

EMERGENCY PHONE NO: CHEMTREC: 1-800-424-9300

Section 1. Material Identification

Sodium Hydroxide (NaOH) Description: Derived by electrolysis of sodium chloride brines, by reacting calcium chloride with sodium carbonate, or by electrolytic production using the diaphragm cell. Sodium hydroxide often contains as impurities minimal amounts of sodium chloride, sodium carbonate, sodium sulfate, sodium chlorate, iron, or nickel. Used to hydrolyze fats and form soaps; in making plastics to dissolve casein; in treating cellulose to make rayon and cellophane; in explosives, dyestuffs, electrolytic extraction of zinc, reclaiming rubber, tin plating, oxide coating, etching and electroplating, laundering and bleaching, pulp and paper manufacture; in vegetable oil refining; in peeling of fruits and vegetables in the food industry; and in veterinary medicine as a disinfectant.

Other Designations: CAS No. 1310-73-2; Aetznatron; caustic soda; Collo-Grillrein; Collo-Tapette; Feurs Rohp; Lewis-Red Devil Lye; soda, hydrate; soda lye; sodium hydrate.

Manufacturer: Contact your supplier or distributor. Consult latest *Chemical Week Buyers'Guide* for a suppliers list.

Cautions: Sodium hydroxide is moderately toxic by ingestion and inhalation and can be seriously corrosive to eyes, skin, and mucous membranes.

R 0
I 2
S 4
K 0

NFPA



HMIS
H 3
F 0
R 1
PPG*
*Sec. 8

Section 2. Ingredients and Occupational Exposure Limits

Sodium hydroxide, ca 100%

1990 OSHA PEL 1990 DFG (Germany) MAK
Ceiling: 2 Mg/M³ 2 MgIM3

1990 IDLH Level 1990 NIOSH REL
250 Mg/M³ (solution mists) Ceiling: 2 Mg/M³

1991-92 ACGIH TLV
Ceiling: 2 Mg/M³

* See NIOSH, *RTECS* (WB4900000), for additional irritation, mutation, and toxicity data.

1985-86 Toxicity Data*

Rabbit, oral, LD : 500 mg/kg; no toxic effect noted

Rabbit, skin: 5Wi@g applied over 24 hr causes severe irritation

Mouse, intraperitoneal, LD₅₀: 40 mg/kg; toxic effects not yet reviewed

Section 3. Physical Data

Boiling Point: 2534 °F (1390 °C)

Specific Gravity: 2.13 at 77 °F (25 °C)

Melting Point: 605 °F (318.4°C)

Water Solubility: I g/0.9 n-d water, I g/0.3 ml boiling water

Vapor Pressure-. 1 mm Hg at 1362 °F (739 °C)

Other Solubilities: I g/7.2 ml alcohol, I g/4.2 ml methanol, soluble in glycerol; pH (0.5% solution): 13

insoluble in acetone and ether

Molecular Weight: 40.01

Appearance and Odor: Odorless, hygroscopic (readily absorbs water) white flakes, cake, lumps, chips, pellets, or sticks.

Section 4. Fire and Explosion Data

Flash Point: None reported Autoignition Temperature: None reported LEL : None reported UEL: None- reported

Extinguishing Media: Although noncombustible as a solid, when in contact with moisture or water sodium hydroxide can generate enough heat to ignite surrounding combustibles. If possible without risk, remove containers from area. Use extinguishing agents suitable for surrounding fire. For small fire, use dry chemical, carbon dioxide (CO₂), or regular foam. Avoid water spray since water reacts with sodium hydroxide to generate substantial heat. If you must use water, be sure it is as cold as possible. For large fires, use fog or regular foam.

Unusual Fire or Explosion Hazards: Sodium hydroxide may melt and flow when heated.

Special Fire-fighting Procedures: Since fire may produce toxic thermal decomposition products, wear a self-contained breathing apparatus (SCBA) with a full facepiece operated in pressure-demand or positive-pressure mode. Also, wear fully protective clothing. Structural firefighters' protective clothing provides limited protection. Apply cooling water to fire-exposed sides of container until fire is well out. Do not splatter or splash this material. Stay away from ends of tanks. Be aware of runoff from fire control methods. Do not release to sewers or waterways.

Section 5. Reactivity Data

Stability/Polymerization: Sodium hydroxide is stable at room temperature in closed containers under normal storage and handling conditions. Hazardous polymerization cannot occur. Violent polymerization can occur when in contact with acrolein or acrylonitrile. Since sodium hydroxide readily absorbs water and carbon dioxide from air, keep containers tightly closed.

