



MATERIAL SAFETY DATA SHEET

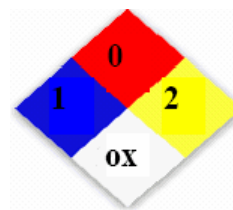
Sodium Chlorate

For more detailed information on the hazards of this product, contact Chemical Safety and Health Department or Medical Services Department at the address below. Technical Information Bulletin may also be available.

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT IDENTIFICATION

Brand Name..... Sodium chlorate
 Chemical Name Sodium chlorate
 Common Name..... Sodium chlorate
 Formula NaClO₃
 Molecular Weight..... 106.44
 Product Use Non-selective herbicide; raw material in the manufacture of chlorine dioxide; oxidizing agent in chemical manufacture.
 Canadian PIN 1495



MANUFACTURER

Tronox
 123 Robert S. Kerr Avenue
 Oklahoma City, Oklahoma 73102
 United States

EMERGENCY TELEPHONE NUMBER

1-866-775-5009 (24 hours)

2. COMPOSITION/INFORMATION ON INGREDIENTS

	CHEMICAL NAME	CAS NUMBER	WEIGHT %
Sodium Chlorate		7775-09-9	99.5

See Section 15 for OSHA Regulatory Status.

3. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

Odorless, white granular solid; soluble in water. Harmful if swallowed. May be irritating to the respiratory system if inhaled, or to eyes or skin in case of contact.

DANGER! Strong oxidizer. Contact with other materials such as paper, wood, hydrocarbons, petroleum products, and clothing may cause fire or explosion. Can produce shock-sensitive mixtures. Thermally unstable at elevated temperatures.

In case of a spill, wear full protective equipment (See Section 8).

Will not burn in a fire, but may cause combustible materials to ignite; it will accelerate the burning of other materials and increase the fire hazard. In case of a fire, **use water only**. Use flooding amounts for a large fire.

POTENTIAL HEALTH EFFECTS

PRIMARY ROUTE(S) OF ENTRY

Inhalation (breathing); eye and skin contact; ingestion (swallowing).

SYMPTOMS OF EXPOSURE

Inhalation: Irritation or burning in the respiratory tract; coughing and sneezing.

Eye Contact: Itching or mild irritation.

Skin Contact: Itching or mild irritation; prolonged and repeated contact may cause dermatitis

Ingestion: The primary target organ in humans is blood; effects include hemolysis and methemoglobinemia-carboxyhemoglobinemia. Ingesting large quantities can cause abdominal pain, nausea, and diarrhea, possibly with dark blood, cyanosis (blue lips, tongue, mucous membranes, with slate gray skin color), possibly progressing to headache, difficulty in breathing, dizziness, seizures, or coma. Large doses can cause kidney or liver damage, and may be fatal.

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE

Breathing or respiratory disorders, digestive tract, kidney and blood disorders could be aggravated by exposure to this chemical.

REPORTED AS CARCINOGEN OR POTENTIAL CARCINOGEN

Not Applicable

OSHA

National Toxicology Program (NTP)

International Agency for Research on Cancer (IARC)

4. FIRST AID MEASURES

Inhalation: If inhaled, remove to fresh air. If not breathing, clear airway and start mouth-to-mouth artificial respiration or use a bag-mask respirator. Get immediate medical attention. If victim is having trouble breathing, transport to medical care and, if available, give supplemental oxygen.

Eye contact: Immediately rinse eyes with water. Remove any contact lenses, and continue flushing eyes with running water for at least 15 minutes. Hold eyelids apart to ensure rinsing of the entire surface of the eye and lids with water. Get immediate medical attention.

Skin Contact: Wash affected areas with plenty of water, and soap if available, for several minutes. Remove and clean contaminated clothing and shoes. Seek medical attention if irritation develops or persists.

Ingestion: Immediately give 3-4 glasses of water, and induce vomiting. Give fluids until vomitus is clear. Do not induce vomiting or give anything by mouth to an unconscious person of convulsing person. Get immediate medical attention.

NOTE TO PHYSICIAN

Chemical of exposure is sodium chlorate, a strong oxidizer and methemoglobin former. Cyanosis, resistant to oxygen therapy, may be noted within several hours following inhalation or ingestion. Large doses can affect the kidneys, liver, and central nervous system, and may be fatal (see Section 11 for toxicological data).

