Sodium perchlorate monohydrate

sc-203397

Material Safety Data Sheet

Hazard Alert Code Key: EXTREME HIGH MODERATE LOW

Section 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME

Sodium perchlorate monohydrate

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

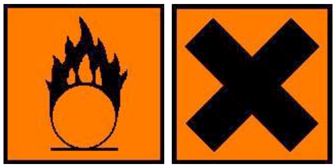
NaClO4 · H2O, "perchloric acid, sodium salt", Irenat., anti-thyroid

Section 2 - HAZARDS IDENTIFICATION

CHEMWATCH HAZARD RATINGS

		Min	Max
Flammability:	0		
Toxicity:	2		
Body Contact:	2		
Reactivity:	2		
Chronic:	2		

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



CANADIAN WHMIS SYMBOLS

EMERGENCY OVERVIEW

RISK

Explosive when mixed with combustible material.
Harmful if swallowed.
Irritating to eyes.

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.

■ Symptoms of exposure to perchlorates include shortness of breath, difficulty breathing and a bluish discoloration of the skin. The effects may be delayed for several hours following exposure.

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■ Nausea and vomiting are almost always apparent after chlorate poisonings usually with upper stomach pain. Diarrhea may also occur.

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EYE

■ This material can cause eye irritation and damage in some persons.

SKIN

■ There is some evidence to suggest that this material can cause inflammation of the skin on contact in some persons.

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

■ 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.

INHALED

■ There is some evidence to suggest that the material can cause respiratory irritation in some persons. The body's response to such irritation can cause further lung damage.

■ 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.

CHRONIC HEALTH EFFECTS

■ Limited evidence suggests that repeated or long-term occupational exposure may produce cumulative health effects involving organs or biochemical systems.

Exposure to the material may cause concerns for humans owing to possible developmental toxic effects, on the basis that similar materials tested in appropriate animal studies provide some suspicion of developmental toxicity in the absence of signs of marked maternal toxicity, or at around the same dose levels as other toxic effects but which are not a secondary non-specific consequence of other toxic effects.

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.

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Chronic and/or sub-lethal exposure to inorganic chlorate may have deleterious effects on human health, such as redness of the eyes and skin (including dermatitis), sore throat, abdominal pain, blue lips or skin, diarrhea, nausea, vomiting, shortness of breath, and unconsciousness. Sodium chlorate may damage the liver, kidneys, and blood cells of humans.

Subchronic chlorate exposure was associated with smaller body and organ weights, blood abnormalities and pituitary and thyroid abnormalities in one study using Sprague-Dawley rats.

Chlorate is a thyroid toxicant producing thyroid gland follicular cell hypertrophy in rats and mice following chronic exposures, and may produce follicular cell tumors in rats. The lack of mutagenicity indicates that the thyroid tumors are induced by a non-mutagenic mechanism and are therefore not likely to be carcinogenic. The effects may be attributed to changes in levels of thyroid hormones seen after administration of high doses of sodium chlorate. In female mice there was equivocal and marginal evidence of increased pancreatic islet carcinoma. Sodium chlorate was negative in most bacterial gene mutation assays and in several cytogenetics tests, including a hypoxanthineguanine phosphoribosyl-transferase (HGPRT) assay in Chinese hamster ovaries and a micronucleus assay.

Intramuscular administration of potassium chlorate to pregnant rats resulted in a prolonged gestation period in most cases, and reduced neonatal weight relative to the controls. According to the author, newborn rats also showed a "marked" increase of haematopoietic residue and lipid deposit over controls, and occasionally, exposure resulted in the appearance of hyaline droplets and casts in newborn kidneys . The number of animals per treatment group/number affected, duration of exposure, and information on dose levels was not available.

African green monkeys (five males and seven females) were used to study the thyroid effects of sodium chlorate when administered for 30-60 days as chlorate at concentrations of 4, 7.5, 15, 30 or 58.4 mg/kg bw per day. Chlorate did not induce thyroid depression. Chlorate did not induce a dose-dependent oxidative stress, as was observed in the case of chlorite.

Female rats were exposed to 1 or 10 mg chlorate/L in their drinking water for ten weeks. Fetuses were taken on the 20th day of gestation and examined for external, visceral and skeletal malformations. No significant adverse findings were reported.

No chromosomal abnormalities were seen in either the micronucleus test or a cytogenetic assay in mouse bone marrow cells following gavage dosing with chlorate.

