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

1.1. Product identifier

Trade name	Sodium hydroxide solution, min 33% (w/w)
IUPAC name	Sodium Hydroxide
Synonyms	Soda lye, lye, caustic soda solution
EINECS (EC no)	215-185-5
CAS no.	1310-73-2
Index no.	011-002-00-6
Molecular Formula	NaOH
Molecular weight	40.01
REACH Registration number	01-2119457892-27-0065
Type of substance	Inorganic mono constituent substance

1.2. Relevant identified uses of the substance or mixture and uses advised against

Table 1: Identified uses

Identified use / IU number	Sector of End Use (SU)	Preparation Category (PC)	Process category (PROC)	Environmental Release Category (ERC)	Article category (AC)	Exposure Scenario
1	SU 1-24 except 21, 22	Not applicable	PROC 1-4, 8-9	ERC 1	Not applicable	ES 1: Manufacturing of liquid NaOH
2	SU 1-24 except 21, 22	Not applicable	PROC 1-4, 8-9	ERC 1	Not applicable	ES 2: Manufacturing of solid NaOH
3	SU 1-24 except 21, 22	PC 0-40	PROC 1-27	ERC 1-7, 12	Not applicable	ES 3: Industrial and professional use of NaOH
4	SU 1-24 except 21, 22	PC 0-40	PROC 1-27	ERC 2, 3, 8-11	Not applicable	
5	SU 21	PC 0-40	Not applicable	ERC 8-11	Not applicable	ES 4: Consumer use of NaOH

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.

Uses advise against: There are no uses advised against.

1.3. Details of the supplier of the safety data sheet

Name	S.C. OLTCHIM S.A
Address	1 Uzinei Street, 240050 Ramnicu Valcea, Romania
Phone N°	+40 250 701 200
FAX N°	+40 250 735 030
E-mail of competent person responsible for SDS in the MS or in the EU:	tehnic@oltchim.com

1.4 Telefon de urgenta

European Emergency N°:	112
Emergency telephone at the company:	+40/250/738141- available 24h/day/365days
For Romania- The institution responsible with providing information in case of a health emergency is The National Institute for Public Health, Department for the International Sanitary Regulation and Toxicological Information.	Telephone: 021.318.36.06, Working hours: Monday - Friday from 8 a.m. to 3 p

2. HAZARDS IDENTIFICATION

2.1. Classification of the substances or the mixture

2.1.1. Classification according to Regulation (EC) 1272/2008 (CLP

Classification

Skin corrosive; category 1A, H314

Corrosive to metals; category 1, H290

2.1.1. Additional information

Risk advice to man and the environment
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 dust 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 edema).
In contact with water generates large amounts of heat. The high water miscibility and very low vapour pressure indicate that NaOH will be found predominantly in water. Significant emissions or exposure to the terrestrial environment and to the air are not expected either. The aquatic effect is due to possible pH changes related to OH^- discharges, as the toxicity of the Na^+ ion is expected to be insignificant compared to the (potential) pH effect.

2.2. Label elements
Labeling according to Regulation (EC) 1272/2008, CLP

Signal word: Warning

Hazard Pictogram Codes and Symbols

GHS05: corrosion

Hazard statements:
H314: Causes severe skin burns and eye damage
H290: May be corrosive to metals

Specific concentration limits

Skin Corr. 1A; H314	$C \geq 5$ %
Skin Corr. 1B; H314	$2\ \% \leq C < 5\ \%$
Skin Irrit. 2; H315	$0{,}5\ \% \leq C < 2\ \%$
Eye Irrit. 2; H319	$0{,}5\ \% \leq C < 2\ \%$

Precautionary statements

P260: Do not breathe dust/fume/gas/mist/vapours/spray.

P280: Wear protective gloves/protective clothing/eye protection/face protection.
P303 + P361 + P353: IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower.
P305 + P351 + P338: IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P310: Immediately call a POISON CENTER or doctor/physician.

2.3. Other hazards: Based on the PBT and vPvB assessment carried out the substance is not a PBT / vPvB substance.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Identification name	CAS	EINCS (EC no)	Index no.	Concentration , % (w/w)
Sodium Hydroxide	1310-73-2	215-185-5	011-002-00-6	min.48

Impurities
No impurities relevant for classification and labelling.

4. FIRST - AID MEASURES

4.1 Description of first aid measures

General Advice: IF exposed or if you feel unwell: Call a Poison Center or doctor/physician. Show this safety data sheet to the doctor in attendance.

Following inhalation: Remove victim to fresh air and keep at rest in a position comfortable for breathing. Apply artificial respiration if the person has stopped breathing and provide oxygen if breathing is difficult.

Following skin contact: Remove/Take off immediately all contaminated clothing.
Rinse skin with plenty of water for at least 15 minutes until slippery feeling disappears. **Get medical attention immediately.** Wash clothing before reuse.

Following eye contact: Rinse cautiously with water for several minutes lifting lower and upper eyelids occasionally. Remove contact lenses, if present and easy to do. Continue rinsing.
Get medical attention immediately.

Following ingestion: NEVER give anything by mouth to an unconscious or convulsive person. Do not induce vomiting. Rinse the mouth and lips with water if the person is conscious, then transfer to hospital urgently. **Get medical attention immediately.**

4.2. Most important symptoms and effects, both acute and delayed

Sympthoms: Sodium hydroxide is severely corrosive to the eyes, mucous membranes and exposed areas of skin.
Risks:
By ingestion: severe burns to the digestive tract, risk of perforation of the alimentary canal, state of shock.
By skin contact: very corrosive for the skin, severe burns, severe lesions, scarring (sometimes retractile), and dermatitis possible in the case of repeated contact.
By eye contact: corrosive for the eyes, severe lesions possibly with lasting effects if the eyes are not rinsed immediately, harm to all the eye tissues, risk of sight loss.
By inhalation: corrosive for respiratory tract.Causes severe skin burns and eye damage.

