

# Sodium chlorate

sc-212938

Material Safety Data Sheet



The Power is Question

Hazard Alert Code Key: **EXTREME** **HIGH** **MODERATE** **LOW**

## Section 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

### PRODUCT NAME

Sodium chlorate

### STATEMENT OF HAZARDOUS NATURE

CONSIDERED A HAZARDOUS SUBSTANCE ACCORDING TO OSHA 29 CFR 1910.1200.

### NFPA



### SUPPLIER

Company: Santa Cruz Biotechnology, Inc.

2145 Delaware Ave  
Santa Cruz, CA 95060

Telephone: 800.457.3801 or 831.457.3800

Emergency Tel: **CHEMWATCH: From within the US and Canada:  
877-715-9305**

Emergency Tel: **From outside the US and Canada: +800 2436 2255  
(1-800-CHEMCALL) or call +613 9573 3112**

### PRODUCT USE

Used as an oxidizing agent. Component of explosives, matches, fireworks. Bleach for paper pulp. Leather tanning and finishing Textile mordant. Weedkiller, herbicide and defoliant; substitute for potassium chlorate. Recovery of bromine from brines. Manufacture of perchlorates.

### SYNONYMS

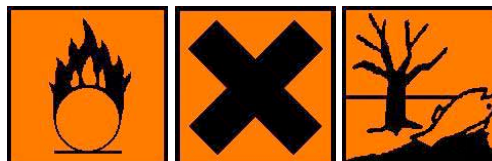
NaClO<sub>3</sub>, Asex, Atlacide, Atratol, B-Herbatox, "Grian sorghum Harvest Aid", "chlorate of sodium", "soda chlorate", "chlorate salt of sodium", Chlorax, De-Fol-Ate, Desolet, "Drexel Defol", "Drop Leaf", Evau-Super, Fall, "Granex O", Harvest-Aid, Klorex, Kusa-Tohru, Kusatol, "Ortho C-1 Defoliant & Weed Killer", Oxycil, Rasikal, "Shed-A-Leaf "" L""", Travex, Tumbleaf, "United Chemical Defoliant No. 1", Val-Drop, "chloric acid, sodium salt", "Olympic Dam Sodium Chlorate"

## 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.  
 Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

## 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.
- Nausea and vomiting are almost always apparent after chlorate poisonings usually with upper stomach pain. Diarrhea may also occur. Chlorates are poisonous to the kidney and this can cause death. Healing can be slow and kidney symptoms last weeks. Often there is severe blood cell damage.

#### EYE

- Evidence exists, or practical experience predicts, that the material may cause eye irritation in a substantial number of individuals. Prolonged eye contact may cause inflammation characterized by a temporary redness of the conjunctiva (similar to windburn).

#### SKIN

- There is some evidence to suggest that the material may cause mild but significant inflammation of the skin either following direct contact or after a delay of some time. Repeated exposure can cause contact dermatitis which is characterized by redness, swelling and blistering.
- 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.

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.

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.

## Section 3 - COMPOSITION / INFORMATION ON INGREDIENTS

NAME	CAS RN	%
sodium chlorate	7775-09-9	>99

## 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:
- For advice, contact a Poisons Information Center or a doctor.
- Urgent hospital treatment is likely to be needed.
- If conscious, give water to drink.
- INDUCE vomiting with fingers down the back of the throat, ONLY IF CONSCIOUS. Lean patient forward or place on left side (head-down position, if possible) to maintain open airway and prevent aspiration.

NOTE: Wear a protective glove when inducing vomiting by mechanical means.

- In the mean time, qualified first-aid personnel should treat the patient following observation and employing supportive measures as indicated by the patient's condition.
- If the services of a medical officer or medical doctor are readily available, the patient should be placed in his/her care and a copy of the MSDS should be provided. Further action will be the responsibility of the medical specialist.
- If medical attention is not available on the worksite or surroundings send the patient to a hospital together with a copy of the MSDS.

### 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.
- If pain persists or recurs seek medical attention.
- Removal of contact lenses after an eye injury should only be undertaken by skilled personnel.

### SKIN

- If skin contact occurs:
- Immediately remove all contaminated clothing, including footwear
- Flush skin and hair with running water (and soap if available).
- Seek medical attention in event of irritation.

### INHALED

- 
- If dust is inhaled, remove from contaminated area.
- Encourage patient to blow nose to ensure clear passage of breathing.
- If irritation or discomfort persists seek medical attention.

### NOTES TO PHYSICIAN

■ 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. Hemodialysis, 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

Treatment regime for bromates may also act as a guide for chlorate poisonings.

