Threshold Limit Values (TLV)	1,3-dichloro- 5,5-dimethylhydantoin (1,3-Dichloro- 5,5-dimethyl hydantoin)		0.2		0.4				TLV® Basis URT irr
US - Minnesota Permissible Exposure Limits (PELs)	1,3-dichloro- 5,5-dimethylhydantoin (1,3-Dichloro- 5,5-dimethylhydantoin)		0.2		0.4				
US - Vermont Permissible Exposure Limits Table Z-1-A Transitional Limits for Air Contaminants	1,3-dichloro- 5,5-dimethylhydantoin (1,3-Dichloro-5, 5-dimethyl hydantoin)		0.2						
US - Vermont Permissible Exposure Limits Table Z-1-A Final Rule Limits for Air Contaminants	1,3-dichloro- 5,5-dimethylhydantoin (1,3-Dichloro-5, 5-dimethyl hydantoin)		0.2		0.4				
US - Tennessee Occupational Exposure Limits - Limits For Air Contaminants	1,3-dichloro- 5,5-dimethylhydantoin (1,3-Dichloro- 5,5-dimethyl hydantoin)		0.2		0.4				
US - California Permissible Exposure Limits for Chemical Contaminants	1,3-dichloro- 5,5-dimethylhydantoin (1,3-Dichloro- 5,5-dimethyl hydantoin)		0.2		0.4				

US - Idaho - Limits for Air Contaminants	1,3-dichloro-5,5-dimethylhydantoin (1,3-Dichloro-5,5-dimethyl hydantoin)	0.2			
Canada - Quebec Permissible Exposure Values for Airborne Contaminants (English)	1,3-dichloro-5,5-dimethylhydantoin (1,3-Dichloro-5,5-dimethyl hydantoin)	0.2	0.4		
US - Hawaii Air Contaminant Limits	1,3-dichloro-5,5-dimethylhydantoin (1,3-Dichloro-5,5-dimethyl hydantoin)	0.2		0.4	
US - Alaska Limits for Air Contaminants	1,3-dichloro-5,5-dimethylhydantoin (1,3-Dichloro-5,5-dimethyl hydantoin)	0.2		0.4	
Canada - Saskatchewan Occupational Health and Safety Regulations - Contamination Limits	1,3-dichloro-5,5-dimethylhydantoin (1,3-Dichloro-5,5-dimethyl hydantoin)	0.2		0.4	
Canada - Yukon Permissible Concentrations for Airborne Contaminant Substances	1,3-dichloro-5,5-dimethylhydantoin (1,3-Dichloro-5,5-dimethyl hydration)	-	0.2	-	0.4
US - Washington Permissible exposure limits of air contaminants	1,3-dichloro-5,5-dimethylhydantoin (1,3-Dichloro-5,5-dimethyl hydantoin)	0.2		0.4	
US - Michigan Exposure Limits for Air Contaminants	1,3-dichloro-5,5-dimethylhydantoin (1,3-Dichloro-5,5-dimethyl hydantoin)	0.2		0.4	
Canada - Prince Edward Island Occupational Exposure Limits	1,3-dichloro-5,5-dimethylhydantoin (1,3-Dichloro-5,5-dimethyl hydantoin)	0.2		0.4	TLV® Basis URT irr
US - Wyoming Toxic and Hazardous Substances Table Z1 Limits for Air Contaminants	1,3-dichloro-5,5-dimethylhydantoin (1,3-Dichloro-5,5-dimethyl hydantoin)	0.2			
Canada - Nova Scotia Occupational Exposure Limits	1,3-dichloro-5,5-dimethylhydantoin (1,3-Dichloro-5,5-dimethyl hydantoin)	0.2		0.4	TLV Basis upper respiratory tract irritation