4.3 Indication of immediate medical attention and special treatment needed
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. If skin burns are present, treat as any thermal burn after decontamination.

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5. FIRE - FIGHTING MEASURES

5.1 Extinguishing media
Suitable extinguishing media: All media. For large fire use powder, foam extinguishing agents or carbon dioxide. Avoid water use if possible. ***Adding water to caustic solution generates large amounts of heat and steam!***

Unsuitable extinguishing media: none known

5.2 Special hazards arising from the substance or mixture
Specific hazards during fire fighting / Specific hazards arising from the chemical
Not considered to be a fire hazard. Contact with water causes violent frothing and spattering. Reacts with metals when result highly flammable hydrogen gas. Closed containers may rupture

violently when heated releasing contents. Toxic sodium oxide fumes can be generated at high temperatures.

5.3 Advice for firefighters

Protection of the fire-fighters: Firefighters should wear proper protective equipment and self contained breathing apparatus with full face-piece operated in positive pressure mode. Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.

Fire Fighting Procedures: Keep unnecessary and unprotected personnel away from entering. Use cold water spray to cool fire-exposed containers to minimize the risk of rupture. Move container from fire area if this is possible without hazard. Contain fire water run-off if possible. Fire water run-off, if not contained, may cause environmental damage.

6. ACCIDENTAL RELEASE MEASURES

6.1 . Personal precautions, protective equipment and emergency procedures

For non-emergency personnel

Keep unprotected persons away. Avoid contact with skin, eyes, and clothing – wear suitable protective equipment (see section 8).
Avoid inhalation of mist– ensure that sufficient ventilation or suitable respiratory protective equipment is used, wear suitable protective equipment (see section 8).

For emergency responders
Ensure adequate ventilation. Keep unprotected persons away.
Avoid contact with skin, eyes, and clothing – wear suitable protective equipment (see section 8).
Avoid inhalation of mist– ensure that sufficient ventilation or suitable respiratory protective equipment is used, wear suitable protective equipment (see section 8).

6.2. Environmental precautions
Spillages or uncontrolled discharges into watercourses must be IMMEDIATELY alerted to the Environmental Agency or other appropriate regulatory body. Collect spillage in containers, seal securely and deliver for disposal according to local regulations.

6.3 Methods and materials for containment and cleaning up

Methods for cleaning up / Methods for containment:
Contain and recover when possible. Do not flush caustic residues to sewer. 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.
Refer to section 13 for disposal of spilled material.

6.4 Reference to other sections
Additional advice: Refer to section 8, 13.

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7. HANDLING AND STORAGE

7.1. Precautions for safe handling

Protective measures: 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. Do not wear contact lenses when handling this product. It is also advisable to have individual pocket eyewash.

Advice on general occupational hygiene: Avoid inhalation or ingestion and contact with skin and eyes. General occupational hygiene measures are required to ensure safe handling of the substance. These measures involve good personal and housekeeping practices (i.e. regular cleaning with suitable cleaning devices), no drinking, eating and smoking at the workplace. Shower and change clothes at end of work shift. Do not wear contaminated clothing at home.

7.2. Conditions for safe storage, including any incompatibilities
The substance should be stored under dry conditions. Any contact with air and moisture should be avoided. Sodium hydroxide wrapped in original packaging will be store in a dry, well-ventilated area away from incompatible substances. Protect containers from damage.
Recommended storage temperature: above 16^0C, but it is not recommended to exceed 35^0C.
Incompatible materials: DO NOT store in aluminum, copper, zinc, lead and their alloys (e.g., brass and bronze). Caustic soda readily attacks these materials.
Incompatible substances: Highly reactive. Reacts violently with: many chemicals, including, water, organic acids (e.g. acetic acid), inorganic acids (e.g. hydrofluoric acid), oxidizing agents (e.g. peroxides), metals (e.g. aluminum). Corrosive to: aluminum alloys, carbon steel, and other metals.

Recommended storage material: The most common construction materials, for handling and storing caustic soda solutions at low to moderate temperatures, are black iron and mild steel. However, liquid caustic soda will attack these metals at elevated temperatures. In steel systems, temperatures above 48^0C (120°F) will cause accelerated corrosion and iron contamination of the caustic (above 120°F, cracking can occur if concentrated caustic is processed in steel equipment that has not been stress relieved.) Where iron contamination or corrosion is unacceptable, epoxy lined steel, 316L and 304L stainless steels are recommended. 316L and 304L stainless is acceptable to 90°C. At temperatures above 90°F, nickel is typically used but Monel®, Inconel®, or Hastelloy® can also be used. Consult with the supplier about the working temperature range of a particular lining.
Plastics, such as polyethylene, polypropylene, PVC, and CPVC, are chemically suitable with caustic soda. They can be used to prevent iron contamination if maximum temperatures for each material are not exceeded. The manufacturer of the tank, drum, piping or equipment in question should be contacted to determine the exact limitations of the specific plastic.
Shelf life: 12 months. Caustic soda solution is a stable product but its storage life is dependent upon the storage conditions
Never add water to a corrosive substance. Always add corrosives to water. When mixing with water, stir small amounts in slowly. Use cold water to prevent excessive heat generation.

7.3 Specific end use(s)
Please check the identified uses from Section 1.2.
For more information please see the relevant exposure scenario, available via your supplier/given in the Annex I.

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8. EXPOSURE CONTROLS / PERSONAL PROTECTION

8.1 Control parameters

8.1.1. Occupational Exposure limit values (OEL), 8 h TWA: 2 mg/m³ of sodium hydroxide with a few exceptions (Czech Republic - 1.0 mg/m^3; Poland – 0.5 mg/m^3)
Short-term exposure limit (STEL), 15 min: 2 mg/m³ of sodium hydroxide

DNEL values

DNEL long term inhalation, general population= 1,0 mg/m^3
DNEL long term inhalation, workers= 1,0 mg/m^3

PNEC values
PNEC aqua: not applicable
PNEC soil/groundwater: not applicable**.**

No PNEC was able to be calculated as the buffering capacity, the pH and its fluctuation are very specific to the ecosystem in question.