- Syrup of Ipecac or gastric lavage with tap water or perhaps a 1% solution of sodium thiosulfate
- Administer a demulcent and an analgesic like meperidine (Demerol). Avoid morphine.
- If readily available, the prompt use of hemodialysis or peritoneal lavage may serve to remove absorbed but unreacted chlorate in significant amounts.
- Administer oxygen. If methemoglobinemia becomes severe a replacement transfusion with whole blood may become necessary.
- DO NOT attempt to correct methemoglobinemia with methylene blue as the dye may enhance the toxicity.
- Sodium thiosulfate solution (100 to 500 ml of 1%) by intravenous drip has been recommended by some authors.
- Correct dehydration by infusing intravenously a glucose solution (5% in water). Avoid electrolytes (except as above) unless acid-base imbalance or shock becomes severe.
- Supportive treatment of acute renal failure. [GOSELIN et al, Clinical Toxicology of Commercial Products, Fifth Edition]

## Section 5 - FIRE FIGHTING MEASURES

Vapour Pressure (mmHG):	Not applicable
Upper Explosive Limit (%):	Not applicable
Specific Gravity (water=1):	2.5 @ 15 C
Lower Explosive Limit (%):	Not applicable

### EXTINGUISHING MEDIA

■ FOR SMALL FIRE:

- USE FLOODING QUANTITIES OF WATER.
- DO NOT use dry chemicals, CO<sub>2</sub> or foam.

FOR LARGE FIRE:

- Flood fire area with water from a protected position.

## **FIRE FIGHTING**

- 
- Alert Emergency Responders and tell them location and nature of hazard.
- May be violently or explosively reactive.
- Wear breathing apparatus plus protective gloves.
- Prevent, by any means available, spillage from entering drains or water course. Consider evacuation.
- Fight fire from a safe distance, with adequate cover.
- Extinguishers should be used only by trained personnel.
- Use water delivered as a fine spray to control fire and cool adjacent area.
- Avoid spraying water onto liquid pools.
- DO NOT approach containers suspected to be hot.
- Cool fire exposed containers with water spray from a protected location.
- If safe to do so, remove containers from path of fire.
- If fire gets out of control withdraw personnel and warn against entry.
- Equipment should be thoroughly decontaminated after use.

## **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.
- Heat affected containers remain hazardous.
- Contact with combustibles such as wood, paper, oil or finely divided metal may cause ignition, combustion or violent decomposition.
- May emit irritating, poisonous or corrosive fumes.

Decomposition may produce toxic fumes of: hydrogen chloride, metal oxides.

## **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:

Safety Glasses.

Full face- shield.

Gloves:

Respirator:

Particulate

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

### **MINOR SPILLS**

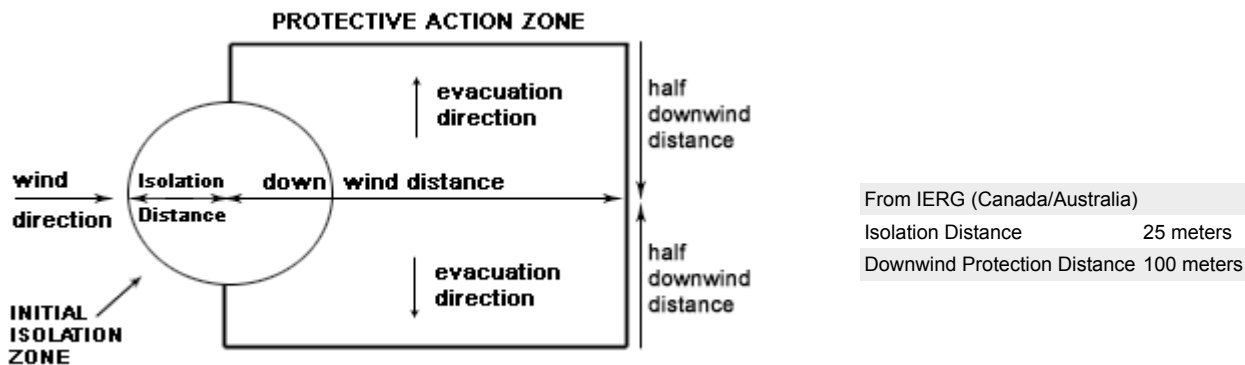
- 
- Clean up all spills immediately.
- No smoking, naked lights, ignition sources.
- Avoid all contact with any organic matter including fuel, solvents, sawdust, paper or cloth and other incompatible materials; as ignition may result.
- Avoid breathing dust or vapors and all contact with skin and eyes.
- Control personal contact by using protective equipment.
- Contain and absorb spill with dry sand, earth, inert material or vermiculite
- DO NOT use sawdust as fire may result.
- Scoop up solid residues and seal in labeled drums for disposal.
- Neutralize/decontaminate area.

