ERCO Worldwide

SODIUM HYDROXIDE SOLUTION
WHMIS CONTROLLED PRODUCT
Date Issued:05/09/2012
Revision #:4

MATERIAL SAFETY DATA SHEET

REV. 4 Issued: May 9, 2012

1. Chemical Product And Company Information

Chemical Name: Sodium Hydroxide Solution
Synonyms/Trade Names: Caustic Soda, Sodium Hydrate, Lye, Liquid Caustic (solution of 45-75% sodium hydroxide in water)
Chemical Family: alkali metal hydroxide
Formula: NaOH
Molecular Weight: 40.0
CAS No.: 1310-73-2
Uses: Acid neutralization; petroleum refining; manufacture of paper, cellulose, textiles, plastics, explosives and dyestuffs;metal cleaning, etching and electroplating; regeneration of ion exchange resins.

Manufacturer & Supplier:
ERCO Worldwide, a division of Superior Plus LP
302 The East Mall, Ste. 200
Toronto, Ontario Canada M9B 6C7
(416) 239-7111

Wanuskewin Rd. & 71st Street
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(306) 931-7767
and/ or
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101 Highway 73 South
Nekoosa, Wisconsin 54457
(715) 887-4000

Transportation Emergency Telephone Numbers :
CANADA: (613) 996-6666
CANUTEC

USA: 1-800-424-9300
CHEMTREC

Emergency Information:

Call toll-free 24 hours a day:

866-855-6947

Canadian WHMIS Classification (s):

Class E - Corrosive Material

2. Composition / Information On Ingredients

Name:	Conc. % By Weight	CAS No.
Sodium Hydroxide	50	1310-73-2
Water	Balance	7732-18-5

3. Hazard Identification

Emergency Overview:
White, odourless, non-volatile solution. Will not burn. Highly reactive. Can react violently with water and numerous commonly encountered materials, generating enough heat to ignite nearby combustible materials. Contact with many organic and inorganic chemicals may cause fire or explosion. Reaction with metals releases flammable hydrogen gas. EXTREMELY CORROSIVE. Can cause blindness, permanent scarring and death. Aerosols can cause lung injury--effects may be delayed.

Routes of Entry:

SKIN CONTACT: Direct contact can cause severe burns with deep ulceration, permanent scarring, and baldness. It
can penetrate to deeper layers of the skin and corrosion will continue until removed. With dilute solution, the sensation
of irritation may be delayed for hours.

EYE CONTACT: Damage can range from severe irritation and mild scarring to blistering, disintegration, ulceration,
severe scarring and clouding. Glaucoma and cataracts are possible late developments. In severe cases, permanent
blindness results.

INGESTION: Ingestion can produced severe corrosive burns to mouth, throat, and esophagus. Symptoms include
severe pain, vomiting, diarrhea, collapse and possible death. Small amounts of caustic which enter the lungs during
ingestion or vomiting (aspiration) can cause serious lung injury and death.

INHALATION: Sodium hydroxide does not readily form a vapour, so inhalation is only likely to occur if aerosol is formed.
Severe irritation of the respiratory tract, and possible permanent damage and pulmonary edema may result from aerosol
exposure. Symptoms of pulmonary edema may be delayed for up to 48 hours.

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE :
Pre-existing skin disorders.

Symptoms of Exposure:
Repeated or prolonged exposure of the skin to low concentrations of liquid can cause dermatitis. There are a few
reports of chronic respiratory disease from repeated and prolonged exposure to mists. There is no evidence of
carcinogenicity in humans from occupational exposures. Sodium hydroxide does not accumulate in the body.

4. First Aid Measures

Skin:
As quickly as possible, flush contaminated area with lukewarm, gently running water for a minimum of 20 minutes, or until the feeling of slipperiness disappears. Under running water, remove contaminated clothing, shoes and leather goods. If irritation persists, repeat flushing and obtain medical attention immediately.

Eyes:
Immediately flush the contaminated eye(s) with lukewarm, gently flowing water for at least 30 minutes, holding the eyelid(s) open. Take care not to rinse contaminated water into the non-affected eye. Obtain medical attention immediately.

Inhalation:
Remove source of contamination or move victim to fresh air. If breathing difficulty is present, oxygen may be beneficial if administered by a person trained in its use. Obtain medical attention immediately.