8.2. Exposure control

8.2.1. Engineering controls: 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.

8.2.2. Personal Protection Equipment
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. Equipment for eye protection should be tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU). Emergency eye wash fountains and safety showers should be available in the immediate vicinity of any potential exposure.
Skin protection: Wear impervious protective clothing, chemical goggles/face shield, chemical resistant gloves, hard hat, pant legs outside boots, chemical resistant boots.
Hand protection: Handle with gloves which were inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. The selected protective gloves have to satisfy the specifications of the standard EN 374 derived from it.
The following material are suitable for protective gloves (permeation time ≥8 hours):
Natural rubber/Natural latex –NR (0.5 mm)
Polychloropropene-CR (0.5 mm)
Nitrile rubber/Nitrile latex-NBR (0.35 mm)
Butyl rubber- Butyl (0.5 mm)
Fluorocarbon rubber-FKM (0,4 mm)
Polyvinyl chloride –PVC (0.5 mm)

Above recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Respiratory protection: If the exposure limit is exceeded (up to 50ppm) a full face-piece

respirator with a chemical cartridge respirator with an adequated cartridge is recommended, approved according to EN 14 387 standard.

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!*

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

Environmental Exposure Control: Avoid releasing to the environment.
Contain the spillage. Any large spillage into watercourses must be alerted to the Environment Agency or other regulatory body.
For detailed explanations of the risk management measures that adequately control exposure of the environment to the substance please check the relevant exposure scenario, available via your supplier.

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	119^0C
Flash point	NA
Flammability	non flammable
Explosive properties	non explosive
Oxidizing properties	no oxidizing properties
Vapor pressure, 20 ^{0}C	18 haP, at 20^0C
Specific density (water=1)	1.37-1.39 g/cm^3
Solubility in water	completely miscible with water
in ethanol, glycerol	soluble
Partition coefficient (log K_{ow})	NA
Viscosity, 20^0C	ca 19mPa

Other information

Melting point	7-9^{O}C
Auto ignition temperature	NA

10. STABILITY AND REACTIVITY

10.1. Reactivity

A violent reaction occurs with mineral or organic acids and ketones.
Sodium hydroxide is highly corrosive to certain metals and alloys: zinc, aluminium, tin, copper, lead, bronze, brass. Sodium hydroxide also destroys leather, strips paint and attacks certain plastics, rubbers and coatings. Contact with nitro methane and other similar nitro compounds cause formation of shock-sensitive salts.

10.2 Chemical stability

Under normal conditions of use and storage (dry conditions), sodium hydroxide is stable.
Hygroscopic product sensitive to the carbon dioxide in the air (carbonation).

10.3 Possibility of hazardous reactions

Sodium hydroxide is a stable product; however certain risks exist in the presence of :
explosives such as nitrous compounds - reaction producing enough heat to detonate the explosive
vinyl chloride monomer- formation of chloroacetylene
tetrahydrofuran-explosion upon contact
sodium tetrahydroborate -gives off hydrogen with an explosion
pentachlorophenol- explosion and formation of toxic vapours
tetrachlorobenzene-explosion due to an increase in pressure
maleic anhydride - explosive decomposition

10.4 Conditions to avoid

Substances to be avoided: water, acid, zinc, aluminium, copper, alkali metals, alkaline earth metals, acetaldehyde, acroleine, acrylonitrile, allyl alcohol, halon, maleic anhydride, bromine, nitroparaffins, nitroaromatics, oleums, tetrahydrofuran.
Minimise exposure to air and moisture to avoid degradation. Avoid contact with incompatibles.

10.5 Incompatible materials

Certain metals and alloys: zinc, aluminium, tin, copper, lead, bronze, brass. Sodium hydroxide also destroys leather, strips paint and attacks certain plastics, rubbers and coatings. Water contact may generate large amounts of heat.

10.6 Hazardous decomposition products
Dangerous products of decomposition: by corrosion of metals, formation of flammable and explosive hydrogen

11. TOXICOLOGICAL INFORMATION

	Conclusions
Absorbtion	When humans are dermally exposed to low (non-irritating) concentrations, the uptake of NaOH should be relatively low due to the low absorption of ions. For this reason the uptake of NaOH is expected to be limited under normal handling and use conditions.
Acute toxicity	Sodium hydroxide is classified as a corrosive to skin, and for this reason there is no need for further acute toxicity testing (EU RAR, 2007; section 4.1.2.2.3, page 65).
Irritation/Corrosion	Based on experimental results and according to the CLP Regulation No 1272/2008 Annex VI Table 3.1, sodium hydroxide is a skin corrosive category 1A at a concentration ≥ 5% (H314: Causes severe skin burns and eye damage) the concentration range for eye/skin irritation is 0,5 % ≤ C < 2 %
Sensitisation	Existing data do not demonstrate that NaOH is a skin sensitizer.
Repeated dose toxicity	No reliable studies were available. However, systemic effects of NaOH after repeated exposure are not expected to occur under normal handling and use and therefore NaOH has no specific organ repeated dose toxicity.
Mutagenity	Both the in vitro and the in vivo genetic toxicity tests indicated no evidence of mutagenic activity.
Carcinogenity	NaOH is of no concern with regard to carcinogenicity.
Toxicity for reproduction	NaOH is not toxic for reproduction.

12. ECOLOGICAL INFORMATION

12.1. Aquatic Toxicity
Acute (short-term) toxicity
Fish: LC50 / 96h / pesti = 35 - 189 mg/l

Aquatic invertebrates: *Ceriodaphnia sp:* EC50 / 48h / apa dulce= 40,4 mg/l

Algae and aquatic plants: study scientifically unjuntified
Chronic (long-term) toxicity :
Fish: No valid long-term toxicity studies to fish are available. Despite of this, there is no need for further toxicity testing with NaOH, as all available tests resulted in a rather small range of toxicity values (chronic toxicity test: ≥ 25 mg/l) and there are sufficient data on pH ranges that are tolerated by major taxonomic groups (EU RAR, 2007; section 3.2.1.1.4, page 30).