Perchlorates may affect the use of iodine by the thyroid gland and chronic exposures may result in symptoms of thyroid dysfunction such as goiter.

Section 3 - COMPOSITION / INFORMATION ON INGREDIENTS

NAME	CAS RN	%
sodium perchlorate	7791-07-3	> 97

Section 4 - FIRST AID MEASURES

SWALLOWED

· IF SWALLOWED, REFER FOR MEDICAL ATTENTION, WHERE POSSIBLE, WITHOUT DELAY. · Where Medical attention is not immediately available or where the patient is more than 15 minutes from a hospital or unless instructed otherwise:

EYE

■ If this product comes in contact with the eyes: · Wash out immediately with fresh 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.

SKIN

■ If skin contact occurs: · Immediately remove all contaminated clothing, including footwear · Flush skin and hair with running water (and soap if available).

INHALED

· If fumes or combustion products are inhaled remove from contaminated area. · Other measures are usually unnecessary.

NOTES TO PHYSICIAN

■ Antithyroid effects produced by the perchlorates may be reversed with iodine. Patients should be warned to report the development of sore throat, fever or rashes since the are indicative of blood abnormalities.
For chlorates:
For severe intoxication: Empty the stomach by lavage and aspiration or by emesis, give demulcents or sweetened drinks and maintain respiration. Pethidine may be given if required. A 1% solution of sodium thiosulfate may be used for lavage and may also be given by intravenous infusion. Haemodialysis, peritoneal dialysis or exchange perfusions may be of value in removing chlorate from the blood. Forced diuresis should not be attempted if there is inadequate urine input.
MARTINDALE: The Extra Pharmacopoeia, 27th Edition
The high sensitivity of glucose-6-phosphate dehydrogenase to denaturation by chlorate explains the inefficacy of methylene blue to reduce methaemoglobin formed, as the antidotal effect of methylene blue depends on NADPH formed mainly by the oxidation of glucose-6-phosphate. The observed changes occur only in the presence of methaemoglobin which forms a destabilising complex with chlorate. Methaemoglobin thus autocatalytically increases methaemoglobin formation and destruction of the erythrocyte.

Section 5 - FIRE FIGHTING MEASURES

Vapour Pressure (mmHG):	Negligible
Upper Explosive Limit (%):	Not Applicable
Specific Gravity (water=1):	2.02
Lower Explosive Limit (%):	Not Applicable

EXTINGUISHING MEDIA

■ FOR SMALL FIRE:
· USE FLOODING QUANTITIES OF WATER.
· DO NOT use dry chemicals, CO2 or foam.

FIRE FIGHTING

· Alert Emergency Responders and tell them location and nature of hazard.
· May be violently or explosive reactive.
When any large container (including road and rail tankers) is involved in a fire,
consider evacuation by 800 metres in all directions.

GENERAL FIRE HAZARDS/HAZARDOUS COMBUSTIBLE PRODUCTS

· Will not burn but increases intensity of fire.
· Heating may cause expansion or decomposition leading to violent rupture of containers.
Decomposition may produce toxic fumes of: hydrogen chloride, metal oxides.
Decomposes on heating and produces toxic fumes of chlorine and alkaline residues.

FIRE INCOMPATIBILITY

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

PERSONAL PROTECTION

Glasses:
Full face- shield.
Gloves:
Respirator:
Particulate

Section 6 - ACCIDENTAL RELEASE MEASURES

MINOR SPILLS
· Clean up all spills immediately.
· No smoking, naked lights, ignition sources.
MAJOR SPILLS
· Clear area of personnel and move upwind.
· Alert Emergency Responders and tell them location and nature of hazard.

Section 7 - HANDLING AND STORAGE

PROCEDURE FOR HANDLING

- Avoid personal contact and inhalation of dust, mist or vapors.
- Provide adequate ventilation.

RECOMMENDED STORAGE METHODS

■ Glass container.

- 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.

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.
- 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.
- the minimum distance to walls is not less than 1 metre.