US - Oregon Permissible Exposure Limits (Z-1)	1,3-dichloro- 5,5-dimethylhydantoin (1,3-Dichloro-5, 5-dimethyl hydantoin)	-	0.2			
Canada - Northwest Territories Occupational Exposure Limits (English)	1,3-dichloro- 5,5-dimethylhydantoin (1,3-Dichloro-5, 5-dimethyl hydantoin)		0.2		0.4	
US ATSDR Minimal Risk Levels for Hazardous Substances (MRLs)	1,3-dichloro- 5,5-dimethylhydantoin (CHLORINE)	0.06				
US ATSDR Minimal Risk Levels for Hazardous Substances (MRLs)	1,3-dichloro- 5,5-dimethylhydantoin (CHLORINE)	0.002				
US ATSDR Minimal Risk Levels for Hazardous Substances (MRLs)	1,3-dichloro- 5,5-dimethylhydantoin (CHLORINE)	0.00005				
US - Minnesota Permissible Exposure Limits (PELs)	1,3-dichloro- 5,5-dimethylhydantoin (Chlorine)	0.5	1.5	1	3	
US NIOSH Recommended Exposure Limits (RELs)	1,3-dichloro- 5,5-dimethylhydantoin (Chlorine)				0.5	1.45 (Ceiling [[15-minute]])
Canada - Alberta Occupational Exposure Limits	1,3-dichloro- 5,5-dimethylhydantoin (Chlorine)	0.5	1.5	1	2.9	
Canada - British Columbia Occupational Exposure Limits	1,3-dichloro- 5,5-dimethylhydantoin (Chlorine)	0.5		1		
US - Tennessee Occupational Exposure Limits - Limits For Air Contaminants	1,3-dichloro- 5,5-dimethylhydantoin (Chlorine)	0.5	1.5	1	3	
US - Vermont Permissible Exposure Limits Table Z-1-A Transitional Limits	1,3-dichloro- 5,5-dimethylhydantoin (Chlorine)	(C)1	(C)3			



for Air Contaminants						
US - Vermont Permissible Exposure Limits Table Z-1-A Final Rule Limits for Air Contaminants	1,3-dichloro-5,5-dimethylhydantoin (Chlorine)	0.5	1.5	1	3	
US - Idaho - Limits for Air Contaminants	1,3-dichloro-5,5-dimethylhydantoin (Chlorine)				1	3
US - California Permissible Exposure Limits for Chemical Contaminants	1,3-dichloro-5,5-dimethylhydantoin (Chlorine)	0.5	1.5	1	3	
US - Alaska Limits for Air Contaminants	1,3-dichloro-5,5-dimethylhydantoin (Chlorine)	0.5	1.5	1	3	
US - Michigan Exposure Limits for Air Contaminants	1,3-dichloro-5,5-dimethylhydantoin (Chlorine)	0.5	1.5	1	3	
US - Oregon Permissible Exposure Limits (Z-1)	1,3-dichloro-5,5-dimethylhydantoin (Chlorine)				1	3
US - Hawaii Air Contaminant Limits	1,3-dichloro-5,5-dimethylhydantoin (Chlorine)	0.5	1.5	1	3	
Canada - Yukon Permissible Concentrations for Airborne Contaminant Substances	1,3-dichloro-5,5-dimethylhydantoin (Chlorine)	1	3	3	9	
US - Washington Permissible exposure limits of air contaminants	1,3-dichloro-5,5-dimethylhydantoin (Chlorine)	0.5				1
Canada - Saskatchewan Occupational Health and Safety Regulations - Contamination Limits	1,3-dichloro-5,5-dimethylhydantoin (Chlorine)	0.5		1		
Canada - Quebec Permissible Exposure Values for Airborne Contaminants (English)	1,3-dichloro-5,5-dimethylhydantoin (Chlorine)	0.5	1.5	1	2.9	

