

## CAUSTIC SODA PEARL (MICROPEARLS)

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

#### 1.1. Product identifier

- Product name	:	<b>CAUSTIC SODA PEARL (MICROPEARLS)</b>
- Chemical Name	:	Sodium hydroxide
- Synonyms	:	Sodium hydrate
- Molecular formula	:	NaOH
- REACH Registration Number	:	01-2119457892-27
- Type of product	:	Substance
- CAS-No.	:	1310-73-2

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

- Identified uses	:	-	Reagent
		-	pH-regulating agents
		-	Ion exchange resins regenerating agent
		-	Catalyst
		-	Etching agent
		-	Cleaning agent
		-	Chemical intermediate

#### 1.3. Details of the supplier of the safety data sheet

**The TNN Development Limited**  
**RM2901, Rainbow Building**  
**23 Renmin Road**  
**Zhongshan dist**  
**Dalian**  
**China**

#### 1.4. Emergency telephone number

**0086 411 82597003**

### SECTION 2. HAZARDS IDENTIFICATION

#### 2.1. Classification of the substance or mixture

##### 2.1.1. European regulation (EC) 1272/2008, as amended

*Classified as hazardous according to the European regulation (EC) 1272/2008, as amended*

Hazard class	Hazard category	Route of exposure	H Phrases
Corrosive to metals	Category 1		H290
Skin corrosion	Category 1A		H314

#### 2.2. Label elements

##### 2.2.1. Name(s) on label

Hazardous components : Sodium hydroxide

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### 2.2.2. Signal word

Danger

### 2.2.3. Hazard pictograms



### 2.2.4. Hazard statements

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

### 2.2.5. Precautionary statements

- |                   |  |  |
|-------------------|--|--|
| <b>Prevention</b> | P260<br>P280                                     | - Do not breathe dust/ fume/ gas/ mist/ vapours/ spray.<br>- Wear protective gloves/ protective clothing/ eye protection/ face protection.   |
| <b>Response</b>   | P303 + P361 + P353<br>P305 + P351 + P338<br>P310 | - IF ON SKIN (or hair): Remove/ Take off immediately all contaminated clothing. Rinse skin with water/ shower.<br>- IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.<br>- Immediately call a POISON CENTER or doctor/ physician. |

### 2.3. Other hazards

- None known.

## SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

### 3.1. Substances

#### 3.1.1. Concentration

Substance name:	Concentration
<b>Sodium hydroxide</b>	>= 99 %
CAS-No.: 1310-73-2 / EC-No.: 215-185-5 / Index-No.: 011-002-00-6 REACH Registration Number: 01-2119457892-27	

## SECTION 4. FIRST AID MEASURES

### 4.1. Description of first aid measures

#### 4.1.1. If inhaled

- 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.

#### 4.1.2. In case of eye contact

- Call a physician or poison control centre immediately.
- 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).
- Take victim immediately to hospital.

#### 4.1.3. In case of skin contact

- Take off contaminated clothing and shoes immediately.

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- 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.

#### 4.1.4. If swallowed

- 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

#### 4.2.1. Inhalation

- Corrosive to respiratory system.
- Symptoms: Breathing difficulties, Cough, chemical pneumonitis, pulmonary oedema
- Repeated or prolonged exposure: Risk of sore throat, nose bleeds, chronic bronchitis

#### 4.2.2. Skin contact

- Corrosive
- Causes severe burns.
- Symptoms: Redness, Swelling of tissue

#### 4.2.3. Eye contact

- Causes severe burns.
- Small amounts splashed into eyes can cause irreversible tissue damage and blindness.
- May cause permanent eye injury.
- Symptoms: Redness, Lachrymation, Swelling of tissue, Burn

#### 4.2.4. Ingestion

- If ingested, severe burns of the mouth and throat, as well as a danger of perforation of the oesophagus and the stomach.
- Symptoms: Nausea, Abdominal pain, Bloody vomiting, Diarrhoea, Suffocation, Cough, Severe shortness of breath

### 4.3. Indication of any immediate medical attention and special treatment needed

- Take victim immediately to hospital.
- Immediate medical attention is required.
- Consult with an ophthalmologist immediately in all cases.
- Burns must be treated by a physician.
- If swallowed
- Avoid gastric lavage (risk of perforation).
- Keep under medical supervision for at least 48 hours.

