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Material Safety Data Sheets Collection:

Sheet No. 115 Sodium Hypochlorite Aqueous Solution

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Section 1. Material Identification

Sodium Hypochlorite (NaOCl) Aqueous Solution Description: Sodium hypochlorite is derived by addition of chlorine to cold dilute solution of sodium hydroxide. Used as a swimming pool disinfectant; as an intermediate and a reagent; in bleaching paper pulp and textiles; in organic chemicals; in medicine, fungicides, germicides; and in laundering.

Other Designations: CAS No. 7681-52-9; Antiformin;® B-K Liquid;® bleach; Chloros;® chlorox; Clorox;® Dakin's Solution;® Hyclorite;® hypochlorite solution; hypochlorous acid, sodium salt; Milton;® soda bleach liquor.

Manufacturer: Contact your supplier or distributor. Consult the latest *Chemicalweek Buyers' Guide*⁽⁷³⁾ for a suppliers list.

Cautions: Sodium hypochlorite is a strong eye, skin, and mucous membrane irritant. The extent of irritation depends on concentration of sodium hypochlorite and the duration of exposure. Although nonflammable, sodium hypochlorite presents a *dangerous fire and explosion hazard* since it may cause ignition when in contact with organic materials such as paper, wood, or oil.



HMIS
H 3
F 0
R 0

PPG*
* Sec. 8

Section 2. Ingredients and Occupational Exposure Limits

Sodium hypochlorite aqueous solution*

1989 OSHA PEL	1990-91 ACGIH TLV	1988 NIOSH REL	1985-86 Toxicity Data†
None established	None established	None established	Human, cytogenetic analysis, lymphocyte:100 ppm/24 hr Rabbit, eye: 10 mg produces moderate irritation Rat, oral (12% solution), LD ₅₀ : ca 12 mg/kg

* The usual composition of an industrial sodium hypochlorite solution is 10.5% sodium hypochlorite and 0.8 to 2.4% sodium hydroxide. The available chlorine is ~10.0%. Solutions containing excess sodium hydroxide (NaOH) pose an increased alkalinity hazard.

† See NIOSH, RTECS (NH3486300), for additional mutative data.

Section 3. Physical Data

Boiling Point: Decomposes

Specific Gravity (20 °C/4 °C): 5.25%NaOCl (household bleach): 1.09

Melting Point: Decomposes

8.0%NaOCl: 1.15

Vapor Pressure: 17.5 mm Hg at 20 °C

12.0%NaOCl: 1.21

pH: 9 to 10*

Water Solubility: Complete solubility

Molecular Weight: 75.45

Appearance and Odor: Sodium hypochlorite is a white, crystalline solid. The aqueous solution is a clear, pale yellow or greenish liquid with a chlorine odor.

* This is the pH of a neutral solution. Some products may contain an excess of NaOH and have a higher pH.

Section 4. Fire and Explosion Data

Flash Point: None reported

Autoignition Temperature: None reported

LEL: None reported

UEL: None reported

Extinguishing Media: Use dry chemical, CO₂, halon, water spray, or standard foam. Use water spray from a safe distance to cool fire-exposed containers, dilute liquid, and control vapors.

Unusual Fire or Explosion Hazards: Sodium hypochlorite is an oxidizing agent and vigorous reactions can occur with oxidizable materials in a fire situation.

Special Fire-fighting Procedures: Since fire may produce toxic fumes, wear a self-contained breathing apparatus (SCBA) with a full facepiece operated in the pressure-demand or positive-pressure mode and full protective gear. If feasible, remove containers from fire area to prevent pressure rupture. Be aware of runoff from fire control methods. Do not release to sewers or waterways.

Section 5. Reactivity Data

Stability/Polymerization: Anhydrous material is unstable, but aqueous solutions can be satisfactorily stable for months under proper storage conditions. Rate of decomposition increases with concentration and temperature. A 12% sodium hypochlorite aqueous solution decomposes slowly at 104 °F (40 °C) to yield sodium chloride (NaCl) and sodium chlorate (NaClO₃). Hazardous polymerization cannot occur.

