

SAFETY DATA SHEET

ACCORDING TO EC-REGULATION 1272/2008 (CLP/GHS).

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

1.1	Product identifier	
	Product Name	Sodium Hydroxide Solution
	Chemical Name	Sodium Hydroxide
	Trade name	Sodium Hydroxide 46 – 49 % solution
	Alternative names	Soda lye, Caustic soda, Sodium hydrate, NaOH
	Formula	NaOH
	EC No.	215-185-5
	REACH Registration No.	01-2119457892-27-0039
	CAS No.	1310-73-2
1.2	Relevant identified uses of the substance or mixture and uses advised against	
	Identified use(s)	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)
	Uses advised against	None
1.3	Details of the supplier of the Safety Data Sheet	
1.3.1	Manufacturer	«HaloPolymer Kirovo-Chepetsk», LLC per. Pozharny, 2, 613040, Kirovo-Chepetsk, Kirov Region, The Russian Federation.
	Telephone	+7-83361-9-4281
	Fax	+7-83361-9-3594
	Website	www.halopolymer.com
1.3.2	Only representative of a non-Community manufacturer	URALCHEM Assist GmbH Johannssenstrasse 10 30159, Hannover, Germany
	Telephone	+49-511/45 99 444
	Fax	+49-511/45 99 446
	E-mail	info@uralchem-assist.de
1.4	Emergency telephone number	
	Manufacturer/supplier:	+7-83361-9-4250 [24 hours.]
	Emergency number	
	Europe	112
	Great Britain	+44 (0) 203 394 9870 (24/7)
	The USA	+1-877 271 7077
		Consult the relevant national official advisory body if necessary

2. SECTION 2: HAZARDS IDENTIFICATION

Classification and labeling have been performed according to Regulation (EC) No. 1272/2008 (CLP/GHP)

2.1	Classification of the substance	
2.1.1	Classification according to Regulation (EC) No 1272/2008 [CLP/GHS]	Hazard class and category: Skin corrosive; category 1A Hazard statement: H314: Causes severe skin burns and eye damage
2.2	Label elements	
	Labeling according to Regulation (EC)	

No 1272/2008 [CLP/GHS]
Hazard Pictogram:



GHS05,

Signal word:

Dgr : Danger

Hazard statements:

H314: Causes severe skin burns and eye damage

Precautionary Statements:

P260: Do not breathe dust/fume/gas/mist/vapours/spray.
P264: Wash hands thoroughly after handling
P280: Wear protective gloves/protective clothing/eye protection/face protection.
P301+P330+P331: IF SWALLOWED: rinse mouth. Do NOT induce vomiting.
P303 + P361 + P353: IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower.
P363: Wash contaminated clothing before reuse.
P304+P340: IF INHALED: Remove person to fresh air and keep comfortable for breathing.
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 Health hazard:

Causes burns to the respiratory track, skin, eyes and gastrointestinal tract.
Medical conditions aggravated by exposure: asthma, respiratory disorders.

Physical hazards:

Mixing with water, acid or incompatible materials may cause splattering and release of heat.

Potential health hazards:

Target organs affected: respiratory system, skin. Eyes

Environmental effects:

Avoid ingress into water-supply sources and sewerage. The substance has alkaline character and can raise pH of surface water.

2.4 Additional Information

See Section 11

3. SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Product identifier type in accordance with Article 18(2) of Regulation (EC) No 1272/2008	Identifier number	Identification name	Weight % content (or range)		EC Number
Index number in CLP Annex VI	011-002-00-6	Sodium hydroxide	46-49	48	215-185-5
CAS number	7732-18-5	Water	41-54	52	231-91-2
Index number in CLP Annex VI	011-005-00-2	sodium carbonate	Max 0.15		207-838-8
CAS number	7647-14-5	sodium chloride	Max 0.007		231-598-3

3.2 Mixtures Not applicable.

3.3 Additional Information None.

4. SECTION 4: FIRST AID MEASURES



4.1 Description of first aid measures

Inhalation

Move to fresh air.
Oxygen or artificial respiration if needed.
Victim to lie down in the recovery position, cover and keep him warm.
Call a physician immediately

Skin Contact

Take off contaminated clothing and shoes immediately.
Wash off immediately with plenty of water.
Keep warm and in a quiet place.
Call a physician or poison control centre immediately.
Wash contaminated clothing before re-use.