## SECTION 5. FIREFIGHTING MEASURES

### 5.1. Extinguishing media

#### 5.1.1. Suitable extinguishing media

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

#### 5.1.2. 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.

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### 5.3. Advice for firefighters

- In the event of fire, wear self-contained breathing apparatus.
- Use personal protective equipment.
- Wear chemical resistant oversuit
- Cool containers/tanks with water spray.
- Prevent fire extinguishing water from contaminating surface water or the ground water system.

## SECTION 6. ACCIDENTAL RELEASE MEASURES

### 6.1. Personal precautions, protective equipment and emergency procedures

#### 6.1.1. Advice for non-emergency personnel

- Prevent further leakage or spillage if safe to do so.
- Keep away from Incompatible products.

#### 6.1.2. 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.

### 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 materials 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

- Refer to protective measures listed in sections 7 and 8.

## 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 storage, including incompatibilities

#### 7.2.1. 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.

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### 7.2.2. Packaging material

#### 7.2.2.1. *Suitable material*

- Stainless steel
- Polyethylene
- Paper + PE.

#### 7.2.2.2. *Unsuitable material*

- no data available

### 7.3. **Specific end use(s)**

- For further information, please contact: Supplier

## SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

### 8.1. **Control parameters**

#### 8.1.1. Exposure Limit Values

##### **Sodium hydroxide**

- UK. EH40 Workplace Exposure Limits (WELs) 12 2011  
Short term exposure limit = 2 mg/m<sup>3</sup>
- US. ACGIH Threshold Limit Values 03 2013  
Ceiling Limit Value = 2 mg/m<sup>3</sup>

#### 8.1.2. Other information on limit values

##### 8.1.2.1. *Derived No Effect Level / Derived minimal effect level*

##### **Sodium hydroxide**

- Workers, Inhalation, Long-term exposure, 1 mg/m<sup>3</sup> , Local effects
- Consumers, Inhalation, Long-term exposure, 1 mg/m<sup>3</sup> , Local effects

### 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. Individual protection measures

##### 8.2.2.1. *Respiratory protection*

- In the case of dust or aerosol formation use respirator with an approved filter.
- Recommended Filter type: P2

##### 8.2.2.2. *Hand protection*

- Impervious gloves
- Suitable material: PVC, Neoprene, Natural Rubber, butyl-rubber
- Unsuitable material: Leather

##### 8.2.2.3. *Eye protection*

- Chemical resistant goggles must be worn.

##### 8.2.2.4. *Skin and body protection*

- Chemical resistant apron
- Apron/boots of PVC, neoprene in case of dusts.

##### 8.2.2.5. *Hygiene measures*

- 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.

#### 8.2.3. Environmental exposure controls

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

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### SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

#### 9.1. Information on basic physical and chemical properties

##### 9.1.1. General Information

- **Appearance** Solid form, crystalline, strongly hygroscopic, flakes, bales, microgranules
- **Colour** white
- **Odour** odourless
- **Molecular weight** 40.01 g/mol

##### 9.1.2. Important health safety and environmental information

- **pH** > 13
- **pKa** No data
- **Melting point/freezing point** 318.4 °C, Pressure: 101.3 kPa
- **Boiling point/boiling range** 1,388 °C, Pressure: 101.3 kPa
- **Flash point** Not applicable
- **Evaporation rate** Not applicable
- **Flammability (solid, gas)** The product is not flammable.
- **Flammability** Not applicable
- **Explosive properties** Not explosive, See section 10.
- **Vapour pressure** 1 hPa, at 739 °C
- **Vapour density** no data available
- **Relative density** 2.13, at 20 °C
- **Bulk density** 1.14 kg/m<sup>3</sup>, at 20 °C
- **Solubility(ies)** 420 g/l, Water, at 0 °C  
1,100 g/l, Water, at 20 °C  
3,470 g/l, Water, at 100 °C
- **Solubility/qualitative** soluble, Alcohol (Glycerol)
- **Partition coefficient: n-octanol/water** No data
- **Auto-ignition temperature** no data available
- **Decomposition temperature** no data available
- **Viscosity** Not applicable
- **Oxidizing properties** Non oxidizer

#### 9.2. Other information

- **Granulometry** 0.8 mm, Mean diameter

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### 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.
- Risk of violent reaction.
- Risk of explosion.
- Reacts violently with water.