US OSHA Permissible Exposure Levels (PELs) - Table Z1	1,3-dichloro-5,5-dimethylhydantoin (Chlorine)					1	3	
US ACGIH Threshold Limit Values (TLV)	1,3-dichloro-5,5-dimethylhydantoin (Chlorine)	0.5				1		TLV® Basis URT & eye irr
US - Wyoming Toxic and Hazardous Substances Table Z1 Limits for Air Contaminants	1,3-dichloro-5,5-dimethylhydantoin (Chlorine)					1	3	
Canada - Northwest Territories Occupational Exposure Limits (English)	1,3-dichloro-5,5-dimethylhydantoin (Chlorine)	1	3	3	8.7	3	8.7	
Canada - Nova Scotia Occupational Exposure Limits	1,3-dichloro-5,5-dimethylhydantoin (Chlorine)	0.5				1		TLV Basis upper respiratory tract & eye irritation
Canada - Prince Edward Island Occupational Exposure Limits	1,3-dichloro-5,5-dimethylhydantoin (Chlorine)	0.5				1		TLV® Basis URT & eye irr

**PERSONAL PROTECTION**



**RESPIRATOR**

- Type AB-P Filter of sufficient capacity. (AS/NZS 1716 & 1715, EN 1432000 & 1492001, ANSI Z88 or national equivalent)

**EYE**

- Chemical goggles.
- Full face shield may be required for supplementary but never for primary protection of eyes
- Contact lenses may pose a special hazard; soft contact lenses may absorb and concentrate irritants. A written policy document, describing the wearing of lens or restrictions on use, should be created for each workplace or task. This should include a review of lens absorption and adsorption for the class of chemicals in use and an account of injury experience. Medical and first-aid personnel should be trained in their removal and suitable equipment should be readily available. In the event of chemical exposure, begin eye irrigation immediately and remove contact lens as soon as practicable. Lens should be removed at the first signs of eye redness or irritation - lens should be removed in a clean environment only after workers have washed hands thoroughly. [CDC NIOSH Current Intelligence Bulletin 59], [AS/NZS 1336 or national equivalent]

**HANDS/FEET**

- Wear chemical protective gloves, eg. PVC.
  - Wear safety footwear or safety gumboots, eg. Rubber
- Suitability and durability of glove type is dependent on usage. Important factors in the selection of gloves include

- frequency and duration of contact,
- chemical resistance of glove material,
- glove thickness and
- dexterity
- DO NOT wear cotton or cotton-backed gloves.
- DO NOT wear leather gloves.
- Promptly hose all spills off leather shoes or boots or ensure that such footwear is protected with PVC over-shoes.

#### OTHER

- Overalls.
- PVC Apron.
- PVC protective suit may be required if exposure severe.
- Eyewash unit.
- 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 footwear.

#### ENGINEERING CONTROLS

■ Engineering controls are used to remove a hazard or place a barrier between the worker and the hazard. Well-designed engineering controls can be highly effective in protecting workers and will typically be independent of worker interactions to provide this high level of protection.

The basic types of engineering controls are

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

Enclosure and/or isolation of emission source which keeps a selected hazard "physically" away from the worker and ventilation that strategically "adds" and "removes" air in the work environment.

### Section 9 - PHYSICAL AND CHEMICAL PROPERTIES

#### PHYSICAL PROPERTIES

Does not mix with water.

Corrosive.

Acid.

State	DIVIDED SOLID	Molecular Weight	197.02
Melting Range (°F)	273- 277	Viscosity	Not Applicable
Boiling Range (°F)	Not available	Solubility in water (g/L)	Partly miscible
Flash Point (°F)	Not available	pH (1% solution)	Not applicable
Decomposition Temp (°F)	Not Available	pH (as supplied)	Not applicable
Autoignition Temp (°F)	Not available	Vapor Pressure (mmHG)	Negligible
Upper Explosive Limit (%)	Not available	Specific Gravity (water=1)	Not available
Lower Explosive Limit (%)	Not available	Relative Vapor Density (air=1)	Not available
Volatile Component (%vol)	Not available	Evaporation Rate	Not available

#### APPEARANCE

Powder with mild chlorine odor; 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.

### Section 10 - CHEMICAL STABILITY

#### CONDITIONS CONTRIBUTING TO INSTABILITY

- Presence of incompatible materials.

- Product is considered stable under normal handling conditions.
- Prolonged exposure to heat.
- Hazardous polymerisation will not occur.