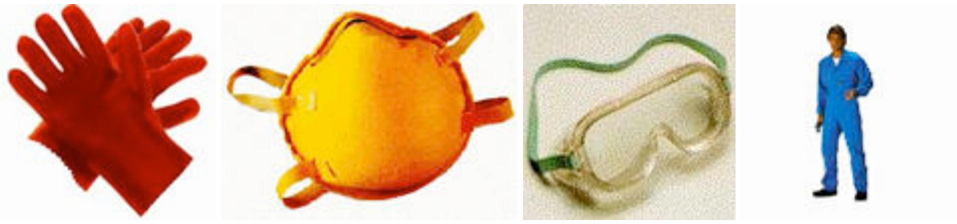
Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

EXPOSURE CONTROLS

Source	Material	TWA ppm	TWA mg/m³	STEL ppm	STEL mg/m³	Peak ppm	Peak mg/m³	TWA F/CC	Notes
US - California Permissible Exposure Limits for Chemical Contaminants	sodium perchlorate (Particulates not otherwise regulated Respirable fraction)		5						(n)
US - Tennessee Occupational Exposure Limits - Limits For Air Contaminants	sodium perchlorate (Particulates not otherwise regulated Respirable fraction)		5						
US - Wyoming Toxic and Hazardous Substances Table Z1 Limits for Air Contaminants	sodium perchlorate (Particulates not otherwise regulated (PNOR)(f)- Respirable fraction)		5						
US - Michigan Exposure Limits for Air Contaminants	sodium perchlorate (Particulates not otherwise regulated, Respirable dust)		5						
Canada - Prince Edward Island Occupational Exposure Limits	sodium perchlorate (Particles (Insoluble or Poorly Soluble) [NOS] Inhalable particles)		10						See Appendix B current TLV/BEI Book

ENDOELTABLE

PERSONAL PROTECTION



RESPIRATOR

Particulate
Consult your EHS staff for recommendations

EYE

· Chemical goggles.
· Full face shield.

HANDS/FEET

■ Wear chemical protective gloves, eg. PVC.
Suitability and durability of glove type is dependent on usage. Important factors in the selection of gloves include: such as:
· frequency and duration of contact,
· chemical resistance of glove material,
· glove thickness and
· dexterity
Select gloves tested to a relevant standard (e.g. Europe EN 374, US F739).
· When prolonged or frequently repeated contact may occur, a glove with a protection class of 5 or higher (breakthrough time greater than 240 minutes according to EN 374) is recommended.
· When only brief contact is expected, a glove with a protection class of 3 or higher (breakthrough time greater than 60 minutes according to EN 374) is recommended.
· Contaminated gloves should be replaced.
Gloves must only be worn on clean hands. After using gloves, hands should be washed and dried thoroughly. Application of a non-perfumed moisturiser is recommended.
· 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.
· 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

■ Local exhaust ventilation usually required. If risk of overexposure exists, wear an approved respirator.
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Section 9 - PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL PROPERTIES

Solid.
Mixes with water.

State	Divided solid	Molecular Weight	140.46
Melting Range (°F)	Not applicable	Viscosity	Not Applicable
Boiling Range (°F)	Not applicable	Solubility in water (g/L)	Miscible
Flash Point (°F)	Not Applicable	pH (1% solution)	Not available.
Decomposition Temp (°F)	Not Applicable	pH (as supplied)	Not applicable
Autoignition Temp (°F)	Not Applicable	Vapour Pressure (mmHG)	Negligible
Upper Explosive Limit (%)	Not Applicable	Specific Gravity (water=1)	2.02
Lower Explosive Limit (%)	Not Applicable	Relative Vapor Density (air=1)	Not Applicable
Volatile Component (%vol)	Negligible	Evaporation Rate	Not available

APPEARANCE

White crystalline powder; mixes with water.

Section 10 - CHEMICAL STABILITY

CONDITIONS CONTRIBUTING TO INSTABILITY

· Presence of incompatible materials.
· Product is considered stable under normal handling conditions.

