

Sodium Hypochlorite ($\leq 10\%$) (Lexi-Tox)

Brand Names: US

Anasept; Anasept Antimicrobial [OTC]; Anasept [OTC]; Avenova; Di-Dak-Sol [OTC]; Epicyn; H-Chlor 12 [OTC]; H-Chlor 6 [OTC]; H-Chlor Wound; Hyclodex; HySept [OTC]

Pharmacologic Category

Disinfectant, Antibacterial (Topical)

CAS Registration

- 7681-52-9
- 8007-59-8

Use

Aqueous solutions of sodium hypochlorite ($\leq 10\%$) are commonly used to remove laundry stains and as a household cleaner. Household laundry bleach usually contains sodium hypochlorite in a concentration of $\sim 5\%$. Additional household products that commonly contain sodium hypochlorite include automatic dishwasher rinses, drain cleaners, household disinfectants, mildew removers, shower and bathtub cleaners, and toilet bowl cleaners. In home maintenance, products that contain sodium hypochlorite are used for cleaning concrete and wood (eg, decks), for swimming pool/spa water maintenance, and for retarding mildew growth. Sodium hypochlorite is also used to decontaminate surfaces that have been contaminated by various biological and chemical terrorism agents.

Clinical Presentation

Dermal: Symptoms ranging from mild irritation and erythema to burns may occur. Household products are less likely to cause significant burns. Children may be more susceptible to adverse reactions.

Ingestion: Household products do not commonly cause severe gastrointestinal problems. The ingestion of a small amount of liquid household bleach (3% to 6%) is unlikely to produce significant toxicity and may result in gastrointestinal irritation, nausea, and vomiting, although the severity may increase when a large volume is ingested. Some bleaches may contain sodium hydroxide. Be sure to check the product ingredients carefully.

Inhalation: Symptoms following inhalation are concentration-dependent and range from mild mucous membrane irritation to dyspnea and bronchospasm.

Mixing household bleach with acids or ammonia can liberate dangerous amount of chlorine (O'Cleireachain 2014) or chloramine, respectively, and may cause respiratory symptoms when the exposure occurs in poorly ventilated or enclosed areas. Ocular and nasal irritation, lacrimation, chest pain (burning), coughing, and sore throat may occur at low concentrations. Higher concentrations can lead to respiratory distress with airway constriction and noncardiogenic pulmonary edema. Significant chlorine inhalation may be complicated by hyperchloremic metabolic acidosis. Children exposed to the same levels of chlorine or chloramine gas may receive a larger dose than an adult because they have

greater lung surface area and more rapid respiratory rate. Children are also more vulnerable than adults because they have smaller airways.

Ocular: Ocular exposure to household bleach may cause only mild irritation if the eyes are rinsed immediately, but effects may be more severe if there is a delay in eye irrigation.

Parenteral: Acute kidney injury has been reported after the intravenous use of hypochlorite solution (Verma 2013).

Comprehensive listing by system (listed alphabetically):

Cardiovascular: Chest pain

Central nervous system: Headache

Dermatologic: Blisters, burns (rare), erythema (common), irritation (common)

Endocrine & metabolic: Hypernatremia (rare), hyperchloremia (rare)

Gastrointestinal: Burns (rare), irritation (common), nausea (common), perforation (rare), vomiting (common)

Local: Pain

Ocular: Blepharospasm, cataracts, chemosis, clouding of the cornea, conjunctival edema, conjunctivitis, iritis, irritation, lacrimation (inhalation or ocular exposure: common), necrosis, photophobia, retinitis

Respiratory: Adult respiratory distress syndrome (rare), cough (common), dyspnea, irritation (common), nasal irritation (inhalation), pneumonitis (may be delayed by 1 to 2 days), pulmonary edema (noncardiogenic), respiratory distress, sore throat, stridor, wheezing

Mechanism of Toxicity

The acute toxicity of sodium hypochlorite stems from the irritant and corrosive properties of the hypochlorite moiety; thus, hypochlorite solutions $\leq 10\%$ are irritating while exposure to $>15\%$ solutions is more likely to result in corrosive injury. Bleach in a solid form has the potential to be especially corrosive.

Diagnosis

Diagnosis should be made based on patient history, physical examination, laboratory findings, and clinical suspicion. The strong odor of bleach may be apparent. Most household product exposures may result in mild irritation of the exposed tissue, but there are rare occasions where more detailed evaluation is required. If the ingestion results in more severe toxicity, refer to [Alkalis](#) for complete information outlining diagnosis and management.

Inhalation: Symptoms of respiratory irritation and a history of household cleaning using multiple products may suggest inhalation exposure to chloramine or [chlorine](#). The use of bleach-containing products in small enclosed spaces (eg, shower stall) may produce upper respiratory irritation. Blood gases should be monitored in patients presenting with acute respiratory symptoms. The development of

chemical pneumonitis can be detected with chest roentgenogram. Initial x-ray may be normal but radiograph changes may occur over a day or two.