Eye Contact

Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes.
In the case of difficulty of opening the lids, administer an analgesic eye wash (oxybuprocaine).
Call a physician or poison control centre immediately.
Take victim immediately to hospital.

Ingestion

Call a physician or poison control centre immediately.
Take victim immediately to hospital.
If swallowed, rinse mouth with water (only if the person is conscious).
Do NOT induce vomiting.
Artificial respiration and/or oxygen may be necessary.

4.2 Most important symptoms and effects, both acute and delayed

Causes burns to the respiratory track, skin, eyes and gastrointestinal tract, causes permanent eye damage.

4.3 Indication of immediate medical attention and special treatment needed

No specific requirements

5. SECTION 5: FIRE-FIGHTING MEASURES

5.1 Extinguishing Media

Suitable Extinguishing Media

Use extinguishing measures that are appropriate to local circumstances and the surrounding environment

Unsuitable Extinguishing Media

Water may be ineffective.

5.2 Special hazards arising from the substance or mixture

The product is not flammable.
Not combustible.
Reacts violently with water.
Gives off hydrogen by reaction with metals.

5.3 Advice for fire-fighters

In the event of fire, wear self-contained breathing apparatus.
Use personal protective equipment.
Wear chemical resistant oversuit
Cool containers / tanks with water spray.

6. SECTION 6: ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures

Advice for non-emergency personnel:
- Prevent further leakage or spillage if safe to do so.
- Keep away from Incompatible products (see Section 10).
Advice for emergency responders:
- Evacuate personnel to safe areas.
- Keep people away from and upwind of spill/leak.
- Ventilate the area.
- Wear suitable protective clothing.
Refer to protective measures listed in sections 7 and 8.

6.2 Environmental precautions

Should not be released into the environment.

Do not flush into surface water or sanitary sewer system.
If the product contaminates rivers and lakes or drains inform respective authorities

- 6.3 Methods and material for containment and cleaning up**
Sweep up and shovel into suitable containers for disposal.
Avoid dust formation.- Keep in properly labelled containers.
Keep in suitable, closed containers for disposal.
Treat recovered material as described in the section "Disposal considerations".
- 6.4 Reference to other sections**
See Sections 7, 8 and 13
- 6.5 Additional Information**
None

7. SECTION 7: HANDLING AND STORAGE

- 7.1 Precautions for safe handling**
Used in closed system
When diluting, always add the product to water. Never add water to the product.
Use only equipment and materials which are compatible with the product.
Keep away from Incompatible products.
To avoid thermal decomposition, do not overheat.
Preferably transfer by pump or gravity.
- 7.2 Conditions for safe storage, including any incompatibilities**
Storage:
Store in original container.
Keep in a well-ventilated place.
Keep in a dry place.
Keep in properly labelled containers.
Keep container closed.
Avoid dust formation.
Keep away from incompatible products.
Packaging material
Suitable material: stainless steel, polyethylene, paper + PE.
Unsuitable material: no data available
- 7.3 Specific end use(s)**
NaOH is used for different purposes in a variety of industrial sectors.
The sector with the largest use of NaOH is the production of other chemicals, both organics (30%) and inorganics (13%). Other uses are in the sectors pulp and paper industry (12%), aluminium and metal industry (7%), food industry (3%), water treatment (3%) and textile (3%). The remainder is used in the production of soaps, mineral oils, bleach, phosphates, cellulose, rubber and others

8. SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

- 8.1 Control parameters**
8.1.1 Occupational Exposure Limits

Substance	Sodium hydroxide			
CAS No.	1310-73-2			
	Limit value - Eight hours		Limit value - Short term*	
Country	ppm	mg/m³	ppm	mg/m³
Austria	-	2 inhalable aerosol	-	4 inhalable aerosol -
Belgium	-	2	-	-
Canada - Québec	-	-	-	2 (1)
Denmark	-	2	-	2
France	-	2	-	-
Hungary	-	2	-	2
Poland	-	0,5	-	1
Spain	-	2	-	-
Sweden	-	1	-	(2)
Switzerland	-	2 inhalable aerosol	-	2 inhalable aerosol