STORAGE INCOMPATIBILITY

· Inorganic oxidising agents can react with reducing agents to generate heat and products that may be gaseous (causing pressurization of closed containers). The products may themselves be capable of further reactions (such as combustion in the air).
· Organic compounds in general have some reducing power and can in principle react with compounds in this class. Actual reactivity varies greatly with the identity of the organic compound.
· Inorganic oxidising agents can react violently with active metals, cyanides, esters, and thiocyanates.
· 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.
· Incidents involving interaction of active oxidants and reducing agents, either by design or accident, are usually very energetic and examples of so-called redox reactions.
· Metals and their oxides or salts may react violently with chlorine trifluoride and bromine trifluoride.
· These trifluorides are hypergolic oxidisers. They ignites on contact (without external source of heat or ignition) with recognised fuels - contact with these materials, following an ambient or slightly elevated temperature, is often violent and may produce ignition.
· The state of subdivision may affect the results.
NOTE: May contain traces of perchloric acid or may, on contact with acids, produce an anhydrous perchloric acid an extremely reactive and explosive species. Many of the reported explosions involving perchlorate may result its ability to form unstable perchlorate esters or salts of the anhydrous acid.
WARNING:
· On the basis of experience with cobalt(III) perchlorate, attention is drawn to the possibility of stable metal perchlorates being converted by unintentional dehydration to unstable (endothermic) lower hydrates capable of explosive decomposition in the absence of impurities. Great care must be taken to avoid dehydration or desolvation of perchlorates.
· Metal perchlorates may be explosively reactive with finely divided aluminium, magnesium and zinc and other metals, calcium and strontium hydrides, glycol (on heating), sulfuric acid (with the formation of unstable perchloric acid), and trifluoromethanesulfonic acid.
· The perchlorate salts of the complexes of divalent cobalt, nickel and particularly iron ([tetramethyl[14]-N8 complexes) are potentially explosive and storage for more than 4 weeks is inadvisable.
· Avoid any contamination of this material as it is very reactive and any contamination is potentially hazardous.
· Segregate chlorates from organic matter, acids, poisonous gases, flammables, corrosives, aluminium and ammonium salts and any other combustible material.
· Mixtures of chlorates with fibrous and absorbent organic materials such as wood, paper, leather, flour, sawdust, sugar, shellac, may be ignited or caused to explode by static sparks, friction or shock.
· The extreme hazardous nature of mixtures of metal chlorates with phosphorus or sulfur, apart from being powerful explosives, are dangerously sensitive to friction or shock; spontaneous ignition occasionally occurs.
· Mixtures with sucrose, lactose, chromium, sulfur dioxide, sodium amide, zirconium, germanium and titanium explode on heating.
· Forms incompatible sometimes explosive mixtures with thorium dicarbide, strontium hydride, hydrogen iodide, fluorine, cyanoguanidine, cyanides, dinickel trioxide, powdered carbon, aqua regia and ruthenium, nitric acid, manganese dioxide and potassium hydroxide or boron.
· Chlorates should not be allowed to come into contact with ammonium salts, aluminium and other powdered metals, phosphorous, silicon, sulfur, sulfides, sulfuric acid, nitrobenzene, iodides and tartaric acid
· Mixtures with hydrocarbons, metal phosphides (Zn, Ag, Al, Cu, Hg, Mg, etc), metal thiocyanates, metal sulfides, arsenic, carbon, phosphorous, sulfur, ammonium salts, powdered metals, arsenic trioxide, phosphorous, silicon, sulfur, sulfides, sulfites and hyposulfites are easily ignited (by friction impact or heat) and are potentially explosive.
· Metal chlorates in contact with strong acids liberate explosive chlorine dioxide gas. With concentrated sulfuric acid a violent explosion can occur unless effective cooling is used. Mixing potassium chlorate and concentrated sulfuric acid results in an explosion with optimum temperature range being 120-130. Heating a moist mixture of metal chlorate and a dibasic organic acid (tartaric or citric acid) liberates chlorine dioxide diluted with carbon dioxide.
· Fusion of chlorates with metal cyanides may lead to an explosion.
· Chlorates containing 1-2% bromate or sulfur are liable to spontaneous explosion.
· Chlorates releases oxygen, chlorine and chlorine dioxide when heated above 300 deg. C..
· In presence of moisture may release oxygen and ozone.
· Intimate mixtures of chlorates, bromates or iodates of barium, cadmium, calcium, magnesium, potassium, sodium or zinc, with finely divided aluminium, arsenic, copper, carbon, phosphorus, sulfur, hydrides of alkali- and alkaline earth-metals; sulfides of antimony, arsenic, copper or tin; metal cyanides, thiocyanates; or impure manganese dioxide may react explosively or violently, either spontaneously (especially in the presence of moisture) or on initiation by heat, impact or friction, sparks or addition of sulfuric acid.
BRETHERICKS HANDBOOK OF REACTIVE CHEMICAL HAZARDS, 4th Edition.
Avoid storage with reducing agents.

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

Section 11 - TOXICOLOGICAL INFORMATION

SODIUM PERCHLORATE

TOXICITY AND IRRITATION
SODIUM PERCHLORATE:

■ unless otherwise specified data extracted from RTECS - Register of Toxic Effects of Chemical Substances.