Ingestion: Endoscopy may be considered to evaluate gastrointestinal injury in symptomatic patients but is unnecessary in most unintentional ingestions to household laundry bleach. In severe cases, monitor for acidosis and the electrolytes sodium and chloride.

Exposure Control

Containment: Rescue personnel are at low risk of secondary contamination from victims exposed to gases released from hypochlorite solutions; however, first responders should protect themselves from the inhalation of hypochlorite produced gases while rescuing a victim.

Treatment: Stabilization

Initially, evaluate and correct immediate life-threatening complications (eg, airway, breathing, and circulation). This evaluation may be required in patients exposed to gases released from hypochlorite solutions or in patients who have ingested significant quantities of household bleach. The most serious complication of ingestion is gastrointestinal ulceration. This is not typically seen following the ingestion of household products since the concentrations are low, but can occur if significant volumes are ingested. If household bleach is mixed with acids or ammonia in a closed area, the most serious complication would be respiratory distress. If sodium hydroxide is contained in the product, see [Alkalis](#).

Treatment: Decontamination

All contaminated clothing and belongings should be bagged in liquid-occlusive containers and removed from patient care areas to protect health care providers from exposure.

Ingestion: Decontamination or neutralization procedures are not utilized. Administration of syrup of ipecac, gastric lavage, or activated charcoal are contraindicated in the management of alkali ingestion (AACT 2004; Benson 2013; Chyka 2005; Höjer 2013; Vale 2004). Fluids (eg, water) are not contraindicated as long as the volume is not excessive and the patient is not in respiratory distress.

Inhalation: Remove the patient from the source of exposure and into fresh air. Monitor for respiratory distress.

Dermal: Gently wash exposed skin and/or hair with nontoxic, mild detergent and warm water; rinse thoroughly with water. Do not attempt to neutralize the sodium hypochlorite with any substances such as vinegar.

Ocular: Irrigate with copious amounts of tap water or normal saline for at least 15 minutes or until the pH of the conjunctival sac is 8 (may require 1 to 2 hours of irrigation) and stable at that pH for 30 minutes; remove contact lenses if easily removable without causing additional trauma to the eye.

Treatment: Antidote(s)

No specific antidote exists.

Treatment: Pharmacologic Supportive Therapy

Bronchospasm: Aerosolized bronchodilator (eg, albuterol)

Superficial burns: Topical corticosteroid therapy; topical antibiotics if partial-thickness burns with blisters and abrasions.

Treatment: Nonpharmacologic Supportive Therapy

Hypoxia: Treatment may include supplemental oxygen and, if necessary, mechanical ventilation.

Superficial burns: Cold saline water compresses

Patient Disposition

Initial evaluation: The following individuals need to be evaluated in the emergency department (ED):

- Patients who expose themselves to sodium hypochlorite with the intent of self-harm or intentional abuse
- Victims of abuse or neglect who were exposed to sodium hypochlorite with malicious intent
- Symptomatic patients

Emergency department monitoring:

- Patients should be immediately evaluated for possible dermal, ocular, gastrointestinal, and respiratory injury.
- Arterial blood gases should be monitored in patients with respiratory symptoms.

Follow-up recommendations:

- Patients with significant skin or corneal injury should be re-examined within 24 hours.

Criteria for emergency department discharge:

- Asymptomatic patients and those with minor symptoms (irritation of nasal, ocular, respiratory tract) may be discharged from the emergency department after a brief period of observation. Most patients will be symptom-free in less than 1 hour.
- Ocular exposures should be evaluated by an ophthalmologist.

Criteria for hospital admission:

- Patients with significant gastrointestinal or respiratory symptoms should be admitted for observation and further evaluation.
- Patients in respiratory distress may require admission to an intensive care unit.

Complications of Exposure

Chemical irritant-induced asthma (reactive airways dysfunction syndrome) due to toxic gas exposure generated from hypochlorite solutions may occur.

Additional Information

Optimal care decisions are made based upon specific patient details. Consider consultation with a poison control center. To reach poison control centers in the United States and its territories, call 1-800-222-1222.