USA - NIOSH	-	-	-	2 (1)
USA - OSHA	-	2	-	-
United Kingdom	-	-	-	2

Remarks

Canada - Québec

(1) Ceiling value

Sweden

Inhalable dust

USA - NIOSH

(1) ceiling limit value (15 min)

8.1.2 PNECs and DNELs

PNECs:

Based on the facts that NaOH dissociates completely in water to Na⁺ and OH⁻, possesses high water solubility and low vapor pressure, PNEC derivation for soil and sediments, as well as PNEC oral for Sodium hydroxide is not considered useful because Sodium hydroxide will be found predominantly in aquatic environment. Based on the available data it is not considered useful to derive a PNEC for Sodium hydroxide in fresh water because the natural pH can vary significantly between several aquatic ecosystems and also the sensitivity to a change of the pH can vary significantly between aquatic ecosystems.

DNELs:

Acute - short-term exposure - local effects (dermal):
According to the CLP Regulation No 1272/2008 Annex VI Table 3.1, the concentration limit for corrosivity of NaOH is considered to be 2%.
Long-term exposure - local effects (dermal DNEL in mg/kg bw):
No DNEL long-term exposure - local effects could be derived as no reliable dose descriptors were available for that route of exposure.
Long-term exposure - local effects (inhalation DNEL in mg/m³):
the DNEL for sodium hydroxide for long-term inhalation for workers is 1.0 mg/m³.
the DNEL for long-term inhalation, general population = 1.0 mg/m³.

8.2 Exposure controls

8.2.1 Appropriate engineering controls

Ensure adequate ventilation

Apply technical measures to comply with the occupational exposure limits

8.2.2 Personal protection equipment

Eye/face protection

Chemical resistant goggles must be worn



Skin protection

Impervious gloves

Suitable material: PVC, Neoprene, Natural rubber, Butyl rubber

Unsuitable material: Leather



Respiratory protection

In the case of dust or aerosol formation use respirator with an approved filter

Recommended Filter type: P2



Skin and body protection

Chemical resistant apron.

Apron/boots of PVC, neoprene in case of dusts

Eye wash bottles or eye wash stations in compliance with applicable standards

Take off contaminated clothing and shoes immediately

Handle in accordance with good industrial hygiene and safety practice

Hygiene measures

8.2.3 Environmental Exposure Controls

Dispose of rinse water in accordance with local and national regulations.

9. SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

Physical state at 20°C and 101.3 kPa

solid

Colour

white

Odour

Odorless

Melting Point (°C) / Freezing Point (°C)

323@101 325 Pa

	Boiling point	1327 @ 101 325 Pa
	Flash Point (°C)	Not applicable
	Flammability (solid, gas)	Not applicable
	Explosive limit ranges.	Not applicable
	Vapour Pressure (mm Hg)	Not applicable
	Surface tension	Not applicable
	Relative density (g/cm ³) @ 20°C	2.13
	Solubility (Water)	100g/100g water at 25°C
	Stability in organic solvents and identity of relevant degradation products	Not applicable
	Partition Coefficient (n-Octanol/water)	Not applicable
	Self-ignition temperature (°C)	Not applicable
	Viscosity (mPa.s)	Not applicable
	Explosive properties	Not applicable
	Oxidising properties	Not applicable
9.2	Other information	None

10. SECTION 10: STABILITY AND REACTIVITY

10.1	Reactivity	Potential for exothermic hazard. May be corrosive to metals.
10.2	Chemical stability	Stable under recommended storage conditions
10.3	Possibility of hazardous reactions	Gives off hydrogen by reaction with metals. Exothermic reaction with strong acids. Reacts violently with water. Risk of explosion.
10.4	Conditions to avoid	Keep away from direct sunlight. To avoid thermal decomposition, do not overheat. Exposure to moisture Freezing.
10.5	Incompatible materials	Metals, Oxidizing agents, Water, Acids, Aluminium, other light metals and their alloys
10.6	Hazardous Decomposition Product(s)	Hydrogen

