

MATERIAL SAFETY DATA SHEET

MSDS No. 01-01

According to REACH Regulation no.1907/2006



SODIUM HYDROXIDE SOLUTION

Revision: 6 Last up date: July 17, 2008 Date issued: February 2, 2000 pag. 1/9



Label no.8
Corrosive substances

C



Corrosive

1. IDENTIFICATION OF THE SUBSTANCE/PREPARATION AND OF THE COMPANY/UNDERTAKING

1.1. Identification of the substance/preparation

| | |
|------------------|--------------------------------------|
| Trade Name | Sodium hydroxide solution |
| Chemical Name | Sodium hydroxide solution |
| Chemical Family | Inorganic bases |
| Common Synonyms | Soda lye, lye, caustic soda solution |
| Chemical Formula | NaOH |
| Molecular Weight | 40.01 |

1.2. Uses of the substance/preparation

The main uses of sodium hydroxide are in chemical manufacturing (pH control, acid neutralization, off-gas scrubbing and catalyst); pulp and paper manufacturing; in petroleum and natural gas industry (removing acidic contaminants in oil and gas processing); manufacture of soap and detergents and other cleaning products; and celluloses, such as rayon, cellophane and cellulose ethers; cotton mercerizing and scouring. Other uses include water treatment, food processing, flue-gas scrubbing, mining, glass making, textile processing, refining vegetable oils, rubber reclamation, metal processing, aluminium processing, metal degreasing, adhesive preparations, paint remover, disinfectant.

1.3. Company/undertaking identification

OLTCHIM S.A.

| | |
|-----------|---|
| Address | 1 Uzinei Street, 240050 - Ramnicu Valcea, Romania |
| Telephone | +40/250/701200 |
| Fax | +40/250/735446 |
| e-mail | oltchim@oltchim.ro |

1.4. Emergency telephone number +40 / 0250/738141

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2. HAZARDS IDENTIFICATION

EC Classification according to Directive 67/548/CEE, Annex I **C; R35**

Corrosive liquid

Cause burns

Health effects: Sodium hydroxide causes severe burns of the eyes, even blindness. In skin contact can cause severe burns. Sodium hydroxide may be fatal if swallowed. Breathing the droplets of solution can irritate the mouth, nose and throat. Exposure to high levels may irritate the lungs, causing coughing and/or shortness of breath. Still higher exposure can cause a build up of fluid in the lungs (pulmonary oedema).

Environmental effects: Considering its high water solubility, sodium hydroxide is not expected to bio accumulate in organism. Sodium hydroxide is slightly toxic in the aquatic environment. The toxic effect on aquatic organism is due pH increasing. When released into the soil this material may leach into groundwater. During movement through soil, some ion exchange will occur. Sodium hydroxide is not classified as dangerous for environmental as specified in Directive 67/548/EEC, Annex I.

Emergency overview: Sodium hydroxide is a corrosive liquid. It is a non flammable substance, but may ignite combustibles (wood, paper, oil). In contact with some metals (cooper, aluminium, tin, zinc, and there alloy) release flammable hydrogen which may cause fire and explosions.

3. COMPOSITION/INFORMATION ON INGREDIENTS

| Hazardous components /constituents | Concentration %wt. | CAS No. | EC No. | Annex I Index No. | Hazard Symbol | Risk phrases |
|------------------------------------|--------------------|-----------|-----------|-------------------|---------------|--------------|
| Sodium Hydroxide | Min.48 | 1310-73-2 | 215-185-5 | 011-002-00-6 | C | R35 |
| Water | Max.52 | 7732-32-5 | | | | |

FIRST - AID MEASURES

Seek medical attention immediately in all cases of exposure!

Inhalation: Severe irritant. Symptoms may include sneezing, sore throat or runny nose. Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Call a physician immediately.

Skin contact: Corrosive! Contact with skin can cause irritation or severe burns and scarring with greater exposures. Remove contaminated clothes and shoes. Rinse skin with plenty of water for at least 30 minutes until slippery feeling disappears. Seek medical attention immediately. Wash clothing before reuse.

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Eye contact: Extremely irritating/corrosive. Contact with the liquid causes painful, redness, blurred vision and severe deep burns.

Immediately flush eyes with high amounts of water for at least 30 minutes, lifting lower and upper eyelids occasionally. Seek medical attention immediately.

Ingestion: Swallowing may cause severe burns of mouth, throat, and stomach. Symptoms may include bleeding, vomiting, diarrhea, fall in blood pressure. Damage may appear days after exposure.