Chemical Incompatibilities: Sodium hypochlorite is incompatible with ammonia, urea, oxidizable materials, chlorine-liberating acids, and oxygen-liberating metals such as nickel, copper, tin, manganese and iron. Sodium hypochlorite has violent reactions with amines, ammonium nitrate, ammonium oxalate, ammonium phosphate, ammonium acetate, ammonium carbonate, cellulose, methanol, aziridine, phenyl acetonitrile, and ethylene imine. Sodium hypochlorite has hazardous reactions with soaps, and may be hazardous during mixing operations or if ignited. It is also incompatible with toilet bowl cleaners containing bisulfates.

Conditions to Avoid: Do not mix ammonia and bleach; chloramine gas may evolve.

Hazardous Products of Decomposition: Thermal oxidative decomposition of sodium hypochlorite can produce toxic fumes of sodium oxide (Na₂O) and chlorine (Cl).

Section 6. Health Hazard Data

Carcinogenicity: The NTP, IARC, and OSHA do not list sodium hypochlorite aqueous solution as a carcinogen.

Summary of Risks: Sodium hypochlorite aqueous solution is toxic primarily by its corrosive and irritant properties, which derive from its alkalinity, its potential as a chlorine generator, and salt's oxidizing potential. The solution's concentration and the exposure's duration affect the degree of toxicity. Inhalation injury may occur by exposure to the mist the solution forms, by exposure to chlorine gas, or from the heated solution's thermal degradation products. Skin contact is corrosive and irritating. Exposure through skin contact or ingestion may cause tissue destruction with permanent damage.

Medical Conditions Aggravated by Long-Term Exposure: Individuals with chronic respiratory disorder should minimize inhalation contact.

Target Organs: Skin, eyes, mucous membranes, and respiratory tract.

Primary Entry Routes: Inhalation, ingestion.

Acute Effects: Inhalation of mist or fumes can cause bronchial irritation, cough, difficulty breathing, stomatitis (inflammation of the mouth's mucous membrane), nausea, and pulmonary edema. Additional effects have included circulatory collapse and delirium. Ingestion of a few ounces (12% concentration) can cause corrosion of the mucous membranes, perforation of the esophagus and stomach, and laryngeal edema; may lead to convulsion, coma, or death. At smaller concentrations (5%), the effects are much less damaging. Liquid contact can produce irritation of the eyes or skin with blistering and eczema (especially at 12%).

Chronic Effects: Sodium hypochlorite is a constant irritant to eyes and throat.

FIRST AID

Eyes: Gently lift the eyelids and flush immediately and continuously with flooding amounts of water until transported to an emergency medical facility. Consult a physician immediately.

Skin: Quickly remove contaminated clothing. Rinse with flooding amounts of water for at least 15 min. For reddened or blistered skin, consult a physician. Wash affected area with soap and water.

Inhalation: Remove exposed person to fresh air and administer 100% humidified supplemental oxygen with assisted ventilation as required to patients with respiratory tract irritation.

Ingestion: Never give anything by mouth to an unconscious or convulsing person. If ingested, have that conscious person drink 1 to 2 glasses of water or milk. Consult a physician immediately. Avoid inducing vomiting and perform gastric lavage cautiously.

After first aid, get appropriate in-plant, paramedic, or community medical support.

Note to Physicians: Consider oral administration of sodium thiosulfate solutions if sodium hypochlorite is ingested. Do not administer neutralizing substances since the resultant exothermic reaction could further damage tissue. Endotracheal intubation could be needed if glottic edema compromises the airway. For individuals with significant inhalation exposure, monitor arterial blood gases and chest x-ray.

Section 7. Spill, Leak, and Disposal Procedures

Spill/Leak: Notify safety personnel and provide adequate ventilation. Cleanup personnel should protect against inhalation of mists and fumes and contact with liquid. Use noncombustible absorbents to pick up spills for disposal. Do not use combustible absorbents such as sawdust. For large spills, dike far ahead of spill to contain. Consider neutralizing with reducing agents. Keep on alkaline side and dilute with copious quantities of water. Do not flush to sewers or waterways since sodium hypochlorite can harm aquatic life in very low concentrations. Follow applicable OSHA regulations (29 CFR 1910.120).