### **MAJOR SPILLS**

- 
- Clear area of personnel and move upwind.
- Alert Emergency Responders and tell them location and nature of hazard.
- May be violently or explosively reactive.
- Wear breathing apparatus plus protective gloves.
- Prevent, by any means available, spillage from entering drains or water courses.
- Consider evacuation.
- No smoking, flames or ignition sources.
- Increase ventilation.
- Contain spill with sand, earth or other clean, inert materials.
- NEVER use organic absorbents such as sawdust, paper or cloth.
- Use spark-free and explosion-proof equipment.
- Collect any recoverable product into labeled containers for possible recycling.
- Avoid contamination with organic matter to prevent subsequent fire and explosion.
- DO NOT mix fresh with recovered material.
- Collect residues and seal in labeled drums for disposal.
- Wash area and prevent runoff into drains.

- Decontaminate equipment and launder all protective clothing before storage and re-use.
- If contamination of drains or waterways occurs advise emergency services.

## PROTECTIVE ACTIONS FOR SPILL



From US Emergency Response Guide 2000 Guide 140

## FOOTNOTES

1 PROTECTIVE ACTION ZONE is defined as the area in which people are at risk of harmful exposure. This zone assumes that random changes in wind direction confines the vapour plume to an area within 30 degrees on either side of the predominant wind direction, resulting in a crosswind protective action distance equal to the downwind protective action distance.

2 PROTECTIVE ACTIONS should be initiated to the extent possible, beginning with those closest to the spill and working away from the site in the downwind direction. Within the protective action zone a level of vapour concentration may exist resulting in nearly all unprotected persons becoming incapacitated and unable to take protective action and/or incurring serious or irreversible health effects.

3 INITIAL ISOLATION ZONE is determined as an area, including upwind of the incident, within which a high probability of localised wind reversal may expose nearly all persons without appropriate protection to life-threatening concentrations of the material.

4 SMALL SPILLS involve a leaking package of 200 litres (55 US gallons) or less, such as a drum (jerrican or box with inner containers). Larger packages leaking less than 200 litres and compressed gas leaking from a small cylinder are also considered "small spills". LARGE SPILLS involve many small leaking packages or a leaking package of greater than 200 litres, such as a cargo tank, portable tank or a "one-tonne" compressed gas cylinder.

5 Guide 140 is taken from the US DOT emergency response guide book.

6 IERG information is derived from CANUTEC - Transport Canada.

## ACUTE EXPOSURE GUIDELINE LEVELS (AEGL) (in ppm)

AEGL 1: The airborne concentration of a substance above which it is predicted that the general population, including susceptible individuals, could experience notable discomfort, irritation, or certain asymptomatic nonsensory effects. However, the effects are not disabling and are transient and reversible upon cessation of exposure.

AEGL 2: The airborne concentration of a substance above which it is predicted that the general population, including susceptible individuals, could experience irreversible or other serious, long-lasting adverse health effects or an impaired ability to escape.

AEGL 3: The airborne concentration of a substance above which it is predicted that the general population, including susceptible individuals, could experience life-threatening health effects or death.

## 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.
- Keep cool, dry and away from incompatible materials.
- Avoid physical damage to containers.
- DO NOT repack or return unused portions to original containers.
- Withdraw only sufficient amounts for immediate use.
- Contamination can lead to decomposition leading to possible intense heat and fire.
- When handling NEVER smoke, eat or drink.
- Always wash hands with soap and water after handling.
- Use only good occupational work practice.
- Observe manufacturer's storing and handling directions.

### RECOMMENDED STORAGE METHODS

- DO NOT use aluminum or galvanized containers.
  - 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.

For materials with a viscosity of at least 2680 cSt. (23 deg. C) and solids:

- Removable head packaging and
- cans with friction closures may be used.

- Where combination packages are used, and the inner packages are of glass, there must be sufficient inert cushioning material in contact with inner and outer packages \* . - In addition, where inner packagings are glass and contain liquids of packing group I and II there must be sufficient inert absorbent to absorb any spillage \* . - \* unless the outer packaging is a close fitting molded plastic box and the substances are not incompatible with the plastic.