#### 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 products

- Hydrogen

### SECTION 11. TOXICOLOGICAL INFORMATION

#### 11.1. Acute toxicity

##### 11.1.1. Acute oral toxicity

- no data available

##### 11.1.2. Acute inhalation toxicity

- no data available

##### 11.1.3. Acute dermal toxicity

- no data available

#### 11.2. Skin corrosion/irritation

- Corrosive

#### 11.3. Serious eye damage/eye irritation

- Corrosive

#### 11.4. Respiratory or skin sensitisation

- no observed effect

#### 11.5. Germ cell mutagenicity

- Animal testing did not show any mutagenic effects., In vitro tests did not show mutagenic effects

#### 11.6. Carcinogenicity

- no data available

#### 11.7. Reproductive toxicity

- Effect on fertility, foetotoxic effect, no observed effect

#### 11.8. Specific target organ toxicity - single exposure

- Inhalation, Remarks: Corrosive
- Oral, Remarks: Corrosive

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- Dermal, Remarks: Corrosive

### 11.9. Specific target organ toxicity - repeated exposure

- Remarks: Not applicable

### 11.10. Aspiration hazard

- no data available

## SECTION 12. ECOLOGICAL INFORMATION

### 12.1. Toxicity

- Fishes, various species, LC50, 96 h, 35 - 189 mg/l
- Crustaceans, Ceriodaphnia sp., EC50, 48 h, 40.4 mg/l

### 12.2. Persistence and degradability

#### 12.2.1. Abiotic degradation

- Air  
Result: neutralization by natural alkalinity
- Water  
Result: ionization/neutralization  
Conditions: pH
- Soil  
Result: ionization/neutralization

### 12.3. Bioaccumulative potential

- Not relevant

### 12.4. Mobility in soil

- Water, Soil/sediments  
considerable solubility and mobility
- Soil  
soluble, mobile, ionization/neutralization
- Air, Chemical degradation

### 12.5. Results of PBT and vPvB assessment

- This substance is not considered to be persistent, bioaccumulating and toxic (PBT).
- This substance is not considered to be very persistent and very bioaccumulating (vPvB).

### 12.6. Other adverse effects

- no data available

## 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. 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.



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### SECTION 14. TRANSPORT INFORMATION

#### International transport regulations

##### - IATA-DGR

14.1. UN number	UN 1823
14.2. UN proper shipping name	SODIUM HYDROXIDE, SOLID
14.3. Transport hazard class(es)	
Hazard class	8
Labels	8 - Corrosive
14.4. Packing group	II
14.5. Environmental hazards	
14.6. Special precautions for user	

##### - IMDG

14.1. UN number	UN 1823
14.2. UN proper shipping name	SODIUM HYDROXIDE, SOLID
14.3. Transport hazard class(es)	
Hazard class	8
Labels	8 - Corrosive substances
14.4. Packing group	II
14.5. Environmental hazards	
14.6. Special precautions for user	
EmS	F-A S-B

##### - ADR

14.1. UN number	UN 1823
14.2. UN proper shipping name	SODIUM HYDROXIDE, SOLID
14.3. Transport hazard class(es)	
Hazard class	8
Labels	8 - Corrosive substances
14.4. Packing group	II
14.5. Environmental hazards	
14.6. Special precautions for user	
HI/UN No.	80 / 1823
Tunnel restriction code	(E)

##### - RID

14.1. UN number	UN 1823
14.2. UN proper shipping name	SODIUM HYDROXIDE, SOLID

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14.3. Transport hazard class(es)	
Hazard class	8
Labels	8 - Corrosive substances
14.4. Packing group	II
14.5. Environmental hazards	
14.6. Special precautions for user	
HI/UN No.	80 / 1823

**- ADN**

14.1. UN number	UN 1823
14.2. UN proper shipping name	SODIUM HYDROXIDE, SOLID
14.3. Transport hazard class(es)	
Hazard class	8
Labels	8 - Corrosive substances
14.4. Packing group	II
14.5. Environmental hazards	
14.6. Special precautions for user	