TOXICITY	IRRITATION
Oral (rat) LD50: 2100 mg/kg	Nil Reported
Intraperitoneal (mouse) LD50: 551 mg/kg	

Section 12 - ECOLOGICAL INFORMATION

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

Section 13 - DISPOSAL CONSIDERATIONS

US EPA Waste Number & Descriptions

A. General Product Information
Ignitability characteristic: use EPA hazardous waste number D001 (waste code I)

Disposal Instructions

All waste must be handled in accordance with local, state and federal regulations.
¦ Puncture containers to prevent re-use and bury at an authorized landfill.
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.
DO NOT allow wash water from cleaning equipment to enter drains. Collect all wash water for treatment before disposal.
FOR DISPOSAL OF SMALL QUANTITIES:
· Cautiously acidify a 3% solution or a suspension of the material to pH 2 with sulfuric acid.
· Gradually add a 50% excess of aqueous sodium bisulfite with stirring at room temperature. (Other reducers such as thiosulfate or ferrous salts may substitute; do NOT use carbon, sulfur or other strong reducing agents). An increase in temperature indicates reaction is taking place. If no reaction is observed on the addition of about 10% of the sodium bisulfite solution, initiate it by cautiously adding more acid.
· Recycle wherever possible or consult manufacturer for recycling options.
· Consult Waste Management Authority for disposal.

Section 14 - TRANSPORTATION INFORMATION

DOT:
Symbols: None Hazard class or Division: 5.1
Identification Numbers: UN1502 PG: II
Label Codes: 5.1 Special provisions: IB6, IP2,
T3, TP33
Packaging: Exceptions: 152 Packaging: Non- bulk: 212
Packaging: Exceptions: 152 Quantity limitations: 5 kg
Passenger aircraft/rail:
Quantity Limitations: Cargo 25 kg Vessel stowage: Location: A
aircraft only:
Vessel stowage: Other: 56, 58
Hazardous materials descriptions and proper shipping names:
Sodium perchlorate

Air Transport IATA:

ICAO/IATA Class: 5.1 ICAO/IATA Subrisk: None
UN/ID Number: 1502 Packing Group: II
Special provisions: None
Cargo Only
Packing Instructions: 511 Maximum Qty/Pack: 25 kg
Passenger and Cargo Passenger and Cargo
Packing Instructions: 508 Maximum Qty/Pack: 5 kg
Passenger and Cargo Limited Quantity Passenger and Cargo Limited Quantity
Packing Instructions: Y508 Maximum Qty/Pack: 2.5 kg
Shipping Name: SODIUM PERCHLORATE

Maritime Transport IMDG:

IMDG Class: 5.1 IMDG Subrisk: None
UN Number: 1502 Packing Group: II
EMS Number: F-H , S-Q Special provisions: None
Limited Quantities: 1 kg
Shipping Name: SODIUM PERCHLORATE

Section 15 - REGULATORY INFORMATION

sodium perchlorate (CAS: 7601-89-0,7791-07-3) is found on the following regulatory lists;
"Canada - Saskatchewan Industrial Hazardous Substances","Canada Domestic Substances List (DSL)","Canada Toxicological Index Service - Workplace Hazardous Materials Information System - WHMIS (English)","International Council of Chemical Associations (ICCA) - High Production Volume List","OECD Representative List of High Production Volume (HPV) Chemicals","US - Massachusetts Oil & Hazardous Material List","US - New Jersey Right to Know Hazardous Substances","US - Pennsylvania - Hazardous Substance List","US - Rhode Island Hazardous Substance List","US DOE Temporary Emergency Exposure Limits (TEELs)","US NFPA 1 Annex B Typical Oxydizers","US Toxic Substances Control Act (TSCA) - Inventory"

Section 16 - OTHER INFORMATION

LIMITED EVIDENCE

- ■ Contact with air may produce sufficient heat to ignite combustible materials.*.
- ■ Cumulative effects may result following exposure*.
- ■ May produce discomfort of the respiratory system and skin*.
- ■ May possibly be harmful to the foetus/ embryo*.

* (limited evidence).

Ingredients with multiple CAS Nos

Ingredient Name CAS sodium perchlorate 7601-89-0, 7791-07-3

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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.

■ 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. Risks may be determined by reference to Exposures Scenarios. Scale of use, frequency of use and current or available engineering controls must be considered.

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