Ingestion:
Never give anything by mouth if victim is rapidly losing consciousness, unconscious or convulsing. Rinse mouth thoroughtly with water. Do not induce vomiting. If victim can swallow, have him/her drink one cup of water to dilute material in stomach. If vomiting occurs naturally, repeat administration of water. If breathing has stopped, begin artificial respiration. Obtain medical attention immediately.

5. Fire-Fighting Measures

Conditions Of Flammability:
Non combustible, reaction with some metals (e.g. aluminum, zinc, magnesium and others) may cause generation of hydrogen, which may form an explosive mixture.

Means To Extinguish:
Use an extinguisher appropriate to the material which is burning. Water must be used with extreme caution to extinguish a fire in an area where sodium hydroxide is stored and must not come into contact with the sodium hydroxide. Do not apply water directly to sodium hydroxide since it can generate significant heat and cause spattering.

Solid sodium hydroxide in contact with moisture or water may generate sufficient heat to ignite nearby combustible materials. When moist, sodium hydroxide can react with metals, such as aluminum, tin and zinc, to form flammable and explosive hydrogen gas. Sodium hydroxide can react with a number of commonly encountered materials, such as acids, releasing enough heat to ignite nearby combustible materials. When heated to temperatures greater than 318-323 deg C (e.g. in a fire), solid sodium hydroxide will flow to low ground. When hot or in the molten state, it can react violently with water causing spattering and releasing an irritating mist. Toxic sodium oxide fumes can be generated by thermal decomposition at elevated temperatures. Closed containers may rupture violently when heated.

Extinguishing media to be avoided: Carbon dioxide.

Hazardous Combustion Products:
Sodium Hydroxide fumes can be generated by thermal decomposition at elevated temperatures.

Flash Point & Method: Not applicable
Upper Flammability Limit: Not applicable
Lower Flammability Limit: Not applicable
Auto-Ignition Temperature: Not applicable
Mechanical Impact Sensitivity: Not applicable
Static Discharge Sensitivity: Not Sensitive

6. Accidental Release Measures

Leak Or Spill Procedures:
Restrict access to area. Provide adequate protective equipment and ventilation. Contain spill or leak by diking with inert material such as sand or earth. Keep spills out of sewers and waterways. Small spills can be diluted and neutralized, preferably with acetic acid. For large spills contact appropriate regulatory authorities.

Waste Control Procedures:
Consult appropriate Federal, State/Provincial and local regulatory authorities to ascertain disposal procedures.

7. Handling Storage

Handling Procedures And Equipment :
Avoid contact with skin and eyes. Wear suitable personal protective equipment. When diluting or preparing solution, add caustic to water in small amounts to avoid boiling and splattering.

Storage:
Keep in a tightly closed container and store in a dry area away from acids or other incompatible materials. Store in corrosion resistant cement floor.

8. Exposures Controls / Personal Protection

Protective Equipment:
Respirator:: Not normally required for most uses. NIOSH recommendations for sodium hydroxide in air:

Up to 100 mg/m3: Supplied air respirator with a full facepiece, helmet or hood; or a full-facepiece respirator with high efficiency
particulate filter(s); or a powered air-purifying respirator with dust and mist filter(s); or a full face-piece SCBA or full face-piece SAR.
NIOSH IDLH Conditions (10 mg/m3) or Planned Entry in Unknown Concentrations: Positive pressure, full face-piece SCBA, or positive pressure full face-piece SAR with an auxiliary positive pressure SCBA.

Escape: Full face-piece respirator with high-efficiency particulate filter(s), or escape type SCBA.

NOTE: Air purifying respirators do not protect against oxygen deficient atmospheres.

Eye Protection: Chemical goggles and faceshield or full face cartrige type respirator.
Footwear: Rubber boot, chemical resistant impervious boots.
Clothing: Wear impervious gloves, pants, jacket or suit.
Others: Remove contaminated clothing immediately and launder before reuse.

Engineering Controls:
General methods include mechanical ventilation (dilution and local exhaust), control of process conditions and process modification, use of proper personal protective equipment. Use a corrosion resistant ventilation system separate from other exhaust systems. Exhaust directly to outside. Use local exhaust ventilation, and process enclosure if necessary, to control airborne dust and mist. Supply sufficient replacement air to make up for air removed by exhaust systems.