11. SECTION 11: TOXICOLOGICAL INFORMATION

11.1	Information on toxicological effects	
11.1.1	Acute toxicity	
	Inhalation / Skin Contact / Eye Contact	According to the REACH Regulation, acute toxicity testing does not generally need to be conducted if the substance is classified as corrosive to the skin (column 2 adaptation, Annex VIII). Sodium hydroxide is a corrosive substance at concentrations of about 2% and higher.
11.1.2	Skin corrosion/irritation	Sodium hydroxide is a corrosive substance at concentrations of about 2% and higher. Skin irritation / corrosion: corrosive
11.1.3	Serious eye damage/irritation	Irritation of the eyes of rabbits was reported at NaOH concentrations of 0.4; 0.5; 0.95; 1; 2 and 3%. Corrosive effects were found at 1.2; 8 and 10% NaOH.
11.1.4	Respiratory or skin sensitization	Not classified
11.1.5	Mutagenicity	Negative mutagenicity tests support no classification
11.1.6	Carcinogenicity	Lack of positive in vitro and in vivo mutagenicity data support no classification for carcinogenicity and support no additional animal testing to assess carcinogenicity.
11.1.7	Reproductive toxicity	Classification for reproductive or developmental toxicity is not necessary since NaOH is not expected to be systemically available

		in the body under normal handling and use conditions and the substance will not reach the foetus nor reach male and female reproductive organs
11.1.8	STOT - single exposure	Respiratory system, skin, eyes
11.1.9	STOT - repeated exposure	NaOH is not expected to be systemically available in the body under normal handling and use conditions and therefore systemic effects of NaOH after repeated exposure are not expected to occur.
11.1.10	Aspiration hazard	Not classified
11.2	Other information	None

12. SECTION 12: ECOLOGICAL INFORMATION

12.1	Toxicity	EC50 (48 h, Ceriodaphnia Sp): 40.4 mg/l The available data indicate that NaOH concentrations of 20 to 40 mg/l may be acutely toxic to fish and invertebrates (single species tests). Data on pH increases due to the addition of these amounts of NaOH in the used test waters are lacking. In waters with a relatively low buffering capacity, NaOH concentrations of 20-40 mg/l may result in a pH increase with one to several pH units
12.2	Persistence and degradability	NaOH is a strong alkaline substance that dissociates completely in water to Na ⁺ and OH ⁻ . High water solubility and low vapour pressure indicate that NaOH will be found predominantly in aquatic environment. This implies that it will not adsorb on particulate matter or surfaces. Atmospheric emissions as aerosols are rapidly neutralized by carbon dioxide and the salts will be washed out by rain
12.3	Bioaccumulative potential	Considering its high water solubility, NaOH is not expected to bioconcentrate in organisms. Log Pow is not applicable for an inorganic compound which dissociates
12.4	Mobility in soil	Sodium hydroxide is a strong alkaline substance that dissociates completely in water to Na ⁺ and OH ⁻ . High water solubility and low vapour pressure indicate that sodium hydroxide will be found predominantly in aqueous environments. NaOH will not adsorb on particulate matter or surfaces and will not accumulate in living substances
12.5	Results of PBT and VPVB assessment	NaOH does not fulfill the criteria for persistence, bioaccumulation and toxicity. Therefore, NaOH is not considered a PBT or a vPvB substance
12.6	Other adverse effects	None anticipated

13. SECTION 13: DISPOSAL CONSIDERATIONS

13.1	Waste treatment methods	Dilute with plenty of water. Solutions with high pH-value must be neutralized before discharge. Neutralise with acid. In accordance with local and national regulations.
13.2	Additional Information	
13.2.2	Contaminated packaging:	Where possible recycling is preferred to disposal or incineration. Clean container with water. Dispose of as unused product In accordance with local and national regulations.

14. SECTION 14: TRANSPORT INFORMATION

14.1	Land transport (ADR/RID):	
	UN-No.:	1824
	Proper shipping name	SODIUM HYDROXIDE, LIQUID
	Class	8
	Packing group:	II
	Hazard label(s):	8

14.2	Inland water ways transport (ADN):	
	UN-No.:	1824
	Proper Shipping Name:	SODIUM HYDROXIDE, LIQUID
	Class:	8
	Packing group:	II
	Hazard Label(s):	8
14.3	Marine transport (IMDG)	
	UN-No.:	1824
	Proper Shipping Name:	SODIUM HYDROXIDE, LIQUID
	Class(es):	8
	Packing group:	II
	EmS number	F-A, S-B
	Marine Pollutant:	no
14.4	Air transport (ICAO-TI/IATA-DGR):	
	UN-No.:	1824
	Proper Shipping Name:	SODIUM HYDROXIDE, LIQUID
	Class(es)	2
	Packing group:	II
14.5	Additional information:	None