Call a physician immediately. Do not induce vomiting. If conscious, give large amounts of water or milk if available. *Never give anything by mouth to an unconscious person.*

Note to Physician: No specific antidote. Perform endoscopy in all cases of suspected sodium hydroxide ingestion. In cases of severe esophageal corrosion, the use of therapeutic doses of steroids should be considered. General supportive measures with continual monitoring of gas exchange, acid-base balance, electrolytes and fluid intake are also required.

Special Measure: Caustic soda must be removed as quickly as possible by washing with water only. Do not attempt to neutralize the caustic soda with chemicals. Continue washing for 30 minutes or until advised by physician. A hospital cannot provide better emergency aid than water for caustic soda exposure.

5. FIRE - FIGHTING MEASURES

Suitable extinguishing media: Use media appropriate for surrounding fires (powder, foam extinguishing agents or carbon dioxide).

Unsuitable extinguishing media: Avoid water use if possible. *Adding water to caustic solution generates large amounts of heat.*

Exposure hazards: Not considered to be a fire hazard. Violent steam generation or eruption may occur upon application of direct water stream to hot liquids. Sodium hydroxide can react with certain metals, such as aluminum and zinc to generate flammable hydrogen gas. Sodium hydroxide itself does not burn, but poisonous gases are produced in fire.

Protection of fire-fighters: Firefighters should wear proper protective equipment and self contained breathing apparatus with full face-piece operated in positive pressure mode.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions: Ventilate area of leak or spill. Remove all sources of ignition. Wear appropriate personal equipment. Keep unnecessary and unprotected personnel away from entering.

Environmental precautions: Prevent from contamination the ground and surface water by isolating the hazard area. Contain and recover when is possible. Dispose according to all applicable federal state or local environment regulations.

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Methods of cleaning up: Contain and recover liquid when possible. Residues from spills can be diluted with water, neutralized with diluted acid such as acetic and hydrochloric. Absorb neutralized caustic residues on clay, sand, vermiculite or other absorbent material and place in a chemical waste container for disposal.

Special precautions: Do not flush caustic residues to sewer. *Do not get water inside containers!*

7. HANDLING AND STORAGE

Handling: Special attention is required when caustic soda is handled. All workers should be properly trained in the required safe handling and first aid procedure. Persons handling caustic soda must always wear protective clothing, close-fitting chemical worker's safety goggles, hard hat and rubber gloves, in order to avoid any contact with hand, skin or eyes. Caustic soda solutions are normally unloaded through the bottom outlet using either air pressure or a centrifugal pump to transfer the solution to a storage tank. In cold weather it is usually necessary to preheat the unloading lines to prevent from plugging. Before connecting the tank car to the unloading line, make sure that the storage tank is properly vented and that it will hold the entire content of the tank car.

Never add water to a corrosive. Always add corrosives to water. When mixing with water, stir small amounts in slowly. Use cold water to prevent excessive heat generation.

Storage: Keep storage tanks closed and be sure that temperature is maintained above 16°C for avoiding freezing. Protect containers from damage. Do not store in aluminum tanks. Do not store or mix with water, acids, flammable liquids, organic halogens compounds, nitro methane and metals such as aluminum, tin and zinc.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Exposure limits:

| | |
|--|-------------------------|
| PEL (OSHA) (permissible exposure limit) | : 2 mg / m ³ |
| TLV (ACGIH) (threshold limit value) | : 2 mg / m ³ |

Engineering control: A system of local and / or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emission of the contaminant at its source, preventing dispersion of it into the general work area.

Respiratory protection: If the exposure limit is exceeded, a half-face dust /mist respirator may be worn for up to ten times the exposure limit or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. A full face-piece dust /mist respirator may be worn for up to 50 times the exposure limit, or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. For emergencies or instances where exposure levels are not known, use a full face-piece positive pressure, air supplied respirator.

Air-purifying respirators do not protect workers in oxygen deficient atmospheres!

Hand protection: Guidelines for sodium hydroxide solution:

RECOMMENDED (resistance to breakthrough longer than 8 hours): Butyl rubber, Natural rubber,

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Neoprene rubber, Nitrile rubber, Polyethylene, Polyvinyl chloride, Viton(TM), Viton(TM)/Butyl rubber, Wear rubber or neoprene gloves.

Eye / Face protection: Chemical splash goggles and/or face shield must be worn when possibility exist for eye contact due to splashing or spraying liquid, airborne particles or vapor. Contact lenses must not be worn. Emergency eye wash fountains and safety showers should be available in the immediate vicinity of any potential exposure.

Skin protection: Wear impervious protective clothing including boots, lab coat, apron or coveralls as appropriate, to prevent skin contact.

Monitoring Methods: Monitoring the substance concentration in workplace may be required to confirm compliance with an OEL and adequacy of exposure control.

Environmental Exposure Control: It is recommendable to develop a monitoring plan in order to maintain the releases in the environment below the maximum allowed concentrations, complying with local, regional, regional and national legislation.