Dosage Forms: US

Gel, External:

Anasept Antimicrobial [OTC]: 0.057% (86 g)

H-Chlor Wound: 0.062% (85 g)

Liquid, External:

Anasept [OTC]: 0.057% (443 mL); 0.057% (237 mL)

Solution, External:

Avenova: 0.01% [as hypochlorous acid] (40 mL)

Di-Dak-Sol [OTC]: 0.0125% (473 mL)

Epicyn: 237 mL

H-Chlor 6 [OTC]: 0.062% (473 mL)

H-Chlor 12 [OTC]: 0.125% (473 mL)

Hyclodex: 0.012% (59 mL, 237 mL)

HySept [OTC]: 0.5% (473 mL); 0.25% (473 mL)

Generic: 0.125% (473 mL); 0.25% (473 mL); 0.5% (473 mL)

Index Terms

Antiformin; Bleach; Chlorine Bleach; Household Bleach; Hypochlorite; Hypochlorous Acid, Sodium Salt; Liquid Bleach; Modified Dakin's Solution; Sodium Oxychloride

References

Agency for Toxic Substances and Disease Registry. Calcium hypochlorite/sodium hypochlorite. Health effects. U.S. Department of Health and Human Services. 2008. Available at www.atsdr.cdc.gov/MHMI/mmg184.pdf

American Academy of Clinical Toxicology; European Association of Poisons Centres and Clinical Toxicologists. Position paper: ipecac syrup. *J Toxicol Clin Toxicol*. 2004;42(2):133-143. [\[PubMed 15214617\]](#)

American Academy of Clinical Toxicology; European Association of Poisons Centres and Clinical Toxicologists. Position paper: whole bowel irrigation. *J Toxicol Clin Toxicol*. 2004;42(6):843-854. [\[PubMed 15533024\]](#)

American Academy of Clinical Toxicology; European Association of Poisons Centres and Clinical Toxicologists. Position statement and practice guidelines on the use of multi-dose activated charcoal in the treatment of acute poisoning. *J Toxicol Clin Toxicol*. 1999;37(6):731-751. [[PubMed 10584586](#)]

Benson BE, Hoppu K, Troutman WG, et al. Position paper update: gastric lavage for gastrointestinal decontamination. *Clin Toxicol*. 2013;51(3):140-146. [[PubMed 23418938](#)]

Chyka PA, Seger D, Krenzelok EP, Vale JA; American Academy of Clinical Toxicology; European Association of Poisons Centres and Clinical Toxicologists. Position paper: single-dose activated charcoal. *Clin Toxicol*. 2005;43(2):61-87. [[PubMed 15822758](#)]

Cohle SD, Thompson W, Eisenga BH, et al. Unexpected death due to chloramine toxicity in a woman with a brain tumor. *Forensic Sci Int*. 2001;124(2-3):137-139. [[PubMed 11792503](#)]

Gernhardt CR, Eppendorf K, Kozlowski A, et al. Toxicity of concentrated sodium hypochlorite used as an endodontic irrigant. *Int Endod J*. 2004;37(4):272-280. [[PubMed 15056354](#)]

Höjer J, Troutman WG, Hoppu K, et al. Position paper update: ipecac syrup for gastrointestinal decontamination. *Clin Toxicol*. 2013;51(3):134-139. [[PubMed 23406298](#)]

Lam TSK, Wong OF, Tang SYH. A case report of sodium hypochlorite accident. *Hong Kong J Emerg Med*. 2010;17:173-176.

Nikpour S, Masoumi-Moghaddam E, Pazoki S, Hassanian-Moghaddam H, Zamani N. Upper gastrointestinal endoscopic evaluation following household sodium hypochlorite ingestion [published online June 28, 2017]. *J Burn Care Res*. [[PubMed 28661987](#)]

O'Cleireachain MR, Macias LH, Richey KJ, et al. The blue man: burn from muriatic acid combined with chlorinated paint in an adult pool construction worker. *J Burn Care Res*. 2014;35(4):e269-e272. [[PubMed 23811790](#)]

Reisz GR, Gammon RS. Toxic pneumonitis from mixing household cleaners. *Chest*. 1986;89(1):49-52. [[PubMed 3940787](#)]

Ross MP, Spiller HA. Fatal ingestion of sodium hypochlorite bleach with associated hypernatremia and hyperchloremic metabolic acidosis. *Vet Hum Toxicol*. 1999;41(2):82-86. [[PubMed 10192136](#)]

Sue YJ, Delaney KA. Antiseptics, disinfectants and sterilizing agents. *Clin Toxicology*. Ford MD, Delaney KA, Ling LJ, et al, eds. Philadelphia, PA: WB Saunders Co; 2001.

Vale JA, Kulig K, American Academy of Clinical Toxicology; European Association of Poisons Centres and Clinical Toxicologists. Position paper: gastric lavage. *J Toxicol Clin Toxicol*. 2004;42(7):933-943. [[PubMed 15641639](#)]

Verma A, Vanguri VK, Golla V, Rhyee S, Trainor M, Abramov K. Acute kidney injury due to intravenous bleach injection. *J Med Toxicol*. 2013;9(1):71-74. [[PubMed 22961673](#)]

Ward MJ, Routledge PA. Hypernatraemia and hyperchloaemic acidosis after bleach ingestion. *Hum Toxicol*. 1988;7(1):37-38. [[PubMed 3346039](#)]

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