Aquatic invertebrates: study scientifically unjuntified
Algae and aquatic plants: study scientifically unjuntified

Toxicity to soil macro-organisms: The terrestrial compartment was not included in the targeted risk assessment (EU RAR, 2007, section 3.1.3.3, page 26), because it is not considered relevant for NaOH since if emitted to the soil, sorption to soil particles will be negligible.

Toxicity to terrestrial plants: There is no direct exposure of soil to NaOH based on the available uses.

Toxicity to birds: No exposure to birds is foreseen.
PNEC not applicable According to the EU RAR (2007; section 3.1.3.5, page 26) bioaccumulation in organisms is not relevant for NaOH. Based on this, there is no need to perform risk assessment for secondary poisoning.

12.2. Persistence and degradability: NaOH will rapidly dissolve and dissociate in water. Therefore, NaOH does not fulfil the P criterion (EU RAR, 2007; section 3.3.1.2, page 34).

12.3. Bioaccumulative potential: Bioaccumulation is not relevant for NaOH, therefore, NaOH does not meet the B criterion of the PBT criteria (EU RAR, 2007; section 3.3.1.2, page 34).

12.4. Mobility in soil
High water solubility indicates 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.

12.5. Results of PBT and vPvB assessment
NaOH, does not fulfil the criteria for persistency, bioaccumulation and toxicity. Therefore, NaOH is not considered a PBT or vPvB substance (EU RAR, 2007; section 3.3.1.2, page 34).

13. DISPOSAL CONSIDERATIONS

This section contains generic advice and guidance.

13.1. Waste treatment methods

Hazardous waste: The classification of the product may meet the criteria for a hazardous waste.

Waste Code (European Waste Catalogue): 06 02 04* Sodium and potasium hydroxide
Note: Also please refer to your specific industry and take into account the waste composition for establish the correct waste code.

13.1.1 Product

Methods of disposal: The generation of waste should be avoided or minimised wherever possible. Empty containers or liners may retain some product residues. This material and its container must be disposed of in a safe way. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Avoid dispersal of spill material and runoff and contact with soil, waterways, drains and sewers.

13.1.2. Packaging

Methods of disposal: The generation of waste should be avoided or minimised wherever possible. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible.

European legislation regarding waste:
Directive 2008/98/EC on waste (Waste framework Directive)
Directive 2008/532/EC replacing Decision 94/3/EC establishing a list of wastes pursuant to Article 1(a) of Council Directive 75/442/EEC on waste and Council Decision 94/904/EC establishing a list of hazardous waste pursuant to Article 1(4) of Council Directive 91/689/EEC on hazardous waste Regulation (Ec) No 1013/2006 of the European Parliament and of the Council on shipments of waste, with subsequent modifications and additions.

14. TRANSPORT INFORMATION

Solid Sodium hydroxide 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

Danger panel 80/1824 (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 polutant	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

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture

Relevant information regarding the European legislation
EU Regulation (EC) No. 1907/2006 (REACH) Regulation (EC) no.1907/2006 of the European Parliament and of the Council regarding the Registration, Evaluation, Authorization and Restriction of Chemicals (REACH) Regulation
Regulation (EC) no.1272/2008 of the European Parliament and of the Council on the Classification, Labeling and Packaging of substances and mixtures.
Directive 2012/18/EU (SEVESO III) of the European Parliament and of the Council on the control of major-accident hazards involving dangerous substances, amending and subsequently repealing Council Directive 96/82/EC
Regulation (EC) No 1005/2009 of the European Parliament and of the Council on substances that deplete the ozone layer
European Agreement concerning the International Carriage of Dangerous Goods by Road (ADR)
Regulation referring to the International Carriage of Dangerous Goods by Rail (RID
International Maritime Dangerous Goods (IMDG

EU Regulation (EC) No. 1907/2006 (REACH)
Annex XIV of REACH -Authorization: Sodium hydroxide is not subject to authorization.

Annex XVII of REACH regulation- Restrictions on the manufacture, placing on the market and use of certain dangerous substances, mixtures and articles
Restrictions on use: no restriction

Other EU regulations: Sodium hydroxide solution 33% is not subject to:
Regulation (EC) No 1005/2009 on substances that deplete the ozone layer
Regulation (EC) No 850/2004 on persistent organic pollutants
Regulation (EC) No 649/2012 concerning the export and import of dangerous chemicals
Directive 2012/18/EU -SEVESO III Directive.
WGK (Germany): WGK 1 slightly water endangering

15.2 Chemical safety Assessment

Chemical Safety Assessments have been carried out for this substance and a CSR was issued.

16. OTHER INFORMATION

Data are based on our latest knowledge but do not constitute a guarantee for any specific product features and do not establish a legally valid contractual relationsh.

16.1. Relevant H-statements (number and full text)

H314 Causes severe skin burns and eye damage.
H290 May be corrosive to metals.