5. FIRE FIGHTING MEASURES

Flash Point and Method N/A

GENERAL HAZARD

This product is not flammable, but may cause combustible materials to ignite; it will accelerate the burning of these materials and increase the fire hazard. Thermally unstable under fire conditions; may undergo a violent decomposition.

EXTINGUISHING MEDIA

Use water only. For small fires, **do not** use CO₂ or dry chemical. For large fires, use flooding quantities of water as fog or spray applied from a distance. For a massive fire in a storage area use an unmanned hose holder or monitor nozzles; if this is impossible, withdraw from the area and let the fire burn.

SPECIAL FIREFIGHTING INSTRUCTIONS

Keep unnecessary people away; isolate hazard area and deny entry. **DO NOT** attempt to fight a large fire unless you are a trained fire fighter. Approach fire from upwind to avoid hazardous vapors and toxic decomposition products. Cool fire-exposed containers with water spray until well after fire is out. Extinguish fire using agent suitable for surrounding fire.

FIREFIGHTING EQUIPMENT

Wear a NIOSH-approved, positive-pressure self-contained breathing apparatus and full protective gear.

6. ACCIDENTAL RELEASE MEASURES

Wear appropriate protective equipment (See Section 8).

ON LAND

Do not create dust. Scoop up with a shovel or sweep up with a synthetic fiber broom and place in metal container. Do not mix with combustible materials. Application of sodium carbonate, borax, or calcium chloride as a diluent and absorbent will reduce the fire hazard. Dispose of as a hazardous waste under federal, state and local regulations.

IN WATER

Absorb with a noncombustible absorbent (vermiculite). Place in metal container and dispose of as above.

7. HANDLING AND STORAGE

Wear appropriate protective equipment (See Section 8). Avoid breathing dust. Avoid contact with eyes, skin, and clothing. Washing thoroughly after handling.

HANDLING

Do not taste or swallow. Use only with adequate ventilation. Wash thoroughly after handling. Keep away from food or drinking water.

Clothing, vegetation, hydrocarbons, petroleum products, and other organic materials contaminated with sodium chlorate or its solutions are dangerously flammable. Keep from contact with clothing and other combustible materials. Remove and wash contaminated clothing promptly. Do not wear leather shoes, gloves or belts. Wear

rubber boots and apron to avoid contact with clothing. Always have a water filled jump tank or deluge shower in immediate work area. If your clothing catches fire, **do not** use a fire blanket. Use the jump tank or deluge shower.

Do not smoke when handling. Do not drop, skid, or slide containers. Keep away from fire. Keep from contact with sparks, impact, abrasion, or any other source of heat.

STORAGE

Store in a dry, well-ventilated area, preferably outdoors. Isolate from incompatible materials (See Section 10). Do not store with reducing agents, ammonia, or amines. Store in original, tightly closed container.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

ENGINEERING CONTROLS

Provide local exhaust and general ventilation system. Do not allow accumulation of dust in pipes, structural members, or walkways.

PERSONAL PROTECTION

Respirator: In operations where dust exposure limits are exceeded, use a NIOSH-approved respirator that has been selected by a technically qualified person for the specific work conditions. If respirators are used, OSHA requires compliance with its respiratory protection program (29 CFR 1910.134).

Eye Protection: Wear safety glasses with side shield (or goggles). Wear a full-face respirator, if needed.

Clothing: Where contact is likely, wear chemical-resistant gloves, a chemical suit and chemical-resistant boots. Wear easily washable clothing and rubber boots or shoes. Wash clothing after each shift. If clothing becomes contaminated, keep wet until washed. **DO NOT** wear leather shoes, gloves or belts.*

Other: Eye wash, safety shower or jump tank.

*If you are operating under dry conditions and conductivity is required, leather shoes may be used only if precautions are taken to avoid contamination of the shoes. If leather is inadvertently contaminated, do not reuse; discard as hazardous, flammable articles.