### 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.

### SAFE STORAGE WITH OTHER CLASSIFIED CHEMICALS



X: Must not be stored together

O: May be stored together with specific preventions

+: May be stored together

## 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
US - Oregon Permissible Exposure Limits (Z-3)	sodium chlorate (Inert or Nuisance Dust: Total dust)		10						(d)
US OSHA Permissible Exposure Levels (PELs) - Table Z3	sodium chlorate (Inert or Nuisance Dust: (d) Respirable fraction)		5						
US OSHA Permissible Exposure Levels (PELs) - Table Z3	sodium chlorate (Inert or Nuisance Dust: (d) Total dust)		15						
US - Hawaii Air Contaminant Limits	sodium chlorate (Particulates not other wise regulated - Total dust)		10						
US - Hawaii Air Contaminant Limits	sodium chlorate (Particulates not other wise regulated - Respirable fraction)		5						
US - Oregon Permissible Exposure Limits (Z-3)	sodium chlorate (Inert or Nuisance Dust: Respirable fraction)		5						(d)
US ACGIH Threshold Limit Values (TLV)	sodium chlorate (Particles (Insoluble or Poorly Soluble) [NOS] Inhalable particles)		10						See Appendix B current TLV/BEI Book
US - Tennessee Occupational Exposure Limits - Limits For Air Contaminants	sodium chlorate (Particulates not otherwise regulated Respirable fraction)		5						

US - Wyoming Toxic and Hazardous Substances Table Z1 Limits for Air Contaminants	sodium chlorate (Particulates not otherwise regulated (PNOR)(f)- Respirable fraction)	5	
US - Michigan Exposure Limits for Air Contaminants	sodium chlorate (Particulates not otherwise regulated, Respirable dust)	5	
Canada - Prince Edward Island Occupational Exposure Limits	sodium chlorate (Particles (Insoluble or Poorly Soluble) [NOS] Inhalable particles)	10	See Appendix B current TLV/BEI Book

## MATERIAL DATA

### SODIUM CHLORATE:

■ It is the goal of the ACGIH (and other Agencies) to recommend TLVs (or their equivalent) for all substances for which there is evidence of health effects at airborne concentrations encountered in the workplace.

At this time no TLV has been established, even though this material may produce adverse health effects (as evidenced in animal experiments or clinical experience). Airborne concentrations must be maintained as low as is practically possible and occupational exposure must be kept to a minimum.

NOTE: The ACGIH occupational exposure standard for Particles Not Otherwise Specified (P.N.O.S) does NOT apply.

Sensory irritants are chemicals that produce temporary and undesirable side-effects on the eyes, nose or throat. Historically occupational exposure standards for these irritants have been based on observation of workers' responses to various airborne concentrations. Present day expectations require that nearly every individual should be protected against even minor sensory irritation and exposure standards are established using uncertainty factors or safety factors of 5 to 10 or more. On occasion animal no-observable-effect-levels (NOEL) are used to determine these limits where human results are unavailable. An additional approach, typically used by the TLV committee (USA) in determining respiratory standards for this group of chemicals, has been to assign ceiling values (TLV C) to rapidly acting irritants and to assign short-term exposure limits (TLV STELs) when the weight of evidence from irritation, bioaccumulation and other endpoints combine to warrant such a limit. In contrast the MAK Commission (Germany) uses a five-category system based on intensive odour, local irritation, and elimination half-life. However this system is being replaced to be consistent with the European Union (EU) Scientific Committee for Occupational Exposure Limits (SCOEL); this is more closely allied to that of the USA.

OSHA (USA) concluded that exposure to sensory irritants can:

- cause inflammation
- cause increased susceptibility to other irritants and infectious agents
- lead to permanent injury or dysfunction
- permit greater absorption of hazardous substances and
- acclimate the worker to the irritant warning properties of these substances thus increasing the risk of overexposure.

## PERSONAL PROTECTION



Consult your EHS staff for recommendations

### EYE

- 
- Chemical goggles.
- Full face shield.
- Contact lenses pose a special hazard; soft lenses may absorb irritants and all lenses concentrate them.

### 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: 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.
- PVC protective suit may be required if exposure severe.
- Eyewash unit.
- Ensure there is ready access to a safety shower.
- 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.
- 
- Respirators may be necessary when engineering and administrative controls do not adequately prevent exposures.
- The decision to use respiratory protection should be based on professional judgment that takes into account toxicity information, exposure measurement data, and frequency and likelihood of the worker's exposure - ensure users are not subject to high thermal loads which may result in heat stress or distress due to personal protective equipment (powered, positive flow, full face apparatus may be an option).
- Published occupational exposure limits, where they exist, will assist in determining the adequacy of the selected respiratory . These may be government mandated or vendor recommended.
- Certified respirators will be useful for protecting workers from inhalation of particulates when properly selected and fit tested as part of a complete respiratory protection program.
- Use approved positive flow mask if significant quantities of dust becomes airborne.
- Try to avoid creating dust conditions.

## RESPIRATOR

Protection Factor	Half-Face Respirator	Full-Face Respirator	Powered Air Respirator
10 x PEL	P1 Air-line*	-	PAPR-P1
50 x PEL	Air-line**	P2	PAPR-P2
100 x PEL	-	P3 Air-line*	-
100+ x PEL	-	Air-line**	PAPR-P3

\* - Negative pressure demand \*\* - Continuous flow

Explanation of Respirator Codes:

Class 1 low to medium absorption capacity filters.