16. 2. Abbreviation and acronyms (NOT ALL ARE USED IN THIS SDS)

AC Article category
ADR European agreement concerning the international carriage of dangerous goods by road
BSAF Bio soil accumulation factor
BCF Bio concentration factor
CAS Chemical Abstracts Service
CLP Classification, labelling and packaging
CMR Carcinogenic, mutagenic or toxic for reproduction
CSA/CSR Chemical safety assessment / Chemical safety report
DNEL Derived no effect level
EC10 Concentration of a substance where 10% of the population is affected
EC50 Concentration of a substance where 50% of the population is affected
ECHA European chemicals agency
EINECS EU list of existing chemical substances
EmS Emergency schedule
ERC Environmental release category
ES Exposure scenario
eSDS Extended safety data sheet
GHS Globally harmonised system
IATA-DGR International air transport association - dangerous goods regulations
ICAO Technical Instructions for the Safe Transport of Dangerous Goods by Air
IU Identified use
IUPAC International Union of Pure and Applied Chemistry
IBC code International code for the construction and equipment of ships carrying dangerous chemicals in bulk
IMDG International maritime dangerous goods
KP Partition coefficient
LC10 Lethal concentration of a substance that can be expected to cause death in 10% of the population
LC50 Lethal concentration of a substance that can be expected to cause death in 50% of the population
LD50 Lethal dose of a substance that can be expected to cause death in 50% of the population

NO(A)EC No observed (adverse) effect concentration
NO(A)EL No observed (adverse) effect level
OECD Organisation for economic co-operation and development
OEL Occupational exposure limit
PBT Persistent, bioaccumulative, and toxic
PC Product category
PNEC Predicted no-effect concentration
PROC Process category
REACH Registration, evaluation, authorisation and restriction of chemicals (i.e. Regulation (EC) No. 1907/2006)
RID International rule for transport of dangerous substances by railway
SDS Safety data sheet
STOT Specific target organ toxicant
STP Sewage treatment plant
SU Sector of end use
TWA Time weighted average
vPvB Very persistent, very bioaccumulative

16.3. Key literature references
The information provided in this eSDS is consistent with the information provided in the REACH CSR. The CSR contains a complete reference list for all data used. Non confidential data from the REACH registration dossier are published by the ECHA, see https://echa.europa.eu/information-on-chemicals/registered-substances ; http://echa.europa.eu/clp/c_l_inventory_en.asp http://chelist.jrc.ec.europa.eu

16.4. Revision 4 replaces revision no.3 from November 23, 2015
Chapters of this safety data sheet have been revised (excepted chapters 1, 6, 9, 11, 13, 14) according to the provision of Regulation (EC) No. 1907/2006, as amended by Regulation 830/2015, and Regulation (EC) No. 1272/2008 -consolidated. The information provided in this SDS is consistent with the information provided in the REACH CSR for sodium hydroxide.

See below Annex I-Exposure Scenario

Disclaimer:

Oltchim provides the information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy. This document is intended only as a guide to the appropriate precautionary handling of the material by a properly trained person using this product. Individuals receiving the information must exercise their independent judgment in determining its appropriateness for a particular purpose. Furthermore, this safety data sheet is made up based on the legal requirements as set by EC 1907/2006 (REACH) and EC Regulation 830/2015

ANNEX I– EXPOSURE SCENARIO

Exposure Scenario 1: Manufacturing of liquid NaOH
List of all use descriptors Sector of use (SU): SU 3, 8 Manufacture of bulk, large-scale substances Product category (PC): not applicable Process category (PROC): PROC1 Use in closed process, no likelihood of exposure PROC2 Use in closed, continuous process with occasional controlled exposure PROC3 Use in closed batch process (synthesis or formulation) PROC4 Use in batch and other process (synthesis) where opportunity for exposure arises PROC8a/b Transfer of chemicals from/to vessels/large containers at (non)dedicated facilities PROC9 Transfer of chemicals into small containers (dedicated filling line) Article category (AC): not applicable Environmental Release Category (ERC): ERC1 Manufacture of substances
EU Risk Assessment An EU risk assessment has been performed based on the Existing Substances Regulation (Council Regulation 793/93). A comprehensive risk assessment report has been finalised in 2007 and is available via internet: http://ecb.jrc.ec.europa.eu/DOCUMENTS/Existing-Chemicals/RISK_ASSESSMENT/REPORT/sodiumhydroxidereport416.pdf
Contributing exposure scenario controlling environmental exposure
Product characteristics
Liquid NaOH, all concentrations
Frequency and duration of use
Continuous
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil
Risk management measures related to the environment aim to avoid discharging NaOH solutions into

municipal wastewater or to surface water, in case such discharges are expected to cause significant pH changes. Regular control of the pH value during introduction into open waters is required. In general discharges should be carried out such that pH changes in receiving surface waters are minimised. In general most aquatic organisms can tolerate pH values in the range of 6-9. This is also reflected in the description of standard OECD tests with aquatic organisms.

Conditions and measures related to external treatment or recovery of waste for disposal

Liquid NaOH waste should be reused or discharged to the industrial wastewater and further neutralized if needed.

Contributing exposure scenario controlling worker exposure

Product characteristic

Liquid NaOH, all concentrations

Frequency and duration of use/exposure

8 hours/day, 200 days/year

Technical conditions and measures at process level (source) to prevent release

Replacing, where appropriated, manual processes by automated and/or closed processes. This would avoid irritating mists, sprayings and subsequent potential splashes:

- Use closed systems or covering of open containers (e.g. screens)
- Transport over pipes, technical barrel filling/emptying of barrel with automatic systems (suction pumps etc.)
- Use of pliers, grip arms with long handles with manual use “to avoid direct contact and exposure by splashes (no working over one’s head)”

Technical conditions and measures to control dispersion from source towards the worker

Local exhaust ventilation and/or general ventilation is good practice

Organisational measures to prevent /limit releases, dispersion and exposure

- Workers in the risky process/areas identified should be trained a) to avoid to work without respiratory protection and b) to understand the corrosive properties and, especially, the respiratory inhalation effects of sodium hydroxide and c) to follow the safer procedures instructed by the employer.
- The employer has also to ascertain that the required PPE is available and used according to instructions

Conditions and measures related to personal protection, hygiene and health evaluation

- Respiratory protection: In case of dust or aerosol formation (e.g. spraying): use respiratory protection with approved filter (P2)
- Hand protection: impervious chemical resistant protective gloves
    - material: butyl-rubber, PVC, polychloroprene with natural latex liner, material thickness: 0.5 mm, breakthrough time: > 480 min

- material: nitrile-rubber, fluorinated rubber, material thickness: 0.35-0.4 mm, breakthrough time: > 480 min

- Eye protection: chemical resistant goggles must be worn. If splashes are likely to occur, wear tightly fitting safety goggles, face –shield
- Wear suitable protective clothing, aprons, shield and suits, if splashes are likely to occur, wear: rubber or plastic boots, rubber or plastic boots

Exposure estimation and reference to its source

Worker exposure:

NaOH is a corrosive substance. For the handling of corrosive substances and formulations, immediate dermal contacts occur only occasionally and it is assumed that repeated daily dermal exposure can be neglected. Therefore, dermal exposure to NaOH was not quantified.