EXPOSURE CONTROLS

COMPONENT	OSHA PEL		ACGIH TLV	
	TWA	STEL	TWA	STEL
Particulates not otherwise classified – inhalable respirable	-	-	10 mg/m ³	N/E
			3 mg/m ³	N/E
Particulates not otherwise classified – total dust respirable fraction	-	N/E	-	-
		N/E		

9. PHYSICAL AND CHEMICAL PROPERTIES

State	Granular solid	Boiling Point °C.....	N/A
Color	White	Bulk Density, lb/cu. Ft.....	approximately 100
Odor.....	None	Weight Per Gallon	N/A
Vapor Pressure.....	N/A	Specific Gravity @ 20 °C ...	2.49
Melting Point °C.....	248	Water Solubility @ 20 °C ...	49.5
		pH.....	N/A

10. STABILITY AND REACTIVITY

REACTIVITY

Normally stable unless contaminated.

INCOMPATIBILITIES

DANGER! Strong oxidizer - contact with other materials may cause fire or explosive mixtures. May react violently with strong reducing agents. DO NOT MIX with charcoal, shellac, sugar, starch, sulfur and sulfur compounds, ammonia, ammonium compounds, amines, acids, phosphorus, metal powders, sawdust, explosives, and other flammable or oxidizable materials including clothing. Can become shock or friction sensitive when mixed with some of these materials.

HAZARDOUS DECOMPOSITION PRODUCTS

If subjected to intense heat, may release toxic and hazardous fumes of sodium oxide, chlorine, and chlorine dioxide.

CONDITIONS TO AVOID

High temperatures; reducing agents.

11. TOXICOLOGICAL INFORMATION

Acute Effects on Humans

Humans appear to be more susceptible than animals to acute effects of exposure to sodium chlorate (see data below). Doses of 100 grams or more are invariably fatal to humans. In a study of 14 cases of poisoning by sodium chlorate, the lowest fatal dose reported occurred in a 46-year old woman who ingested 15 grams (estimated to be 280 mg/kg body weight). In another reported case, however, an 18-year old male survived a dose of 100 grams (estimated to be 1.14 g/kg of body weight) (HSDB, 1998).

The U.S. Environmental Protection Agency (USEPA) reviewed two studies conducted with adult male volunteers that reported the acute No Observable Adverse Effect Level (NOAEL) to be 0.034 mg chlorate ion/kg-day, and the sub-acute NOAEL to be 0.036 mg chlorate ion/kg-day (EPA, 1994).

RTECS FO0525000

LD _{Lo} (human)	214 mg/kg – unreported route
LD _{Lo} (child)	185 mg/kg – unreported route
Oral TD _{Lo} (woman)	800 mg/kg
Oral LD ₅₀ (rat)	1200 mg/kg
Oral LD ₅₀ (mouse)	8350 mg/kg
Oral LD ₅₀ (rabbit)	7200 mg/kg
Oral LD _{Lo} (cat)	1350 mg/kg

Oral LD _{Lo} (dog)	700 mg/kg
Inhalation LC ₅₀ (rat)	>28 g/m ³ /1 hr
Intraperitoneal LD ₅₀ (mouse)	596 mg/kg
Dermal LD ₅₀ (rabbit)	>10 g/kg
Dermal (rabbit)	500 mg/24 hr – mild irritation
Eye (rabbit)	10 mg – mild irritation

Mutation effects were observed in bacteria and insects.

Potential Chronic Effects

In sub-chronic oral studies, the NOAEL for sodium chlorate was found to be: 9 mg/kg-day for Green monkeys dosed via drinking water for 30-60 days (Bercz, et al., 1982); 38-53 mg/kg-day for rats dosed via drinking water for three months (McCauley, et al., 1995); 100 mg/kg-day for rates dosed by gavage for three months (Barrett, 1987a); and 360 mg/kg-day for beagle dogs dosed by gavage for three months (Barrett, 1987b).

In a one-year study on rats dosed via drinking water, no NOAEL was determined; however, the Lowest Observable Adverse Effect Level was 1.8 mg/kg-day (Abdel-Rahmann, et al., 1985).

In a study with pregnant rats, sodium chlorate did not appear to affect either dams or fetuses. The NOAEL appeared to be 1000 mg/kg-day (Schroeder, 1987). No studies of reproductive toxicity of sodium chlorate are available.