#### STORAGE INCOMPATIBILITY

‡ For 1,3-dichloro-5,5-dimethylhydantoin

- Avoid contact with ammonia, urea, or other nitrogen containing compounds.
- 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.

Chlorine

- is a strong oxidiser
- reacts explosively with acetylene, boron, diborane, or other boron hydrides at ordinary temperatures
- forms easily ignited, sensitive explosive mixtures with gases and vapors such as anhydrous ammonia, benzene, butane, ethane, ethylene, fluorine, hydrocarbons, formaldehyde, hydrogen, hydrogen bromide, hydrogen chloride, oxygen, propane, propene in the presence of heat, hot surfaces, welding arc, sparks, strong sunlight, UV light, or a catalyst such as mercury oxide
- contact with 2-carboxymethylisothiuronium chloride or s-ethylisothiuronium hydrogen sulfate may form nitrogen trichloride. a dangerous explosive
- Many compounds containing more than one N-halogen bond are unstable and exhibit explosive properties.

BRETHERRICK L. Handbook of Reactive Chemical Hazards.

- Reacts with mild steel, galvanised steel / zinc producing hydrogen gas which may form an explosive mixture with air.
- Avoid any contamination of this material as it is very reactive and any contamination is potentially hazardous
- Segregate from alcohol, water.
- Avoid strong bases.
- 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.
- Avoid storage with reducing agents.

For incompatible materials - refer to Section 7 - Handling and Storage.

## Section 11 - TOXICOLOGICAL INFORMATION

1,3-dichloro-5,5-dimethylhydantoin

#### TOXICITY AND IRRITATION

- unless otherwise specified data extracted from RTECS - Register of Toxic Effects of Chemical Substances.
- 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.
- No significant acute toxicological data identified in literature search.
- 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.

for halohydantoins

Acute toxicity 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.

#### CARCINOGEN

1,3-dichloro-5,5-dimethylhydantoin	US - Rhode Island Hazardous Substance List	IARC	
Chlorine	US ACGIH Threshold Limit Values (TLV) - Carcinogens	Carcinogen Category	A4
chlorine	US - Rhode Island Hazardous Substance List	IARC	

chlorine	US - Maine Chemicals of High Concern List	Carcinogen	A4
chlorine	Canada - Prince Edward Island Occupational Exposure Limits - Carcinogens	Notes	TLV® Basis URT & eye irr
chlorine	Canada - Prince Edward Island Occupational Exposure Limits - Carcinogens	Notes	TLV Basis upper respiratory tract & eye irritation

## Section 12 - ECOLOGICAL INFORMATION

Very toxic to aquatic organisms.

This material and its container must be disposed of as hazardous waste.

Avoid release to the environment.

Refer to special instructions/ safety data sheets.

### Ecotoxicity

Ingredient	Persistence: Water/Soil	Persistence: Air	Bioaccumulation	Mobility
hypochlorous acid	No Data Available	No Data Available		
chlorine	No Data Available	No Data Available	LOW	

## Section 13 - DISPOSAL CONSIDERATIONS

### US EPA Waste Number & Descriptions

A. General Product Information

Ignitability characteristic: use EPA hazardous waste number D001 (waste code I)

Corrosivity characteristic: use EPA hazardous waste number D002 (waste code C)

### Disposal Instructions

All waste must be handled in accordance with local, state and federal regulations.

- Containers may still present a chemical hazard/ danger when empty.
- Return to supplier for reuse/ recycling if possible.

Otherwise:

- If container can not be cleaned sufficiently well to ensure that residuals do not remain or if the container cannot be used to store the same product, then puncture containers, to prevent re-use, and bury at an authorised landfill.
- Where possible retain label warnings and MSDS and observe all notices pertaining to the product.

Legislation addressing waste disposal requirements may differ by country, state and/ or territory. Each user must refer to laws operating in their area. In some areas, certain wastes must be tracked.

A Hierarchy of Controls seems to be common - the user should investigate:

- Reduction
- Reuse
- Recycling
- Disposal (if all else fails)

This material may be recycled if unused, or if it has not been contaminated so as to make it unsuitable for its intended use. Shelf life considerations should also be applied in making decisions of this type. Note that properties of a material may change in use, and recycling or reuse may not always be appropriate. In most instances the supplier of the material should be consulted.