NaOH is not expected to be systemically available in the body under normal handling and use conditions and therefore systemic effects of NaOH after dermal or inhalation exposure are not expected to occur.

Based on NaOH measurements and following the proposed risk management measures controlling worker exposure, the reasonable worst-case inhalation exposure of 0.33 mg/m^3 (typical value is 0.14 mg/m^3) is below the DNEL of 1 mg/m^3.

Environmental exposure:

The aquatic effect and risk assessment only deals with the effect on organisms/ecosystems due to possible pH changes related to OH^- discharges, as the toxicity of the Na^+ ion is expected to be insignificant compared to the (potential) pH effect. The high water solubility and very low vapour pressure indicate that NaOH will be found predominantly in water. When the risk management measures related to the environment are implemented, there is no exposure to the activated sludge of a sewage treatment plant and there is not exposure of the receiving surface water.

The sediment compartment is not considered, because it is not considered relevant for NaOH. If emitted to the aquatic compartment, sorption to sediment particles will be negligible.

Significant emissions to air are not expected due to the very low vapour pressure of NaOH). If emitted to air as an aerosol in water, NaOH will be rapidly neutralised as a result of its reaction with CO_2 (or other acids).

Significant emissions to the terrestrial environment are not expected either. The sludge application route is not relevant for the emission to agricultural soil, as no sorption of NaOH to particulate matter will occur in STPs/WWTPs. If emitted to soil, sorption to soil particles will be negligible. Depending on the buffer capacity of the soil, OH^- will be neutralised in the soil pore water or the pH may increase.

Bioaccumulation will not occur.

Exposure Scenario 2: Manufacturing of solid NaOH

List of all use descriptors

Sector of use (SU): SU 3, 8 Manufacture of bulk, large-scale substances

Product category (PC):	not applicable
Process category (PROC):	PROC1 Use in closed process, no likelihood of exposure
	PROC2 Use in closed, continuous process with occasional controlled exposure
	PROC3 Use in closed batch process (synthesis or formulation)
	PROC4 Use in batch and other process (synthesis) where opportunity for exposure arises
	PROC8a/b Transfer of chemicals from/to vessels/large containers at (non)dedicated facilities
	PROC9 Transfer of chemicals into small containers (dedicated filling line)
Article category (AC):	not applicable
Environmental Release Category (ERC):	ERC1 Manufacture of substances

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Contributing exposure scenario controlling environmental exposure

Product characteristics

Solid NaOH

Frequency and duration of use

Continuous

Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil

Risk management measures related to the environment aim to avoid discharging NaOH solutions into municipal wastewater or to surface water, in case such discharges are expected to cause significant pH changes. Regular control of the pH value during introduction into open waters is required. In general discharges should be carried out such that pH changes in receiving surface waters are minimised. In general most aquatic organisms can tolerate pH values in the range of 6-9. This is also reflected in the description of standard OECD tests with aquatic organisms.

Conditions and measures related to external treatment or recovery of waste for disposal

There is no solid waste of NaOH. Liquid NaOH waste should be reused or discharged to the industrial wastewater and further neutralized if needed.

Contributing exposure scenario controlling worker exposure

Product characteristic

Solid NaOH, all concentrations

Frequency and duration of use/exposure

8 hours/day, 200 days/year

Technical conditions and measures at process level (source) to prevent release

Replacing, where appropriated, manual processes by automated and/or closed processes. This would avoid irritating mists, sprayings and subsequent potential splashes:

- Use closed systems or covering of open containers (e.g. screens)
- Transport over pipes, technical barrel filling/emptying of barrel with automatic systems (suction pumps etc.)
- Use of pliers, grip arms with long handles with manual use “to avoid direct contact and exposure by splashes (no working over one’s head)”

Technical conditions and measures to control dispersion from source towards the worker

Local exhaust ventilation and/or general ventilation is good practice

Organisational measures to prevent /limit releases, dispersion and exposure

- Workers in the risky process/areas identified should be trained a) to avoid to work without respiratory protection and b) to understand the corrosive properties and, especially, the respiratory inhalation effects of sodium hydroxide and c) to follow the safer procedures instructed by the employer.
- The employer has also to ascertain that the required PPE is available and used according to instructions

Conditions and measures related to personal protection, hygiene and health evaluation

- Respiratory protection: In case of dust or aerosol formation (e.g. spraying): use respiratory protection with approved filter (P2)
- Hand protection: impervious chemical resistant protective gloves
  - material: butyl-rubber, PVC, polychloroprene with natural latex liner, material thickness: 0.5 mm, breakthrough time: > 480 min
  - material: nitrile-rubber, fluorinated rubber, material thickness: 0.35-0.4 mm, breakthrough time: > 480 min
- Eye protection: chemical resistant goggles must be worn. If splashes are likely to occur, wear tightly fitting safety goggles, face –shield
- Wear suitable protective clothing, aprons, shield and suits, if splashes are likely to occur, wear: rubber or plastic boots, rubber or plastic boots

Exposure estimation and reference to its source

Worker exposure:

NaOH is a corrosive substance. For the handling of corrosive substances and formulations, immediate dermal contacts occur only occasionally and it is assumed that repeated daily dermal exposure can be neglected. Therefore, dermal exposure to NaOH was not quantified.

NaOH is not expected to be systemically available in the body under normal handling and use conditions and therefore systemic effects of NaOH after dermal or inhalation exposure are not expected to occur.