9. Physical And Chemical Properties

State:	Liquid (solution)
Odour:	Odourless
Odour Threshold:	Odourless
Boiling Point:	140°C (284°F) @ 760 mm Hg
Melting Point:	Not applicable
Freezing Point:	Approx. 14 °C
pH:	>14 (at high alkali concentration in water pH scale is not applicable)
Coefficient Of Water/Oil Distribution:	Not available
Appearance:	Clear to slightly turbid, viscous liquid
Specific Gravity:	1.52 @ 20°C
Vapour Pressure:	1.5 mm Hg, 0.2 kPa @ 25°C
Vapour Density:	Not applicable
Evaporation Rate:	Not applicable (the only evaporation that occurs is water, not sodium hydroxide)
Solubility In Water:	Soluble in all proportions
Bulk Density:	Not applicable

10. Stability And Reactivity

Chemical Stability:
Normally stable. Sodium hydroxide rapidly absorbs carbon dioxide from air forming sodium carbonate. Water, when added to sodium hydroxide solutions may cause localized overheating and possible splattering. Never add water to caustic solution. Add sodium hydroxide to water slowly and in small amounts.

Reactivity Conditions:
Exothermic heat liberation with water. Sodium hydroxide does not polymerize itself, but will violently polymerize certain other substances including:
acetaldehyde, acrolein, acrylonltrile.

Incompatible Substances:
Incompatible with strong acids, flammable liquids, organo halogen compounds, most common metals, nitromethane, nitrous compounds.

Sodium hydroxide reacts vigorously, violently or explosively with many organic and inorganic chemicals, such as strong acids, acid chlorides, acid anhydrides, ketones, glycols and organic peroxides. Known examples of such reactions are given below:
WATER - reacts violently with water generating significant heat and dangerously spattering corrosive sodium hydroxide. The reaction may generate enough heat to ignite adjacent combustible materials.
ALUMINUM, TIN, OR ZINC - produces flammable and explosive hydrogen gas.
SODIUM BOROHYDRIDE (sodium tetrahydroborate) - alkaline solutions decompose rapidly with evolution of of hydrogen, when the pH is below 10.5.
TETRAHYDROFURAN, 1,2,4,5-TETRACHLOROBENZENE, 2,2,2-TRICHLOROETHANOL, CHLORONITROTOLUENES or NITROBENZENE - may explode.
MALEIC ANHYDRIDE - causes decomposition of maleic anhydride in a runaway explosive reaction with evolution of large volumes of carbon dioxide.
CYANOGEN AZIDE - forms explosive solid.
NITROALKANES (e.g. nitromethane, nitroethane, nitropropane) - forms salts in the presence of water, which are explosive when dry.
SILVER NITRATE and AMMONIA - addition of warm sodium hydroxide solution to warm ammoniacal silver nitrate with stirring caused immediate precipitation of black silver nitride which exploded.
ZIRCONIUM - heating results in an explosion.
ACETALDEHYDE, ACROLEIN, ACRYLONITRILE, ALLYL ALCOHOL or ALLYL CHLORIDE - polymerizes violently.
ZINC DUST - mixture may ignite.
1,2- DICHLOROETHYLENE, TRICHLOROETHYLENE OR TETRACHLOROETHANE - can form spontaneously flammable chemicals.
PHOSPHORUS - when boiled with sodium hydroxide solutions, phosphine gas, which is spontaneously flammable in air, is evolved.
HYDROQUINONE - accidental mixing of hot crude hydroquinone with concentrated sodium hydroxide solution led to extensive exothermic decomposition.
CINNAMALDEHYDE - may form peroxides in contact with solid sodium hydroxide.
MINERAL ACIDS (e.g. hydrochloric acid, hydrofluoric acid or sulfuric acid) - violent reaction.
CHLORINE TRIFLUORIDE , PHOSPHORUS PENTOXIDE or TRICHLORONITROMETHANE - violent reaction.
SUGARS (e.g. fructose, lactose and maltose) - autoxidation can produce up to 3000 ppm of carbon monoxide under moderately alkaline conditions.
CHLOROFORM and METHANOL - react vigorously.