15. SECTION 15: REGULATORY INFORMATION

15.1	Safety, health and environmental regulations/legislation specific for the substance or mixture	
15.1.1	EU regulations	<ul style="list-style-type: none"> • Council Directive 98/83/EC of 3 November 1998 concerning the quality of surface water intended for human consumption: $6.5 < \text{pH} < 9.5$; • Council Directive 75/440/EEC of 16 June 1975 concerning the quality of surface water intended for the abstraction of drinking water: $5.5 < \text{pH} < 9.0$; • Council Directive (76/160/EEC) of 8 December 1975 concerning the quality of bathing water: $6.0 < \text{pH} < 9.0$; • Council Directive (78/659/EEC) of 18 July 1978 concerning the quality of fresh waters needing protection or improvement in order to support fish life: $6.0 < \text{pH} < 9.0$; • Council Directive (79/923/EEC) of 30 October 1979 on the quality required of shellfish waters: $7.0 < \text{pH} < 9.0$.
	Authorizations and/or restrictions on use	Not applicable
15.1.2	National regulations	<p>Hazard classification - In accordance with: State Standard of Russian Federation (GOST 12.1.007).</p> <p>Label elements - In accordance with: State Standard of Russian Federation (GOST 31340-07).</p> <p>Taking into account the existing EU Directives for pH control for surface water and the data of many Member States on additional national regulations to control the pH of waste waters (STP influents) and surface waters it is concluded that STPs and surface waters are sufficiently protected with regard to pH changes.</p>
15.2	Chemical Safety Assessment	Chemical Safety Report is available

16. SECTION 16: OTHER INFORMATION

16.1	Classification of the substance	
16.1.1	Classification according to Regulation (EC) No 1272/2008 [CLP/GHS]	<p>Hazard class and category: Skin corrosive; category 1A</p> <p>Hazard statement: H314: Causes severe skin burns and eye damage</p>

Label elements

Hazard Pictogram:



GHS05,

Signal word:

Dgr : Danger

Hazard statements:

H314: Causes severe skin burns and eye damage

Precautionary Statements

P260: Do not breathe dust/fume/gas/mist/vapours/spray.
P264: Wash hands thoroughly after handling
P280: Wear protective gloves/protective clothing/eye protection/face protection.
P301+P330+P331: IF SWALLOWED: rinse mouth. Do NOT induce vomiting.
P303 + P361 + P353: IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower.
P363: Wash contaminated clothing before reuse.
P304+P340: IF INHALED: Remove person to fresh air and keep comfortable for breathing.
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.

16.2 LEGEND

STOT
DNEL
PNEC
PBT

Specific Target Organ Toxicity
Derived No Effect Level
Predicted No Effect Concentration
PBT: Persistent, Bioaccumulative and Toxic

Information contained in this publication or as otherwise supplied to Users is believed to be accurate and is given in good faith, but it is for the Users to satisfy themselves of the suitability of the product for their own particular purpose. HaloPolymer Kirovo-Chepetsk LLC gives no warranty as to the fitness of the product for any particular purpose and any implied warranty or condition (statutory or otherwise) is excluded except to the extent that exclusion is prevented by law. HaloPolymer Kirovo-Chepetsk LLC accepts no liability for loss or damage (other than that arising from death or personal injury caused by defective product, if proved), resulting from reliance on this information. Freedom under Patents, Copyright and Designs cannot be assumed.

You should not use the product with the purposes other than those specified, without consultation with us.

It is the Customer's responsibility to make an assessment of this product and use it observing safety precautions and requirements of relevant laws and legal norms.

The Buyer of the product intended for a third party's usage is obliged to take all reasonable steps to afford access to all information contained in this SDS for any person making use of this product.

An Employer must inform employees and other persons of the dangers they can be incurred and precautionary measures they should apply.