Based on NaOH measurements and following the proposed risk management measures controlling worker exposure, the reasonable worst-case inhalation exposure of 0.26 mg/m^3 (measured at the drumming/bagging place) is below the DNEL of 1 mg/m^3.

Environmental exposure:

The aquatic effect and risk assessment only deals with the effect on organisms/ecosystems due to possible pH changes related to OH^- discharges, as the toxicity of the Na^+ ion is expected to be insignificant compared to the (potential) pH effect. The high water solubility and very low vapour pressure indicate that NaOH will be found predominantly in water. When the risk management measures related to the environment are implemented, there is no exposure to the activated sludge of a sewage treatment plant and there is not exposure of the receiving surface water.

The sediment compartment is not considered, because it is not considered relevant for NaOH. If emitted to the aquatic compartment, sorption to sediment particles will be negligible.

Significant emissions to air are not expected due to the very low vapour pressure of NaOH). If emitted to air as an aerosol in water, NaOH will be rapidly neutralised as a result of its reaction with CO_2 (or other acids).

Significant emissions to the terrestrial environment are not expected either. The sludge application route is not relevant for the emission to agricultural soil, as no sorption of NaOH to particulate matter will occur in STPs/WWTPs. If emitted to soil, sorption to soil particles will be negligible. Depending on the buffer capacity of the soil, OH^- will be neutralised in the soil pore water or the pH may increase.

Bioaccumulation will not occur.

Exposure Scenario 3: Industrial and Professional Use of NaOH

List of all use descriptors

Sector of use (SU): SU 1-24

Because sodium hydroxide has so many uses and is used so widely it can potentially be used in all sectors of end use (SU) described by the use descriptor system (SU 1-24). NaOH is used for different purposes in a variety of industrial sectors.

Product category (PC): PC 0-40

Sodium hydroxide can be used in many different chemical product categories (PC). It can be used for example as an adsorbent (PC2), metal surface treatment product (PC14), non-metal-surface treatment product (PC15), intermediate (PC19), pH regulator (PC20), laboratory chemical (PC21), cleaning product (PC35), water softener (PC36), water treatment chemical (PC37) or extraction agent. However, it could potentially also be used in other chemical product categories (PC 0 – 40).

Process category (PROC): PROC1 Use in closed process, no likelihood of exposure

PROC2 Use in closed, continuous process with occasional controlled exposure

PROC3 Use in closed batch process (synthesis or formulation)

PROC4 Use in batch and other process (synthesis) where opportunity for exposure arises

PROC5 Mixing or blending in batch processes (multistage and/or significant contact)

PROC8a/b Transfer of chemicals from/to vessels/large containers at (non)dedicated facilities

PROC9 Transfer of chemicals into small containers (dedicated filling line)

PROC10 Roller application or brushing

PROC11Non industrial spraying

PROC13 Treatment of articles by dipping and pouring

PROC15 Use of laboratory reagents in small scale laboratories

The process categories mentioned above are assumed to be the most important ones but other process

categories could also be possible (PROC 1 – 27).

Article category (AC): not applicable

Although sodium hydroxide can be used during the manufacturing process of articles, the substance is not expected to be present in the article. The article categories (AC) do not seem applicable for sodium hydroxide.

Environmental Release Category (ERC): ERC1 Manufacture of substances

ERC2 Formulation of preparations

ERC4 Industrial use of processing aids in processes and products, not becoming part of articles

ERC6A Industrial use resulting in manufacture of another substance (use of intermediates)

ERC6B Industrial use of reactive processing aids

ERC7 Industrial use of substances in closed systems

ERC8A Wide dispersive indoor use of processing aids in open systems

ERC8B Wide dispersive indoor use of reactive substances in open systems

ERC8D Wide dispersive outdoor use of processing aids in open systems

ERC9A Wide dispersive indoor use of substances in closed systems

The environmental release categories mentioned above are assumed to be the most important ones but other industrial environmental release categories could also be possible (ERC 1 – 12).

Further explanations

Typical uses include: production of organic and inorganic chemicals, formulation of chemicals, production and whitening of paper pulp, production of aluminium and other metals, food industry, water treatment, production of textiles, professional end use of formulated products and other industrial uses.

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Contributing exposure scenario controlling environmental exposure

Product characteristics

Solid or liquid NaOH, all concentrations (0-100%), if solid: low dustiness class
Frequency and duration of use
Continuous
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil
Risk management measures related to the environment aim to avoid discharging NaOH solutions into municipal wastewater or to surface water, in case such discharges are expected to cause significant pH changes. Regular control of the pH value during introduction into open waters is required. In general discharges should be carried out such that pH changes in receiving surface waters are minimised. In general most aquatic organisms can tolerate pH values in the range of 6-9. This is also reflected in the description of standard OECD tests with aquatic organisms.
Conditions and measures related to external treatment or recovery of waste for disposal
There is no solid waste of NaOH. Liquid NaOH waste should be reused or discharged to the industrial wastewater and further neutralized if needed.

Contributing exposure scenario controlling worker exposure
Product characteristic
Solid or liquid NaOH, all concentrations (0-100%), if solid: low dustiness class
Frequency and duration of use/exposure
8 hours/day, 200 days/year
Technical conditions and measures at process level (source) to prevent release
For worker, both solid and liquid NaOH containing products at concentration > 2%: Replacing, where appropriated, manual processes by automated and/or closed processes. This would avoid irritating mists, sprayings and subsequent potential splashes: • Use closed systems or covering of open containers (e.g. screens) • Transport over pipes, technical barrel filling/emptying of barrel with automatic systems (suction pumps etc.) • Use of pliers, grip arms with long handles with manual use “to avoid direct contact and exposure by splashes (no working over one’s head)”
Technical conditions and measures to control dispersion from source towards the worker
For worker, both solid and liquid NaOH containing products at concentration > 2%: Local exhaust ventilation and/or general ventilation is good practice
Organisational measures to prevent /limit releases, dispersion and exposure
For worker, both solid and liquid NaOH containing products at concentration > 2%:

- Workers in the risky process/areas identified should be trained a) to avoid to work without respiratory protection and b) to understand the corrosive properties and, especially, the respiratory inhalation effects of sodium hydroxide and c) to follow the safer procedures instructed by the employer.
- The employer has also to ascertain that the required PPE is available and used according to instructions
- Where possible for professional use, use of specific dispensers and pumps specifically designed to prevent splashes/spills/exposure to occur.