Chemical Incompatibilities: Sodium hydroxide generates large amounts of heat when in contact with water and may steam and splatter. It reacts with mineral acids to form corresponding salts; reacts with weak-acid gases like hydrogen sulfide, sulfur dioxide, and carbon dioxide; ignites when in contact with cinnamaldehyde or zinc; and has exploded when exposed to a mixture of chloroform and methane. Sodium hydroxide can be very corrosive to metals such as aluminum, tin, and zinc as well as to alloys such as steel, and may cause formation of flammable hydrogen gas. An increase in temperature and pressure occurs in closed containers when sodium hydroxide is mixed with: acetic anhydride, glacial acetic acid, chlorohydrin, chlorosulfonic acid, ethylene cyanohydrin, glyoxal, oleum, 36% hydrochloric acid, 48.7% hydrofluoric acid, 70% nitric acid, or 96% sulfuric acid.

Conditions to Avoid: Avoid generation of sodium hydroxide dusts, and contact with water, metals, and the chemicals listed above.

Hazardous Products of Decomposition: Thermal oxidative decomposition of sodium hydroxide can produce toxic sodium oxide (Na₂O) and sodium peroxide (Na₂O₂) fumes.

Section 6. Health Hazard Data

Carcinogenicity: In 1990 reports, the IARC, NTP, and OSHA do not list sodium hydroxide as a carcinogen (see Chronic Effects).

Summary of Risks: Sodium hydroxide is toxic by inhalation of dusts or mists, ingestion, or direct skin or eye contact. Damage is immediate and without prompt medical attention can become permanent. This strong, corrosive alkali dissolves any living tissue it contacts.

Medical Conditions Aggravated by Long-Term Exposure: None reported.

Target Organs: Eyes, digestive tract, respiratory system, and skin.

Primary Entry Routes: Ingestion, inhalation, and skin and eye contact.

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Section 6. Health Hazard Data, continued

Acute Effects: Ingestion causes immediate burning of mouth, esophagus, and stomach; painful swallowing; excessive salivation; edematous (excess fluid in surrounding tissue) lips, chin, tongue, and pharynx covered with exudate (fluid oozed from swollen tissue); esophageal edema (swelling from fluid buildup in esophagus walls that can prevent all swallowing within hours); possibly edematous, gelatinous, and necrotic (localized tissue death) mucous membranes; vomiting (sometimes coffee grounds-like material due to digestive hemorrhage); and rapid, faint pulse; and cold, clammy skin. Death results commonly from shock, asphyxia (oxygen loss due to interrupted breathing), or pneumonia by the second or third day after ingestion. Dust inhalation can cause many small blisters, temporary hair loss (in nasal passages since sodium hydroxide breaks down keratin), and possibly pulmonary edema (fluid in lungs). Skin contact causes slippery, soapy feeling that is not usually painful for 3 min after contact-even though skin damage begins immediately. It causes blisters, keratin (hair and nails) destruction, and intracellular edema (excess fluid in skin cells), with damage progressing to severe blisters, tissue corrosion, deep ulcerations, and permanent scarring if not immediately washed off. The cornea begins to corrode on contact. Disintegration and sloughing of conjunctival and corneal epithelium may progress to temporary or permanent corneal opacification (cloudiness, becoming impervious to light) or symblepharon (adhesion of lid to eyeball).

Chronic Effects: Dermatitis may result from repeated exposure to dilute solutions. Cases of squamous cell carcinoma (malignant tumors of epithelial origin) of the esophagus are reported 12 to 42 years after sodium hydroxide ingestion, although it is unclear whether the cancer results from scar formation caused by tissue destruction or directly from the chemical's possible carcinogenicity.

FIRST AID: Emergency personnel should protect against contamination.

Eyes: Gently lift the eyelids and flush immediately and continuously with flooding amounts of cold water until transported to an emergency medical facility. *Do not* allow victim to keep eyes tightly shut. *Warning!* Although splashed directly in only one eye, sodium hydroxide may affect the other eye's sight if prompt medical attention is not received. Consult a physician immediately.

Skin: *Quickly* remove contaminated clothing. Rinse with flooding amounts of water for at least 15 min. *Be aware* that this substance can become very hot when in contact with water. For reddened or blistered skin, consult a physician. Wash affected area with soap and water.

Inhalation: Remove exposed person to fresh air and support breathing as needed.