### SECTION 15. REGULATORY INFORMATION

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

- Regulation (EC) No 1907/2006 of the European Parliament and of the Council of 18 December 2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH), as amended
- Regulation (EC) No 1272/2008 of the European Parliament and of the Council of 16 December 2008 on classification, labelling and packaging of substances and mixtures, as amended
- Council Directive 98/24/EC of 7 April 1998 on the protection of the health and safety of workers from the risks related to chemical agents at work, as amended
- Commission Directive 2000/39/EC of 8 June 2000 establishing a first list of indicative occupational exposure limit values in implementation of Council Directive 98/24/EC on the protection of the health and safety of workers from the risks related to chemical agents at work, as amended
- Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on waste
- The List of Wastes (Wales) Regulations 2005. 2005 Welsh Statutory Instrument (WSI), number W.148 (1820), 14 July 2005
- The List of Wastes (England) Regulations 2005. 2005 Statutory Instrument (SI), number 895, 6 April 2005, as amended
- EH40/2005. Workplace Exposure Limits, as amended through 1,10, 2007 (WELs) Published by the Health and Safety Executive (HSE). Issued under the Control of Substances Hazardous to Health Regulations - as amended

**15.1.1. Notification status**

Inventory Information	Status
USA. Toxic Substances Control Act (TSCA)	- In compliance with inventory
Australia. Inventory of Chemical Substances (AICS)	- In compliance with inventory
Canada. Domestic Substances List (DSL)	- In compliance with inventory
Korea. Existing Chemicals Inventory (KECI (KR))	- In compliance with inventory
EU list of existing chemical substances (EINECS)	- In compliance with inventory
Japan. Inventory of Existing & New Chemical Substances (ENCS)	- In compliance with inventory
China. Inventory of Existing Chemical Substances (IECSC)	- In compliance with inventory
Philippine. Inventory of Chemicals and Chemical Substances (PICCS)	- In compliance with inventory
New Zealand. Inventory of Chemicals (NZIOC)	- In compliance with inventory
Mexico INSQ (INSQ)	- In compliance with inventory

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### 15.2. Chemical Safety Assessment

- A Chemical Safety Assessment has been carried out for this substance.
- See Exposure scenario

## SECTION 16. OTHER INFORMATION

### 16.1. Other information

- New (SDS)
- Distribute new edition to clients

This SDS is only intended for the indicated country to which it is applicable. The European SDS format compliant with the applicable European legislation is not intended for use nor distribution in countries outside the European Union with the exception of Norway and Switzerland. Safety datasheets applicable in other countries/regions are available upon request.

The information given corresponds to the current state of our knowledge and experience of the product, and is not exhaustive. This applies to product which conforms to the specification, unless otherwise stated. In this case of combinations and mixtures one must make sure that no new dangers can arise. In any case, the user is not exempt from observing all legal, administrative and regulatory procedures relating to the product, personal hygiene, and protection of human welfare and the environment.

Print Date: 14.07.2015

## 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](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<sup>3</sup> (typical value is 0.14 mg/m<sup>3</sup>) is below the DNEL of 1 mg/m<sup>3</sup>.

#### Environmental exposure:

The aquatic effect and risk assessment only deals with the effect on organisms/ecosystems due to possible pH changes related to OH<sup>-</sup> discharges, as the toxicity of the Na<sup>+</sup> 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 CO<sub>2</sub> (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<sup>-</sup> 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	
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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<sup>3</sup> (measured at the drumming/bagging place) is below the DNEL of 1 mg/m<sup>3</sup>.

### Environmental exposure:

The aquatic effect and risk assessment only deals with the effect on organisms/ecosystems due to possible pH changes related to OH<sup>-</sup> discharges, as the toxicity of the Na<sup>+</sup> 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<sub>2</sub> (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<sup>-</sup> 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

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](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/m<sup>3</sup>.

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 <sup>3</sup> )	Solid (mg/m <sup>3</sup> )
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<sup>-</sup> discharges, as the toxicity of the Na<sup>+</sup> 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 CO<sub>2</sub> (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<sup>-</sup> 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](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 mg/m<sup>3</sup> is slightly higher than the long term DNEL for inhalation of 1 mg/m<sup>3</sup> but smaller than the short term occupational exposure limit of 2 mg/m<sup>3</sup>. Furthermore, NaOH will be rapidly neutralised as a result of its reaction with CO<sub>2</sub> (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.