Conditions and measures related to personal protection, hygiene and health evaluation

For worker and professional, both solid and liquid NaOH containing products at concentration > 2%:

- Respiratory protection: In case of dust or aerosol formation (e.g. spraying): use respiratory protection with approved filter (P2)
- Hand protection: impervious chemical resistant protective gloves
  - material: butyl-rubber, PVC, polychloroprene with natural latex liner, material thickness: 0.5 mm, breakthrough time: > 480 min
  - material: nitrile-rubber, fluorinated rubber, material thickness: 0.35-0.4 mm, breakthrough time: > 480 min
- If splashes are likely to occur, wear tightly fitting chemical resistant safety goggles, face –shield
- If splashes are likely to occur, wear suitable protective clothing, aprons, shield and suits, rubber or plastic boots, rubber or plastic boots

Exposure estimation and reference to its source

Exposure Scenario 4: Consumer Use of NaOH

List of all use descriptors

Sector of use (SU): SU 21 Private households

Product category (PC): PC 0-40

Sodium hydroxide can be used in many different chemical product categories (PC): PC 20, 35, 39 (neutralisation agents, cleaning products, cosmetics, personal care products). The other PCs are not explicitly considered in this exposure scenario. However, NaOH can also be used in other PCs in low concentrations e.g. PC3 (up to 0.01%), PC8 (up to 0.1%), PC28 and PC31 (up to 0.002%) but it can be used also in the remaining product categories (PC 0-40).

Process category (PROC): not applicable

Article category (AC): not applicable

Environmental Release Category (ERC): ERC8A Wide dispersive indoor use of processing aids in open systems
ERC8B Wide dispersive indoor use of reactive substances in open systems
ERC8D Wide dispersive outdoor use of processing aids in open systems
ERC9A Wide dispersive indoor use of substances in closed systems

The environmental release categories mentioned above are assumed to be the most important ones but other wide dispersive environmental release categories could also be possible (ERC 8 – 11b).

Further explanations

NaOH (up to 100%) is also used by consumers. It is used at home for drain and pipe cleaning, wood treatment and it also used to make soap at home. NaOH is also used in batteries and in oven-cleaner pads.

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Contributing exposure scenario controlling environmental exposure

Product characteristics

Solid or liquid NaOH, all concentrations (0-100%), if solid: low dustiness class

Conditions and measures related to external treatment or recovery of waste for disposal

This material and its container must be disposed of in a safe way (e.g. by returning to a public recycling facility). If container is empty, trash as regular municipal waste.

Batteries should be recycled as much as possible (e.g. by returning to a public recycling facility). Recovery of NaOH from alkaline batteries includes emptying the electrolyte, collection and neutralization with sulphuric acid and carbon dioxide.

Contributing exposure scenario controlling worker exposure

Product characteristic

Solid or liquid NaOH, all concentrations (0-100%), if solid: low dustiness class

Typical concentrations: floor strippers (<10%), hair straighteners (<2%), oven cleaners (<5%), drain openers (liquid: 30%, solid: <100%), cleaning products (<1.1%)

Conditions and measures related to the design of the product

- It is required to use resistant labelling-package to avoid its auto-damage and loss of the label integrity,

under normal use and storage of the product. The lack of quality of the package provokes the physical loss of information on hazards and use instructions.

- It is required that household chemicals, containing sodium hydroxide for more than 2%, which may be accessible to children should be provided with a child-resistant fastening (currently applied) and a tactile warning of danger (Adaptation to Technical Progress of the Directive 1999/45/EC, annex IV, Part A and Article 15(2) of Directive 67/548 in the case of, respectively, dangerous preparations and substances intended for domestic use). This would prevent accidents by children and other sensitive groups of society.
- It is advisable to deliver only in very viscous preparations
- It is advisable to delivery only in small amounts
- For use in batteries, it is required to use completely sealed articles with a long service life maintenance.

Conditions and measures related to information and behavioural advice to consumers

It is required that improved use instructions, and product information should always be provided to the consumers. This clearly can efficiently reduce the risk of misuse. For reducing the number of accidents in which (young) children or elderly people are involved, it should be advisable to use these products in the absence of children or other potential sensitive groups. To prevent improper use of sodium hydroxide, instructions for use should contain a warning against dangerous mixtures.

Instructions addressed to consumers:

- Keep out of reach of children.
- Do not apply product into ventilator openings or slots.

Conditions and measures related to personal protection and hygiene

For consumer, both solid and liquid NaOH containing products at concentration > 2%:

- Respiratory protection: In case of dust or aerosol formation (e.g. spraying): use respiratory protection with approved filter (P2)
- Hand protection: impervious chemical resistant protective gloves
- If splashes are likely to occur, wear tightly fitting chemical resistant safety goggles, face–shield

Exposure estimation and reference to its source

Consumer exposure:

Acute/short term exposure was assessed only for the most critical use: use of NaOH in a spray oven cleaner. Consexpo and SprayExpo were used to estimate exposure. The calculated short-term exposure of 0.3 – 1.6 mg/m^3 is slightly higher than the long term DNEL for inhalation of 1 mg/m^3 but smaller than the short term occupational exposure limit of 2 mg/m^3. Furthermore, NaOH will be rapidly neutralised as a result of its reaction with CO_2 (or other acids).

Environmental exposure:

Consumer uses relates to already diluted products which will further be neutralized quickly in the sewer, well before reaching a WWTP or surface water.