Disposal: Contact your supplier or a licensed contractor for detailed recommendations. Follow applicable Federal, state, and local regulations.

EPA Designations

RCRA Hazardous Waste (40 CFR 261.33): Not listed

Listed as a CERCLA Hazardous Substance* (40 CFR 302.4), Reportable Quantity (RQ): 100 lb (45.4 kg) [* per Clean Water Act, Sec. 311(b)4]

SARA Extremely Hazardous Substance (40 CFR 355): Not listed

SARA Toxic Chemical (40 CFR 372.65): Not listed

OSHA Designations

Air Contaminant (29 CFR 1910.1000, Subpart Z): Not listed

Section 8. Special Protection Data

Goggles: Wear protective eyeglasses or chemical safety goggles, per OSHA eye- and face-protection regulations (29 CFR 1910.133).

Respirator: Seek professional advice prior to respirator selection and use. Follow OSHA respirator regulations (29 CFR 1910.134) and, if necessary, wear a NIOSH-approved respirator. For emergency or nonroutine operations (cleaning spills, reactor vessels, or storage tanks), wear an SCBA. *Warning! Air-purifying respirators do not protect workers in oxygen-deficient atmospheres.*

Other: Wear rubber gloves, boots, aprons, and gauntlets to prevent skin contact.

Ventilation: Provide general and local ventilation systems to maintain airborne concentrations that promote worker safety and productivity.

Workers should not have irritation effects from exposure. Local exhaust ventilation is preferred since it prevents contaminant dispersion into the work area by controlling it at its source.⁽¹⁰³⁾

Safety Stations: Make available in the work area emergency eyewash stations, safety/quick-drench showers, and washing facilities.

Contaminated Equipment: Never wear contact lenses in the work area: soft lenses may absorb, and all lenses concentrate, irritants. Remove this material from your shoes and equipment. Launder contaminated clothing before wearing.

Comments: Never eat, drink, or smoke in work areas. Practice good personal hygiene after using this material, especially before eating, drinking, smoking, using the toilet, or applying cosmetics.

Section 9. Special Precautions and Comments

Storage Requirements: Store in closed, vented, noncorroding containers in a cool [$<85^{\circ}\text{F}$ (29.5°C)], dry, well-ventilated area away from direct sunlight, heat, incompatible materials, acids, and organics (wood, paper, or oil). "Empty" containers can retain hazardous product residues.

Solutions in water are storage hazards due to oxygen evolution. Avoid long storage periods since the product degrades with age. Protect containers from physical damage.

Engineering Controls: Avoid inhalation of vapors, dusts, or fume and contact with skin and eyes. Protect workers against irritation effects of airborne exposure. Use adequate ventilation and appropriate personal protective gear. Institute a respiratory protection program that includes regular training, maintenance, inspection, and evaluation. Practice good personal hygiene and housekeeping procedures.

Transportation Data (49 CFR 172.101, .102)

DOT Shipping Name: Hypochlorite solution containing >7% available chlorine by weight

DOT Hazard Class: Corrosive material

ID No.: UN1791

DOT Label: Corrosive

DOT Packaging Exceptions: 173.244

DOT Packaging Requirements: 173.277

DOT Shipping Name: Hypochlorite solution containing not more than 7% available chlorine by weight

DOT Hazard Class: ORM-B

ID No.: NA1791

DOT Label: None

DOT Packaging Exceptions: 173.505

DOT Packaging Requirements: 173.510

IMO Shipping Name: Hypochlorite, solutions with >5% available chlorine

IMO Hazard Class: 8

ID No.: UN1791

IMO Label: Corrosive

IMDG Packaging Group: II/III

MSDS Collection References: 1, 3-11, 14, 25, 34, 37, 48, 49, 73, 84, 100, 101, 103, 109, 124, 126, 127, 132, 136, 139, 140

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