Other precautions: Maintain shower, eye wash fountain and quick-drench facilities in work area.

9. PHYSICAL AND CHEMICAL PROPERTIES

General information

| | |
|------------|----------------------------|
| Appearance | clear and colorless liquid |
| Odor | odorless |

Important health, safety and environmental information

| | |
|--|--------------------------------|
| pH | alkaline |
| Boiling point | 145°C |
| Flash point | NA |
| Flammability | non flammable |
| Explosive properties | non explosive |
| Oxidizing properties | no oxidizing properties |
| Vapor pressure, 20 °C | 17 mmHg at 20°C |
| Specific density (water=1) | 1.53 g/cm ³ |
| Solubility in water | completely miscible with water |
| in ethanol, glycerol | soluble |
| Partition coefficient (log K _{ow}) | NA |
| Viscosity, 20°C | 50 cP |

Other information

| | |
|---------------------------|------|
| Melting point | 14°C |
| Auto ignition temperature | NA |

10. STABILITY AND REACTIVITY

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Chemical stability: Stable under ordinary conditions of use and storage.

Conditions to avoid: Moisture, heat and incompatibles.

Materials to avoid: Contact with acids and organic halogen compounds, especially trichloroethylene, may cause violent reactions. Contact with nitro methane and other similar nitro compounds cause formation of shock-sensitive salts. Contact with metals such as aluminum, magnesium, tin and zinc causes formation of flammable hydrogen gas. Sodium hydroxide reacts readily with various sugars to produce carbon monoxide. Precautions should be taken including monitoring the tank atmosphere for carbon monoxide to ensure safety of personnel before vessel entry.

Corrosivity to metals: Corrosive to aluminium, tin, zinc, copper, brass and bronze. Corrosive to steel at elevated temperatures (above 40 deg C). Not corrosive to nickel.

Hazardous decomposition products: Decomposition by reaction with certain metals releases flammable and explosive hydrogen gas.

11. TOXICOLOGICAL INFORMATION

Animal toxicity data:

| | |
|---------------------------------------|------------|
| LD ₅₀ /oral-rabbit | 500 mg/kg |
| LD ₅₀ /dermal-rabbit | 1350 mg/kg |
| LD ₅₀ /intraperitoneal-rat | 40 mg/kg |

Acute toxicity

Inhalation: Severe irritant. Effects from inhalation of mist vary from mild irritation to serious damage of the upper respiratory tract, depending on severity of exposure. Symptoms may include sneezing, sore throat or runny nose. Severe pneumonia may occur.

Eye contact: Extremely irritating/corrosive. Contact with the liquid causes painful, redness, blurred vision and severe deep burns.

Skin contact: Corrosive! Contact with skin can cause irritation or severe burns and scarring with greater exposures.

Ingestion: Corrosive! Swallowing may cause severe burns of mouth, throat, and stomach. Severe scarring of tissue and death may result. Symptoms may include bleeding, vomiting, diarrhea, fall in blood pressure. Damage may appear days after exposure.

Chronic effects: Persons with preexisting skin disorders or eye problems or impaired respiratory function may be more susceptible to the effects of the substance.

CMR effects

Carcinogenicity: Sodium hydroxide has been implicated as a cause of cancer of the esophagus in individuals who have ingested it. The cancer may develop 12 to 42 years after the ingestion

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incident. Similar cancers have been observed at the sites of severe thermal burns. These cancers may be due to tissue destruction and scar formation rather than the sodium hydroxide itself.

Mutagenicity: There are no reports of human or animal in vivo studies available. Short-term testing (in vitro and bacterial) suggests that sodium hydroxide is not mutagenic.

Teratogenicity and Embryotoxicity: There is no human or animal information available.

12. ECOLOGICAL INFORMATIONS

Ecotoxicity

| | | |
|---------|--------------------------|-------------------------------|
| Fish | <i>Carassius auratus</i> | LC 50 =160 mg /l 24h (static) |
| | <i>Gambusia affinis</i> | LC 50=125 mg/l/96h |
| | <i>Cyprinus carpio</i> | LC 100 =180mg/l/24 h |
| Daphnia | <i>Daphnia sp.</i> | LC 50=100mg/l/48h |

Mobility: High water miscibility and low vapor pressure indicate that sodium hydroxide will be found predominately in aquatic environment. During movement through soil some ion exchange will occur. Also, some of the hydroxide may remain in the aqueous phase and will move downward through soil in the direction of groundwater flow. Sodium hydroxide does not cause biological oxygen deficit.

Persistence and degradability: Biodegradation is not applicable.

Bioaccumulative potential: Considering its high water solubility, sodium hydroxide is not expected to bioconcentrate in organism.