Class 2 medium absorption capacity filters.

Class 3 high absorption capacity filters.

PAPR Powered Air Purifying Respirator (positive pressure) cartridge.

Type A for use against certain organic gases and vapors.

Type AX for use against low boiling point organic compounds (less than 65°C).

Type B for use against certain inorganic gases and other acid gases and vapors.

Type E for use against sulfur dioxide and other acid gases and vapors.

Type K for use against ammonia and organic ammonia derivatives

Class P1 intended for use against mechanically generated particulates of sizes most commonly encountered in industry, e.g. asbestos, silica.

Class P2 intended for use against both mechanically and thermally generated particulates, e.g. metal fume.

Class P3 intended for use against all particulates containing highly toxic materials, e.g. beryllium.

The local concentration of material, quantity and conditions of use determine the type of personal protective equipment required.

Use appropriate NIOSH-certified respirator based on informed professional judgement. In conditions where no reasonable estimate of exposure can be made, assume the exposure is in a concentration IDLH and use NIOSH-certified full face pressure demand SCBA with a minimum service life of 30 minutes, or a combination full facepiece pressure demand SAR with auxiliary self-contained air supply. Respirators provided only for escape from IDLH atmospheres shall be NIOSH-certified for escape from the atmosphere in which they will be used.

## ENGINEERING CONTROLS

■ Local exhaust ventilation usually required. If risk of overexposure exists, wear an approved respirator. Correct fit is essential to obtain adequate protection an approved self contained breathing apparatus (SCBA) may be required in some situations. Provide adequate ventilation in warehouse or closed storage area.

Air contaminants generated in the workplace possess varying "escape" velocities which, in turn, determine the "capture velocities" of fresh circulating air required to effectively remove the contaminant.

Type of Contaminant:	Air Speed:
solvent, vapors, degreasing etc., evaporating from tank (in still air).	0.25-0.5 m/s (50-100 f/min.)
aerosols, fumes from pouring operations, intermittent container filling, low speed conveyer transfers, welding, spray drift, plating acid fumes, pickling (released at low velocity into zone of active generation)	0.5-1 m/s (100-200 f/min.)
direct spray, spray painting in shallow booths, drum filling, conveyer loading, crusher dusts, gas discharge (active generation into zone of rapid air motion)	1-2.5 m/s (200-500 f/min.)



grinding, abrasive blasting, tumbling, high speed wheel generated dusts (released at high initial velocity into zone of very high rapid air motion). 2.5-10 m/s (500-2000 f/min.)

Within each range the appropriate value depends on:

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

Simple theory shows that air velocity falls rapidly with distance away from the opening of a simple extraction pipe. Velocity generally decreases with the square of distance from the extraction point (in simple cases). Therefore the air speed at the extraction point should be adjusted, accordingly, after reference to distance from the contaminating source. The air velocity at the extraction fan, for example, should be a minimum of 1-2 m/s (200-400 f/min) for extraction of solvents generated in a tank 2 meters distant from the extraction point. Other mechanical considerations, producing performance deficits within the extraction apparatus, make it essential that theoretical air velocities are multiplied by factors of 10 or more when extraction systems are installed or used.

## Section 9 - PHYSICAL AND CHEMICAL PROPERTIES

### PHYSICAL PROPERTIES

Solid.

Mixes with water.

State	Divided solid	Molecular Weight	106.44
Melting Range (°F)	478.4- 501.8	Viscosity	Not Applicable
Boiling Range (°F)	Decomposes	Solubility in water (g/L)	Miscible
Flash Point (°F)	Not Applicable	pH (1% solution)	7
Decomposition Temp (°F)	Not Available	pH (as supplied)	Not applicable
Autoignition Temp (°F)	Not available.	Vapour Pressure (mmHG)	Not applicable
Upper Explosive Limit (%)	Not applicable	Specific Gravity (water=1)	2.5 @ 15 C
Lower Explosive Limit (%)	Not applicable	Relative Vapor Density (air=1)	Not applicable
Volatile Component (%vol)	Not applicable.	Evaporation Rate	Not applicable

### APPEARANCE

Colourless, odourless, deliquescent crystals. Soluble in water and alcohol. Solubility in water is decreased by salt, sodium chloride. CARE: Strong oxidising agent.

## 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 polymerization will not occur.
- Presence of elevated temperatures.
- Presence of incompatible materials

### STORAGE INCOMPATIBILITY

- Contact with acids produces toxic fumes
- Metals and their oxides or salts may react violently with chlorine trifluoride. Chlorine trifluoride is a hypergolic oxidizer. It ignites on contact (without external source of heat or ignition) with recognized 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.
- 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.

BRETHERRICKS HANDBOOK OF REACTIVE CHEMICAL HAZARDS, 4th Edition.