Corrosivity to Metals:

Sodium hydroxide is very corrosive to all types of aluminum alloys at any temperature and any concentration. Zinc metal and zinc-containing bronzes and brasses are attacked and are not suitable for use with sodium hydroxide. Admiralty brass and brass are attacked by concentrations of 10% solutions and greater. Concentrations of 20-100% corrode tantalum at any temperature. Concentrations greater than 30% attack silicon bronze and silicon copper. Concentrations of 50% and greater are corrosive to types 1010, 1020, 1075 and 1095 carbon steel, copper, aluminum bronze and naval bronze. Sodium hydroxide solutions of all concentrations and temperatures including molten sodium hydroxide are not corrosive to nickel. Solutions are not corrosive to nickel-base alloys, Monel 400, Hastelloy C and D, Inconel 600 and Incoloy 800 at all concentrations of sodium hydroxide up to 200-300 deg C and to titanium and zirconium up to 200 deg C. All stainless steels resist general corrosion by all concentrations of sodium hydroxide up to 65 deg C. Both types 304 and 316 stainless steels are resistant to a wide range of concentrations and temperature and are resistant to any concentration below 80 deg C. Stress corrosion cracking of stainless steels can occur at about 100 deg C. Concentrations of less than 50% do not attack low carbon steels up to 90 deg C. Unalloyed cast irons exhibit generally good resistance to sodium hydroxide solutions. These cast irons are not attacked by low concentrations at any temperature. Concentrations up to 70% generally do not attack these cast irons up to 80 deg C. Alloying with nickel substantially improves the resistance if cast irons to sodium hydroxide. 70% solutions are not corrosive to high nickel austenitic cast irons (Ni-resist cast irons) up to 120 deg C. Dilute solutions are not corrosive to silicon cast irons. Concentrations up to 75% do not attack copper-nickel alloy 70-30 up to 100 deg C.

Corrosivity to Non-Metals:

Sodium hydroxide solutions attack plastics, such as polyamide-imide (Torlon) (10-100% solutions), polybutylene terephthalate and polyethylene terephthalate (20-100%), thermoset polyester isophthalic acid (10-100%), polyvinylidene fluoride (Kynar; PVDF) (70-100% solutions), polyurethane (riged) (80-100%), and polyvinylidene chloride (Saran) (100%); elastomers, such as polysulfide and butadiene-styrene (SBR) (10-100%) and soft rubber (30-100%) (52,55); and coatings, such as polyester and vinyls (10-100%), coal tar epoxy, general purpose epoxy, epoxy polyamide and phenolic (70-100%).

Sodium hydroxide solutions (10-100%) do not attack plastics, such as Teflon and other fluorocarbons, such as ethylene tetrafluoroethylene (Tefzel), ethylene chlorotrifluoroethylene (Halar), chlorotrifluoroethylene (Kel-F), polyvinylidene chloride (up to 70%), polyvinyl chloride (PVC), polypropylene, nylon, acrylonitrile-butadiene-styrene (ABS), styrene-acrylonitrile (SAN), polyetherether ketone (Peek), high-density polyethylene (HDPE), ultra high molecular weight polyethylene (UHMPE), crosslinked polyethylene (XPE), polystyrene and ethylene vinyl acetate (EVA) (52,54); elastomers, such as ethylene propylene (EP,EPDM), nitrile rubber (nitrile Buna N), neoprene, Viton A and other fluorocarbons, Chemraz, Kalrez, Teflon and Fluoraz, chloroprene, butyl rubber (isobutylene isoprene; IIR), natural rubber, synthetic isoprene, chlorosulfonated polyethylene (CSM), silicone rubbers, flexible polyvinyl chloride (PVC), ethylene vinyl acetate; and coatings, such as chemical resistant epoxy, coal tar epoxy, general purpose epoxy, epoxy polyamide, phenolic and urethanes (10-50% but see above for higher concentrations).

Hazardous Decomposition Products:

Does not decompose

11. Toxicological Information

Skin Contact: Severe burning, frequently deep ulcerations and ultimate scarring. Destructive effect on tissues.

Skin Absorption: It can penetrate to deeper layers of skin and corrosion will continue until removed. The severity of injury depends on the concentration and the duration of exposure.

Eye Contact: Instantaneous painful irritation of the eyes. Can penetrate deeply causing irritation or severe burns depending on the concentration and duration of exposure. In severe cases, ulceration and permanent blindness may occur.

Inhalation: Irritation of respiratory tract, inflammation of lungs, difficulty breathing. May cause pulmonary edema.

Ingestion: Burning of the mouth, throat and esophagus; vomiting; diarrhea; edema (swelling) of larynx and a subsequent suffocation. Perforation of gastro-intestinal tract can occur.