- DO NOT allow wash water from cleaning or process equipment to enter drains.
- It may be necessary to collect all wash water for treatment before disposal.
- In all cases disposal to sewer may be subject to local laws and regulations and these should be considered first.
- Where in doubt contact the responsible authority.

Recycle wherever possible.

- Consult manufacturer for recycling options or consult local or regional waste management authority for disposal if no suitable treatment or disposal facility can be identified.
- 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)
- Decontaminate empty containers with 5% aqueous sodium hydroxide or soda ash, followed by water. Observe all label safeguards until containers are cleaned and destroyed.

For small quantities of oxidising agent:

- Cautiously acidify a 3% solution to pH 2 with sulfuric acid.
- Gradually add a 50% excess of sodium bisulfite solution with stirring.
- Add a further 10% sodium bisulfite.
- If no further reaction occurs (as indicated by a rise in temperature) cautiously add more acid.

## Section 14 - TRANSPORTATION INFORMATION



DOT:

Symbols:	None	Hazard class or Division:	5.1
Identification Numbers:	UN3085	PG:	II
Label Codes:	5.1, 8	Special provisions:	62, IB6, IP2, T3, TP33
Packaging: Exceptions:	None	Packaging: Non-bulk:	212
Packaging: Exceptions:	None	Quantity limitations: Passenger aircraft/rail:	5 kg
Quantity Limitations: Cargo aircraft only:	25 kg	Vessel stowage: Location:	B
Vessel stowage: Other:	13, 34, 56, 58, 106, 138		

Hazardous materials descriptions and proper shipping names:

Oxidizing solid, corrosive, n.o.s.

**Air Transport IATA:**

ICAO/IATA Class:	5.1	ICAO/IATA Subrisk:	8
UN/ID Number:	3085	Packing Group:	II
Special provisions:	A3		

Cargo Only

Packing Instructions:	562	Maximum Qty/Pack:	25 kg
Passenger and Cargo		Passenger and Cargo	
Packing Instructions:	558	Maximum Qty/Pack:	5 kg
Passenger and Cargo Limited Quantity		Passenger and Cargo Limited Quantity	
Packing Instructions:	Y544	Maximum Qty/Pack:	2.5 kg

Shipping name: OXIDIZING SOLID, CORROSIVE, N.O.S. (contains 1,3-dichloro-5,5-dimethylhydantoin)

**Maritime Transport IMDG:**

IMDG Class:	5.1	IMDG Subrisk:	8
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UN Number:	3085	Packing Group:	II
EMS Number:	F-A,S-Q	Special provisions:	274
Limited Quantities:	1 kg	Marine Pollutant:	Yes
Shipping name:OXIDIZING SOLID, CORROSIVE, N.O.S.(contains 1,3-dichloro-5,5-dimethylhydantoin)			