- 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.

Avoid storage with reducing agents.

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

## Section 11 - TOXICOLOGICAL INFORMATION

sodium chlorate

### TOXICITY AND IRRITATION

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

TOXICITY	IRRITATION
Oral (man) TDLo: 286 mg/kg	Skin (rabbit): 500 mg/24h - Mild
Oral (rat) LD50: 1200 mg/kg	Eye (rabbit): 10 mg - Mild

- The material may be irritating to the eye, with prolonged contact causing inflammation. Repeated or prolonged exposure to irritants may produce conjunctivitis.

The material may cause 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.

## Section 12 - ECOLOGICAL INFORMATION

Refer to data for ingredients, which follows:

### SODIUM CHLORATE:

- Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.
- 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.

- Chlorate is highly soluble in water (95.7 g/100 ml at 20 deg. C) and will therefore be uniformly distributed in groundwater or surface waters and be readily presented to aquatic organisms.

- The high solubility of chlorate implies that it does not easily adsorb to particulates nor bioaccumulate in biota.
- The chlorate anion is chemically stable under environmental conditions.
- Chlorate is a nitrate analogue, i.e., once chlorate is in the marine environment, it can be taken up by microalgae and macroalgae using the same mechanism as nitrate

The above combination of chlorate solubility, stability, and mobility creates the potential for both localised and area-wide potential effects of ecotoxicological interest.

Chlorate can easily be removed under anoxic conditions by mixed microbial cultures. There are numerous strains of micro-organisms capable of reducing both chlorate and perchlorate under anoxic conditions. Chlorate is non-toxic to wastewater bacterial assemblages at concentrations <1,000 mg/L. Due to the low oxygen concentration in anoxic selector basins, facultative anaerobic bacteria use the oxygen bound in chlorate for respiration, and reduce chlorate in the process. Under anaerobic conditions, chlorate (ClO<sub>3</sub><sup>-</sup>) is first converted to chlorite (ClO<sub>2</sub><sup>-</sup>) by the enzyme chlorate reductase, which is present in perchlorate- and chlorate-reducing bacteria. In the second step, chlorite is disproportionated to chloride (Cl<sup>-</sup>) and molecular oxygen (O<sub>2</sub>) by the non-respiratory enzyme chlorite dismutase, which catalyses the reaction. The presence of chlorite dismutase is a prerequisite for the growth of perchlorate- and chlorate reducing bacteria as chlorite is

toxic due to its high reactivity. The chlorite dismutase enzyme is present in all dissimilatory perchlorate- and chlorate reducing bacteria in the environment, because chlorate is a strong oxidizing agent (oxidation state V), it gets reduced to chlorine species in lower oxidation states, such as the oxyanions chlorite (ClO<sub>2</sub><sup>-</sup>, oxidation state III) and hypochlorite (ClO<sup>-</sup>, oxidation state I), chlorine dioxide (oxidation state IV), and chloride (oxidation state -I). Thus, at least some, and possibly a substantial, reduction of the chlorate resulting from the application of chlorate is likely to occur in the field prior to any runoff to surface water. Under environmental (terrestrial field) redox conditions, and based on chemical equilibria alone, the thermodynamically favored, end reduction product of chlorate in soil and in water is the chloride anion. Any intermediate chlorine dioxide that may form under environmental conditions will undergo photochemical reactions when exposed to sunlight. The chlorine oxyanions, chlorite and hypochlorite (other possible more reduced intermediates in the ultimate reduction of chlorate to chloride), are strong oxidizers in themselves; thus, they are also reduced and/or undergo disproportionation reactions. Although reduction reactions of chlorate, chlorite, and hypochlorite are said to occur very fast, how fast they occur is not known (i.e., the actual rate constants in the environment are not known). Therefore, at any given time the distribution of reduced species (type and concentration) cannot be estimated. However, it is unlikely that a single reduced species would be present for any length of time.

Dietary exposure (food only) to inorganic chlorates as the chlorate ion (ClO<sub>3</sub><sup>-</sup>) may be expected from the translocation of very small amounts of chlorate ion by plants (translocation of significant amounts would be phytotoxic to plants) from the environment which may be present as a result of inorganic chlorate uses.

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.

Based on the very low vapor pressure and very high solubility of chlorate ion in water, chlorate is not expected to volatilize from soil or water. In addition, the low log n-octanol/water partition coefficient indicates that chlorates have low potential to bioaccumulate.