Ingestion: Never give anything by mouth to an unconscious or convulsing person. If ingested, have that *conscious and alert* person drink 1 to 2 glasses of water, followed by vinegar or fruit juice to neutralize the poison. *Do not induce vomiting!*

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

Note to Physicians: Perform endoscopy in all suspected cases of sodium hydroxide ingestion. Perform blood analysis to determine if dehydration, acidosis, or other electrolyte imbalances have occurred.

Section 7. Spill, Leak and Disposal Procedures

Spill/Leak: Notify safety personnel, isolate hazard area, deny entry, and stay upwind of spills. Cleanup personnel should protect against vapor inhalation and skin or eye contact. Use water spray to disperse vapors, but do not spray directly on spills. For small dry spills, avoid excess dust generation by carefully scooping or vacuuming (with appropriate filter) into a suitable container (above 60 °C sodium hydroxide corrodes steel) for later disposal. For large dry spills, cover with plastic sheet or other impermeable layer and contain for later disposal. Follow applicable OSHA regulations (29 CFR 1910.120).

Environmental Transport: Sodium hydroxide is not mobile in solid form, although it absorbs moisture very easily. Once liquid, sodium hydroxide leaches rapidly into soil, possibly contaminating water sources.

Environmental Degradation: Ecotoxicity values: TLM, mosquito fish, 125 ppm/96 hr (fresh water); TLM, bluegill, 99 mg/48 hr (tap water). Disposal: Contact your supplier or a licensed contractor for detailed recommendations. Follow applicable Federal, state, and local regulations. EPA Designations

Listed as a RCRA Hazardous Waste (40 CFR 261.22): Characteristic of corrosivity

Listed as a CERCLA Hazardous Substance* (40 CFR 302.4), Re table

Quantity (RQ): 1000 lb (454 kg) [* per Clean Water Act, Sec. 304(b)(4)] OSHA Designations

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

Listed as an Air Contaminant (29 CFR 1910.1000, Table Z-1-A)

SARA Toxic Chemical (40 CFR 372.65): 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). Since contact lens use in industry is controversial, establish your own policy.

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. Select the respirator based on its suitability to provide adequate worker protection for the given working conditions, level of airborne contamination, and presence of sufficient oxygen. 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 impervious gloves, hoods, aprons, and gauntlets to prevent any skin contact.

Ventilation: Provide general and local exhaust ventilation systems to maintain airborne concentrations below the OSHA PEL (Sec. 2). Local exhaust ventilation is preferred since it prevents contaminant dispersion into the work area by controlling it at its source.

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

Separate contaminated work clothes from street clothes. Launder contaminated work clothing before wearing. Remove this material from your shoes and clean personal protective equipment.

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: Avoid physical damage to containers. Store in dry, well-ventilated area away from water, acids, metals, flammable liquids, and organic halogens. Keep containers tightly closed since sodium hydroxide can decompose to sodium carbonate and carbon dioxide upon exposure to air. Since corrosion occurs easily above 140 °F (60 °C), do not store or transport sodium hydroxide in aluminum or steel containers at temperatures near this level. Store containers in rooms equipped with trapped floor drains, curbs, or gutters.

Engineering Controls: To reduce potential health hazards, use sufficient dilution or local exhaust ventilation to control hazardous contaminants and to maintain concentrations at the lowest practical level.

Other Precautions: Consider preplacement and periodic medical examinations of exposed workers that emphasize eyes, skin, and respiratory tract. Consider a respiratory protection program that includes regular training, maintenance, inspection, and evaluation. Inform employees of the possible hazards in using sodium hydroxide.

Transportation Data (49 CFR 172.101..102)

DOT Shipping Name: Sodium hydroxide; dry, solid, flake, bead or granular

IMO Shipping Name: : UN 1 823,Sodium hydroxide, solid

DOT Hazard Class: Corrosive material

INO Hazard Class: 8

ID No.: UN 1 823

ID No.: UN1823

DOT Label: Corrosive

UAO Label: Corrosive

DOT Packaging Exceptions: 173.244

IMDG Packaging Group: 11

DOT Packaging Requirements: 173.245b

MSDSCollectionReferences:26,38,73,89,100,101,103,124,126,127,132,133,136,139,140,143,146,148,149,153,159,161,163

Prepared by: M Gannon, BA; Industrial Hygiene Review: DJ Wilson, CIH; Medical Review: W Silvemian, MD; Edited by: ER O'Connor, MS