## Section 15 - REGULATORY INFORMATION

### **1,3-dichloro-5,5-dimethylhydantoin (CAS: 118-52-5) is found on the following regulatory lists;**

"Canada - Alberta Occupational Exposure Limits","Canada - British Columbia Occupational Exposure Limits","Canada - Northwest Territories Occupational Exposure Limits (English)","Canada - Nova Scotia Occupational Exposure Limits","Canada - Prince Edward Island Occupational Exposure Limits","Canada - Quebec Permissible Exposure Values for Airborne Contaminants (English)","Canada - Saskatchewan Occupational Health and Safety Regulations - Contamination Limits","Canada - Yukon Permissible Concentrations for Airborne Contaminant Substances","Canada Domestic Substances List (DSL)","Canada Ingredient Disclosure List (SOR/88-64)","Canada Toxicological Index Service - Workplace Hazardous Materials Information System - WHMIS (English)","US - Alaska Limits for Air Contaminants","US - California Occupational Safety and Health Regulations (CAL/OSHA) - Hazardous Substances List","US - California Permissible Exposure Limits for Chemical Contaminants","US - Connecticut Hazardous Air Pollutants","US - Hawaii Air Contaminant Limits","US - Idaho - Limits for Air Contaminants","US - Michigan Exposure Limits for Air Contaminants","US - Minnesota Hazardous Substance List","US - Minnesota Permissible Exposure Limits (PELs)","US - New Jersey Right to Know Hazardous Substances","US - Oregon Permissible Exposure Limits (Z-1)","US - Pennsylvania - Hazardous Substance List","US - Rhode Island Hazardous Substance List","US - Tennessee Occupational Exposure Limits - Limits For Air Contaminants","US - Vermont Permissible Exposure Limits Table Z-1-A Final Rule Limits for Air Contaminants","US - Vermont Permissible Exposure Limits Table Z-1-A Transitional Limits for Air Contaminants","US - Washington Permissible exposure limits of air contaminants","US - Wisconsin Control of Hazardous Pollutants - Emission Thresholds, Standards and Control Requirements (Hazardous Air Contaminants)","US - Wyoming Toxic and Hazardous Substances Table Z1 Limits for Air Contaminants","US ACGIH Threshold Limit Values (TLV)","US EPA High Production Volume Chemicals 1994 List of Additions","US NFPA 1 Annex B Typical Oxidizers","US NIOSH Recommended Exposure Limits (RELs)","US OSHA Permissible Exposure Levels (PELs) - Table Z1","US Toxic Substances Control Act (TSCA) - Chemical Substance Inventory"

#### **Regulations for ingredients**

### **hypochlorous acid (CAS: 7790-92-3) is found on the following regulatory lists;**

"Canada Environmental Quality Guidelines (EQGs) Water: Aquatic life","Canada Non-Domestic Substances List (NDSL)","US Toxic Substances Control Act (TSCA) - Chemical Substance Inventory"

### **chlorine (CAS: 7782-50-5) is found on the following regulatory lists;**

"Canada - Alberta Ambient Air Quality Objectives","Canada - Alberta Occupational Exposure Limits","Canada - British Columbia Occupational Exposure Limits","Canada - Northwest Territories Occupational Exposure Limits (English)","Canada - Nova Scotia Occupational Exposure Limits","Canada - Prince Edward Island Occupational Exposure Limits","Canada - Prince Edward Island Occupational Exposure Limits - Carcinogens","Canada - Quebec Permissible Exposure Values for Airborne Contaminants (English)","Canada - Saskatchewan Occupational Health and Safety Regulations - Contamination Limits","Canada - Yukon Permissible Concentrations for Airborne Contaminant Substances","Canada CEPA Environmental Registry Substance Lists - List of substances on the DSL that meet the ecological criteria for categorization (English)","Canada CEPA Environmental Registry Substance Lists - List of substances on the DSL that meet the human health criteria for categorization (English)","Canada Domestic Substances List (DSL)","Canada Ingredient Disclosure List (SOR/88-64)","Canada National Pollutant Release Inventory (NPRI)","Canada Toxicological Index Service - Workplace Hazardous Materials Information System - WHMIS (English)","International Council of Chemical Associations (ICCA) - High Production Volume List","US - Alaska Limits for Air Contaminants","US - California Air Toxics ""Hot Spots"" List (Assembly Bill 2588) Substances for which emissions must be quantified","US - California Occupational Safety and Health Regulations (CAL/OSHA) - Hazardous Substances List","US - California OEHHA/ARB - Acute Reference Exposure Levels and Target Organs (RELs)","US - California OEHHA/ARB - Chronic Reference Exposure Levels and Target Organs (CRELs)","US - California Permissible Exposure Limits for Chemical Contaminants","US - California Toxic Air Contaminant List Category II","US - Connecticut Hazardous Air Pollutants","US - Delaware Pollutant Discharge Requirements - Reportable Quantities","US - Hawaii Air Contaminant Limits","US - Idaho - Limits for Air Contaminants","US - Louisiana Minimum Emission Rates Toxic Air Pollutants","US - Louisiana Toxic Air Pollutant Ambient Air Standards","US -