Inorganic chlorates are generally completely ionized in water, producing chlorate (ClO<sub>3</sub><sup>-</sup>) anion. Anions do not bind readily to soil or sediment particulates and, therefore, are expected to be very mobile. Assuming that chlorate does not undergo any redox reactions, it is expected to be very mobile and to partition predominantly into the water. However, extensive redox reactions are expected to occur in the environment that will reduce the concentration of chlorate in the water column. The redox chemistry of chlorate affects its behavior in soils and natural water. Therefore, identification of the conditions under which chlorate and other oxyanions of chlorine may predominate is an important consideration in the environmental fate and risk assessment of chlorate. The oxidation-reduction reactions of chlorate with organic matter and other inorganic chemical species are very complex and depend on the redox conditions of the media, nature and concentration of reductants, chlorate concentration, temperature, pH, and degree of moisture (soils). For example, chlorate is generally more stable under alkaline than acidic conditions; however, when a chemical element (chlorine) can exist in two or more oxidation states (i.e., chlorite and chlorate), the redox potential of the media also effects the predominance of the reduction products. Nitrate concentrations in soil and water (as well as other physical and chemical properties of soil and water) play an important role in the redox chemistry of chlorate in the environment. The duration of residual activity for sodium chlorate in soil was 3-4 months after using 1,000 liters of a 1% solution/ha. Sodium chlorate may persist in soil for 6 months to 5 years, depending on rate applied, soil type, fertility, organic matter, moisture, and weather conditions. Toxicity in soil is decreased considerably by a high nitrate content, alkaline conditions, and high soil temperatures. Decomposition of the compound occurs more readily in moist soils above 20 degrees C.

Plants absorb sodium chlorate through both roots and leaves. Chlorate is carried downward through the xylem since it kills the phloem tissue. It also increases the rate of respiration, decreasing catalase activity, and depleting the plant's food reserves. Chlorate-injured plants are more susceptible to frost. Sodium chlorate is 30-50 times more toxic to plants than sodium chloride (table salt)

Chlorate is nontoxic (acute toxicity > 100 mg/l) to most of the freshwater and marine species examined. However, chlorate is highly toxic (acute toxicity < 0.1 mg/l) to certain macro brown algal species. The toxicity of chlorate is coupled to its reduction to chlorite and this reduction is linked to an active, functioning nitrate reductase system. Chlorite is toxic to the algae, which do not contain the enzyme chlorite dismutase to convert chlorite into innocuous chloride and oxygen

Sodium chlorate is considered non-toxic to fish. The possible 48-hour LC50 for various species of fish is as high as 10,000 mg/l; other reported literature values confirm low toxicities, e.g.:

- Fish (freshwater) LC50: 7.3-1100 mg/l; NOEC 600-1000 mg/l
- Invertebrates (freshwater) LC50: 2100 - 4100 mg/l; NOEC 52-1000 mg/l
- Aquatic Plants LC50: 133-444 mg/l; NOEC 50-3137 mg/l

Chlorites produced as a result of the reduction of chlorates exhibit low to high environmental toxicity. Environmental conditions dictate the rate and extent of conversion.

Biological uptake of chlorate by phytoplankton appears to be a potential and significant sink for effluent-derived chlorate. Since chlorate is an analogue of nitrate, chlorate will be taken up by the phytoplankton. Once chlorate is in the marine environment, it can be taken up by macroalgae using the same mechanism as nitrate. In brown algae, the uptake of nutrients is an active process and does not simply rely on the slow diffusion of seawater. Nitrate and chlorate are structurally analogous to each other and may potentially be incorporated into the same enzyme active site, as is evidenced by the fact that chlorate can be used as a substrate by various nitrate reductases. There is competition for the active sites on the enzyme system and if nitrate is abundant, it prevents too much chlorate from being reduced. If nitrate concentrations are just high enough to induce the nitrate reductase system, but not high enough to out-compete chlorate for all the active sites, then chlorate may be reduced to chlorite at a maximal rate.

Chlorite toxicity to various aquatic species has been reported:

- Fish (freshwater) LC50: 50.6-420 mg/l; NOEC 32-216 mg/l
- Fish (estuarine/ marine) LC50: 75 mg/l; NOEC 13.9 mg/l
- Invertebrates (freshwater) EC50: 0.027-1.4 mg/l; NOEC 0.003 - 0.4 mg/l
- Invertebrates (estuarine/ marine) EC50: 0.576 - 21.4 mg/l; NOEC 14.3 mg/l
- Aquatic Plants EC50: 1.32 mg/l; NOEC <0.62 mg/l

The long-term toxicity of sodium chlorate to birds resulted in reduced egg production and fertility.

■ DO NOT discharge into sewer or waterways.