Annex 1 to the extended Safety Data Sheet (eSDS)
Exposure Scenarios

Exposure Scenario 1: Manufacturing of liquid NaOH	
<i>List of all use descriptors</i>	
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
<i>EU Risk Assessment</i>	
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	
<i>Product characteristics</i>	
Liquid NaOH, all concentrations	
<i>Frequency and duration of use</i>	
Continuous	
<i>Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil</i>	
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.	
<i>Conditions and measures related to external treatment or recovery of waste for disposal</i>	
Liquid NaOH waste should be reused or discharged to the industrial wastewater and further neutralized if needed.	
Contributing exposure scenario controlling worker exposure	
<i>Product characteristic</i>	
Liquid NaOH, all concentrations	
<i>Frequency and duration of use/exposure</i>	
8 hours/day, 200 days/year	
<i>Technical conditions and measures at process level (source) to prevent release</i>	
Replacing, where appropriated, manual processes by automated and/or closed processes. This would avoid irritating mists, sprayings and subsequent potential splashes:	
<ul style="list-style-type: none"> • 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)" 	
<i>Technical conditions and measures to control dispersion from source towards the worker</i>	
Local exhaust ventilation and/or general ventilation is good practice	
<i>Organisational measures to prevent /limit releases, dispersion and exposure</i>	

- 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/m³ (typical value is 0.14 mg/m³) is below the DNEL of 1 mg/m³.

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 CO₂ (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

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

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

<p>safer procedures instructed by the employer.</p> <ul style="list-style-type: none"> The employer has also to ascertain that the required PPE is available and used according to instructions
<p>Conditions and measures related to personal protection, hygiene and health evaluation</p> <ul style="list-style-type: none"> 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 <ul style="list-style-type: none"> 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
<p>Exposure estimation and reference to its source</p> <p>Worker exposure:</p> <p>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.</p> <p>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.</p> <p>Based on NaOH measurements and following the proposed risk management measures controlling worker exposure, the reasonable worst-case inhalation exposure of 0.26 mg/m³ (measured at the drumming/bagging place) is below the DNEL of 1 mg/m³.</p> <p>Environmental exposure:</p> <p>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.</p> <p>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.</p> <p>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 CO₂ (or other acids).</p> <p>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.</p> <p>Bioaccumulation will not occur.</p>

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
PROC11 Non 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.

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

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

Worker/professional 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 in the pulp and paper industry, de-inking waste paper, aluminium, textile and chemical industry and following the proposed risk management measures controlling worker and professional exposure, the inhalation exposure is below the DNEL of 1 mg/m³.

In addition to the measured exposure data the ECETOC TRA tool has been used to estimate the inhalation exposure (see Table below). It was assumed that there is no local exhaust ventilation and no respiratory protection unless specified otherwise. The duration of exposure was set at more than 4 hours per day as a worst-case assumption and professional use was specified where relevant as a worst-case assumption. For the solid, the low dustiness class was selected because NaOH is very hygroscopic. Only the most relevant PROCs were considered in the assessment.

PROC	PROC description	Liquid (mg/m ³)	Solid (mg/m ³)
PROC 1	Use in closed process, no likelihood of exposure	0.17	0.01
PROC 2	Use in closed, continuous process with occasional controlled exposure (e.g. sampling)	0.17	0.01
PROC 3	Use in closed batch process (synthesis or formulation)	0.17	0.1
PROC 4	Use in batch and other process (synthesis) where opportunity for exposure arises	0.17	0.2 (with LEV)
PROC 5	Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact)	0.17	0.2 (with LEV)
PROC 7	Spraying in industrial settings and applications	0.17	Not applicable
PROC 8a/b	Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non dedicated or dedicated facilities	0.17	0.5
PROC 9	Transfer of substance or preparation into small containers (dedicated filling line, including weighing)	0.17	0.5
PROC10	Roller application or brushing of adhesive and other coating	0.17	0.5
PROC11	Spraying outside industrial settings or applications	0.17	0.2 (with LEV)
PROC13	Treatment of articles by dipping and pouring	0.17	0.5
PROC14	Production of preparations or articles by tableting, compression, extrusion, pelettisation	0.17	0.2 (with LEV)
PROC15	Use a laboratory reagent	0.17	0.1
PROC19	Hand-mixing with intimate contact and only PPE available.	0.17	0.5
PROC23	Open processing and transfer operations (with minerals) at elevated temperature	0.17	0.4 (with LEV and RPE(90%))
PROC24	High (mechanical) energy work-up of substances bound in materials and/or articles	0.17	0.5 (with LEV and RPE(90%))

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 no 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 CO₂ (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 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.

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

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 $0.3 - 1.6 \text{ mg/m}^3$ 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.