Four studies (Wyngaarden, et al., 1952, Greer, et al., 1966, Eskandari, et al., 1997, Van Sande, et al., 2003) indicate that chlorate inhibits iodide uptake by the thyroid. Rats and mice fed drinking water containing sodium chlorate in concentrations up to 2g/L demonstrated decreased T4 levels after 4 days and a concentrationdependent increase in thyroid follicular cell hyperplasia after 90 days (Hooth, et al., 2001). Chlorine dioxide is converted to chlorate and chlorite in vivo. Human volunteers had no detectable thyroid hormone changes after drinking 500 ml of water containing 5 mg/L sodium chlorate each day for 12 weeks (Lubbers, et al., 1982).

Perchlorate is produced during the electrolytic production of chlorates and is present in the finished product in an expected range of approximately 17-22 ppm. Perchlorate can potentially inhibit iodide uptake by the thyroid and result in a decrease in thyroid hormone (Wyngaarden, et al., 1952, Greer, et al., 1966, Eskandari, et al., 1997, Van Sande, et al., 2003). The health effects of perchlorate are being studied by USEPA through the preparation of a toxicity assessment that is currently under review, which is expected to lead to the establishment of a maximum contaminant level for perchlorate in drinking water by 2007.

Sodium dichromate, a source of hexavalent chromium, is necessary to the electrolytic production of chlorates and sodium dichromate is present in the finished product in the range of 1-3 ppm. The State of California has determined in accordance with the Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65) that hexavalent chromium poses a significant risk of cancer when in excess of 0.001 microgram (one onebillionth of a gram) per day could be inhaled.

12. ECOLOGICAL INFORMATION

Sodium chlorate acts as a non-selective contact herbicide, acting as a desiccant; it is a semi-permanent soil sterilant.

Sodium chlorate was found to be weakly toxic to aquatic organisms. (Matida, 1976)

13. DISPOSAL CONSIDERATIONS

RCRA Waste Code:.....D001

Sodium chlorate, including spill cleanups, is prohibited from land disposal without prior treatment. Dispose in accordance with applicable federal, state, and local regulations.

14. TRANSPORT INFORMATION

DOT Proper Shipping NameSodium chlorate
DOT Hazard Class.....5.1 (Oxidizer)
DOT I.D. Number.....UN 1495
DOT Packing Group.....II
Label(s).....Oxidizer
ERG – Guide No.140

TDG Shipping Name.....Sodium chlorate
TDG Classification.....5.1 (Oxidizer)
Product Identification Number.....UN 1495
Packing Group.....II
Label(s).....Oxidizer

IMDG Proper Shipping Name.....Sodium chlorate
IMDG Hazard Class5.1 (Oxidizer)
IMDG I.D. Number.....UN 1495
Packing Group.....II
Label(s).....Oxidizer

IATA Proper Shipping Name.....Sodium chlorate
IATA Hazard Class5.1 (Oxidizer)
IATA I.D. Number.....UN 1495
Packing Group.....II
Label(s).....Oxidizer

15. REGULATORY INFORMATION

OSHA HAZARD COMMUNICATION STANDARD (29 CFR 1910.1200)

Hazardous Non-Hazardous

SAFE DRINKING WATER ACT – MAXIMUM CONTAMINANT LEVELS GOAL

In July, 1994 EPA concluded that existing data are inadequate for developing a maximum contaminant level goal for chlorate. (Federal Register, **59**, No. 145, pp 38691-4, 1994)

CERCLA/SUPERFUND (40 CFR 117, 302)

Chemical Name	RQ (lbs)/(kg)
N/A	

NOAEL - No Observable Adverse Effect Level
PIN – Product Identification Number
RQ - Reportable Quantity
TD_{Lo} - The lowest dose of a substance that causes a specific toxic effect.
TPQ - Threshold Planning Quantity

PREPARATION INFORMATION

Prepared by Safety and Health Department
MSDS No. B-5012
Date Revised:... February 28, 2006
Date of Issue: .. March 2006

Replaces: September 17, 2003

REVISION INFORMATION

Updated with ANSI Standard
Section 1: Updated company name, address, and phone number
Section 14: IMDG/IATA added
Section 15: WHMIS classification changed