### Ecotoxicity

Ingredient	Persistence: Water/Soil	Persistence: Air	Bioaccumulation	Mobility
sodium chlorate			LOW	

### GESAMP/EHS COMPOSITE LIST - GESAMP Hazard Profiles

Name / Cas No / RTECS No	EHS	TRN	A1a	A1b	A1	A2	B1	B2	C1	C2	C3	D1	D2	D3	E1	E2	E3
E2~ / CAS:7775- 09-9 / FO0525000			124	647	Ino	0	0	Ino	1	NI	1	0	(2)	1	1	S	D 2

Legend: EHS=EHS Number (EHS=GESAMP Working Group on the Evaluation of the Hazards of Harmful Substances Carried by Ships)  
 NRT=Net Register Tonnage, A1a=Bioaccumulation log Pow, A1b=Bioaccumulation BCF, A1=Bioaccumulation, A2=Biodegradation,  
 B1=Acuteaquatic toxicity LC/ECIC50 (mg/l), B2=Chronic aquatic toxicity NOEC (mg/l), C1=Acute mammalian oral toxicity LD50 (mg/kg),  
 C2=Acute mammalian dermal toxicity LD50 (mg/kg), C3=Acute mammalian inhalation toxicity LC50 (mg/kg), D1=Skin irritation & corrosion,  
 D2=Eye irritation & corrosion, D3=Long-term health effects, E1=Tainting, E2=Physical effects on wildlife & benthic habitats, E3=Interference  
 with coastal amenities, For column A2: R=Readily biodegradable, NR=Not readily biodegradable. For column D3: C=Carcinogen,  
 M=Mutagenic, R=Reprotoxic, S=Sensitising, A=Aspiration hazard, T=Target organ systemic toxicity, L=Lunginjury, N=Neurotoxic,  
 I=Immunotoxic. For column E1: NT=Not tainting (tested), T=Tainting test positive. For column E2: Fp=Persistent floater, F=Floater, S=Sinking  
 substances. The numerical scales start from 0 (no hazard), while higher numbers reflect increasing hazard. (GESAMP/EHS Composite List  
 of Hazard Profiles - Hazard evaluation of substances transported by ships)

## 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.
- If manganese, chromium or molybdenum are present adjust the pH of the solution to 7 and treat with sulfide to precipitate for burial as a hazardous waste. Destroy excess sulfide, neutralize and flush the solution down the drain (subject to State and Local Regulation).

[Sigma/Aldrich].

- Recycle wherever possible or consult manufacturer for recycling options.
- Consult Waste Management Authority for disposal.
- Bury residue in an authorized landfill.
- Recycle containers where possible, or dispose of in an authorized landfill.

## Section 14 - TRANSPORTATION INFORMATION



DOT:

Symbols:	None	Hazard class or Division:	5.1
Identification Numbers:	UN1495	PG:	II
Label Codes:	5.1	Special provisions:	A9, IB8, IP2, IP4, N34, T3, TP33
Packaging: Exceptions:	152	Packaging: Non-bulk:	212
Packaging: Exceptions:	152	Quantity limitations: Passenger aircraft/rail:	5 kg

Quantity Limitations: Cargo aircraft only: 25 kg Vessel stowage: Location: A

Vessel stowage: Other: 56, 58

Hazardous materials descriptions and proper shipping names:

Sodium chlorate

#### Air Transport IATA:

ICAO/IATA Class:	5.1	ICAO/IATA Subrisk:	None
UN/ID Number:	1495	Packing Group:	II
Special provisions:	None		

Shipping Name: SODIUM CHLORATE

#### Maritime Transport IMDG:

IMDG Class:	5.1	IMDG Subrisk:	None
UN Number:	1495	Packing Group:	II
EMS Number:	F-H , S-Q	Special provisions:	None

Limited Quantities: 1 kg

Shipping Name: SODIUM CHLORATE

## Section 15 - REGULATORY INFORMATION



### REGULATIONS

#### sodium chlorate (CAS: 7775-09-9) 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)", "Canada Toxicological Index Service - Workplace Hazardous Materials Information System - WHMIS (French)", "GESAMP/EHS Composite List - GESAMP Hazard Profiles", "IMO IBC Code Chapter 17: Summary of minimum requirements", "IMO MARPOL 73/78 (Annex II) - List of Other Liquid Substances", "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 Department of Homeland Security Chemical Facility Anti-Terrorism Standards - Chemicals of Interest", "US DOE Temporary Emergency Exposure Limits (TEELs)", "US EPA High Production Volume Chemicals Additional List", "US FDA Indirect Food Additives: Adhesives and Components of Coatings - Substances for Use Only as Components of Adhesives - Adhesives", "US NFPA 1 Annex B Typical Oxidizers", "US Postal Service (USPS) Hazardous Materials Table: Postal Service Mailability Guide", "US Toxic Substances Control Act (TSCA) - Inventory", "USA: Chemical Facility Anti-Terrorism Standards - List Appendix A - 6CFR 27"

## 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\*.

\* (limited evidence).

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- Classification of the mixture 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. 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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