Other adverse effects: The toxicity of to aquatic life will be influenced be the hardness and alkalinity of the receiving water. The estimate of high acute toxicity is based on the criterion for pH of water which considers the pH of 9.0 the upper limit for healthy population of aquatic life, since addition of sodium hydroxide to water results in elevated pH.

13. DISPOSAL CONSIDERATIONS

Waste treatment: Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and sent to an approved waste facility. Any disposal practice must be in compliance with all local, regional and national regulations. Do not dump into any sewers, on the ground, or into any body of water.

Packaging treatment: The empty container/tank cars or tank trucks are washed with plenty of water. The resulted effluent must be neutralised.

14. TRANSPORT INFORMATION

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Sodium hydroxide solution can be shipped according to transport regulations for dangerous goods, hazard class 8, Corrosive substance.

Transport Labeling**Label no.8
Corrosive substances****RID/ADR**

| | |
|----------------------|---------------------------|
| UN No. | 1824 |
| Proper shipping name | Sodium Hydroxide Solution |
| Hazard class | 8 |
| UN Packing Group | II |
| Classification code | C5 |

| | | |
|---------------------|----------------|--------------------------------|
| <i>Danger panel</i> | <i>80/1824</i> | (Hazard Identification No. 80) |
| | | (UN Identification No 1824) |

IMDG/IMO

| | |
|----------------------|---------------------------|
| UN No. | 1824 |
| Hazard class | 8 |
| UN Packing Group | II |
| Proper shipping name | Sodium Hydroxide Solution |
| EmS No. | F-A, S-B |
| Marine pollutant | No |

IATA/IT-ICAO

| | |
|--------------------------|---------------------------|
| Proper shipping name | Sodium Hydroxide Solution |
| UN No. | 1824 |
| Hazard class | 8 |
| UN Packing Group | II |
| IATA Label | Corrosive |
| Packaging Note Passenger | 809 |
| Packaging Note Cargo | 813 |
| Max. Quantity Passenger | 5 l |
| Max. Quantity Cargo | 60 l |

15. REGULATORY INFORMATION

Sodium hydroxide is classified and labeled under Directive 67/548/EEC, Annex I. This product is listed on EINECS.

| | |
|--------------------------|-------------------------------------|
| EC Classification | EC Index No. 011-002-00-6 C; R35 |
|--------------------------|-------------------------------------|

EC Labeling

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| | | |
|---------------|-------|---|
| EC label name | | Sodium Hydroxide solution |
| EC Number | | 215-185-5 |
| Hazard symbol | C | Corrosive |
| R- phrases | 35 | Cause severe burns. |
| S- phrases | 26 | In case of contact with eyes, rinse immediately with plenty of water and seek medical advise. |
| | 37/39 | Wear suitable gloves and eye/face protection. |
| | 45 | In case of accident or if you fell unwell, seek medical advice immediately (show the label where possible). |

16. OTHER INFORMATION**List of relevant R-phrases (see chapter 3)**

R35 Cause severe burns.

Precautions to be taken in handling and storing: Keep well ventilated the areas where solution of sodium hydroxide is stored and handled.

Work hygienic practices: Avoid direct contact of substance with skin/eyes. Avoid the exposure of personnel with dermatological affections.

Interdictions: Do not drink or eat in working area.
Do not smoke in or near working area.
The use of open flame in working areas is prohibited.

Uses and Restrictions: Advice in this document relates only to product as originally supplied. Other derivative chemicals will have different properties and hazard.
Chemical intermediate for inorganic and organic synthesis.

Hazardous reaction: Heat generated upon dilution with water. Dilute only by adding to water with agitation. Do not add water to sodium hydroxide.

MSDS Revisions: This Material Safety Data Sheet is made in accordance to European Directive and will replace the previous version 5 dated January 10, 2008.

Revised information:

TÜV mark for Quality-Environmental Integrated System was replaced with the new one, remitted by TÜV Management GmbH.

Sources of key data uses to compile the data sheet:
EC Directive 67/548/EC resp. 99/45/EC as amended in each case.
EC Directive 2001/58/EC as amended in each case.

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EC Directive 2000/39/EC as amended in each case.

National Threshold Limit Values of corresponding countries as amended in each case.

Transport regulations according to ADR, RID, IMDG, IATA as amended in each case.

This MSDS has been elaborated in accordance with Regulation (EC) No.1907/2006 REACH

The information contained here in is based on the present state of our knowledge. It characterizes the product with regard to the appropriate safety precautions. It does not represent a guarantee of the properties of the product.

This MSDS cannot cover all possible situations which the user may experience during handling and processing. Each aspect of the user's operation should be examined to determine if, or where, additional precautions may be necessary. All health and safety information contained within this MSDS should be provided to the user's employees or customers.