Massachusetts Oil & Hazardous Material List", "US - Michigan Exposure Limits for Air Contaminants", "US - Minnesota Hazardous Substance List", "US - Minnesota Permissible Exposure Limits (PELs)", "US - New Jersey Right to Know Hazardous Substances", "US - Oregon Hazardous Materials", "US - Oregon Permissible Exposure Limits (Z-1)", "US - Pennsylvania - Hazardous Substance List", "US - Rhode Island Hazardous Substance List", "US - South Dakota Drinking Water Standards - Disinfectants", "US - Tennessee Occupational Exposure Limits - Limits For Air Contaminants", "US - Utah Primary Drinking Water Standards - Disinfectant Residuals", "US - Vermont Permissible Exposure Limits Table Z-1-A Final Rule Limits for Air Contaminants", "US - Washington Permissible exposure limits of air contaminants", "US - Washington Toxic air pollutants and their ASIL, SQER and de minimis emission values", "US - Wisconsin Control of Hazardous Pollutants - Emission Thresholds, Standards and Control Requirements (Hazardous Air Contaminants)", "US - Wisconsin Control of Hazardous Pollutants - Substances of Concern for Sources of Incidental Emissions of Hazardous Air Contaminants", "US - Wyoming List of Highly Hazardous Chemicals, Toxics and Reactives", "US - Wyoming Toxic and Hazardous Substances Table Z1 Limits for Air Contaminants", "US ACGIH Threshold Limit Values (TLV)", "US ACGIH Threshold Limit Values (TLV) - Carcinogens", "US ATSDR Minimal Risk Levels for Hazardous Substances (MRLs)", "US CERCLA Priority List of Hazardous Substances", "US Clean Air Act - Hazardous Air Pollutants", "US CWA (Clean Water Act) - List of Hazardous Substances", "US CWA (Clean Water Act) - Reportable Quantities of Designated Hazardous Substances", "US Department of Homeland Security Chemical Facility Anti-Terrorism Standards - Chemicals of Interest", "US Department of Transportation (DOT) List of Hazardous Substances and Reportable Quantities - Hazardous Substances Other Than Radionuclides", "US Department of Transportation (DOT) Marine Pollutants - Appendix B", "US DOE Temporary Emergency Exposure Limits (TEELs)", "US EPA Acute Exposure Guideline Levels (AEGs) - Final", "US EPA High Production Volume Chemicals Additional List", "US EPA Master Testing List - Index I Chemicals Listed", "US EPCRA Section 313 Chemical List", "US Food Additive Database", "US List of Lists - Consolidated List of Chemicals Subject to EPCRA, CERCLA and Section 112(r) of the Clean Air Act", "US NFPA 45 Fire Protection for Laboratories Using Chemicals - Flammability Characteristics of Common Compressed and Liquefied Gases", "US NIOSH Recommended Exposure Limits (RELs)", "US OSHA List of Highly Hazardous Chemicals, Toxics and Reactives", "US OSHA Permissible Exposure Levels (PELs) - Table Z1", "US SARA Section 302 Extremely Hazardous Substances", "US Toxic Substances Control Act (TSCA) - Chemical Substance Inventory", "USA: Chemical Facility Anti-Terrorism Standards - List Appendix A - 6CFR 27", "WHO Guidelines for Drinking-water Quality - Guideline values for chemicals that are of health significance in drinking-water"

## Section 16 - OTHER INFORMATION

### LIMITED EVIDENCE

■ Cumulative effects may result following exposure\*.

\* (limited evidence).

### Denmark Advisory list for selfclassification of dangerous substances

Substance	CAS	Suggested codes
1, 3- dichloro- 5, 5- dimethylhydantoin	118- 52- 5	Xn; R22 Xi; R38
hypochlorous acid	7790- 92- 3	Xn; R22 Xi; R38
chlorine	7782- 50- 5	Xn; R22 Xi; R38

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

A list of reference resources used to assist the committee may be found at:

[www.chemwatch.net/references](http://www.chemwatch.net/references).

■ The (M)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.



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