LD_{50}: Rabbit dermal 1,350 mg/kg
Rat oral 140-340 mg/kg
Mouse ip 40 mg/kg

LC_{50}: Not available

Exposure Limits: 2 mg/m^3 (ACGIH-TLV-C) and (OSHA PEL-TWA)

Irritancy: Not available.

Sensitization: Not available.

Carcinogenicity: Not listed by IARC or ACGIH.

Teratogenicity & Mutagenicity: Information not available.

Reproductive Toxicology: Information not available

Toxicological Synergism: Not available

12. Ecological Information

Ecological Information:
May cause shifts in water pH outside the range of pH 5 -10. This change may be toxic to aquatic organisms.

Biodegradability:
Not biodegradable (Biodegradability term pertains to an organic material capable of decomposition as a result of attack by microorganisms). However, sodium hydroxide will be neutralized by acidity present in natural environment.

Aquatic Toxicity:
May cause shifts in water pH outside the range of pH 5 -10. This change may be toxic to aquatic organisms.

LC50:
Species: Carassius auratus (Goldfish);Conditions: freshwater, static; Concentration: 160000 ug/L for 24 hr
Species: Poecilia reticulata (Guppy) age 3-4 week young organisms; Conditions: saltwater, renewal, 24 deg C, pH >9.8-<10.0, salinity 2.8%, dissolved oxygen > or =70% saturated; Concentration: 209000 ug/L for 24 hr (95% confidence interval: 153000-286000 ug/L) /98.6% purity/
Species: Poecilia reticulata (Guppy) age 3-4 week young organisms; Conditions: saltwater, renewal, 24 deg C, pH >9.8-<10.0, salinity 2.8%, dissolved oxygen > or =70% saturated; Concentration: 196000 ug/L for 48 hr (95% confidence interval: 144000-267000 ug/L) /98.6% purity/
Species: Poecilia reticulata (Guppy) age 3-4 week young organisms; Conditions: saltwater, renewal, 24 deg C, pH >9.8-<10.0, salinity 2.8%, dissolved oxygen > or =70% saturated; Concentration: 196000 ug/L for 96 hr (95% confidence interval: 144000-267000 ug/L) /98.6% purity/

13. Disposal Considerations

Disposal Considerations:
Consider recycle or re-use where possible. Do not discharge to sewers or any body of water. Disposal must be in compliance with Federal, State/Provincial and local regulations.

14. Transportation Information

Shipping Name (TDGR)	UN Number	Hazard Class	Packing Group
Sodium Hydroxide Solution	1824	8	II

15. Regulatory Information

This product has been classified in accordance with the hazard criteria of the CPR and the MSDS contains all of the information required by the CPR .

Safety:
CANADIAN FEDERAL REGULATIONS : (not a comprehensive list)

CANADIAN ENVIRONMENTAL PROTECTION ACT (CEPA): Sodium hydroxide is on the Domestic Substances List (DSL).

WHMIS CLASSIFICATION: E - Corrosive material

WHMIS INGREDIENT DISCLOSURE LIST: Yes, 1%

UNITED STATES FEDERAL REGULATIONS : (not a comprehensive list)

TOXIC SUBSTANCES CONTROL ACT (TSCA) INVENTORY: Sodium hydroxide is listed on the inventory.

OSHA: Hazardous Substance under 29 CFR Section 1910, Subpart Z.

CERCLA: Hazardous Substance under 40 CFR Part 302, RQ = 1,000 lbs
.
SARA 313: No ingredients subject to the reporting requirements of 40 CFR Part 372

SARA 311/312 EPA HAZARD CATEGORIES: Immediate (Acute) Health, Reactive Hazard

SARA 302: No ingredients subject to 40 CFR Part 355

This product has been certified to NSF/ANSI Standard 60.

Environmental:
All components of this product are either on the Domestic Substances List (DSL) or the Non-Domestic Substances List (NDSL) or exempt.

All components of this product are either on the Toxic Substances Control Act (TSCA) Inventory List or exempt.

Transportation:
Refer to Section 14 - Transportation Information
ERG Number 154

16. Other Information

Prepared By:

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Summary of Changes Made in this Revision :

Section "5. Fire-Fighting Measures" subsection "Means to Extinguish" was revised.
Sections "10. Stability And Reactivity", "11. Toxicological Information" and "12 Ecological Information" were updated.