SAFETY DATA SHEET

CAUSTIC SODA ANHYDROUS

Compilation date: 17/01/11

Revision No: 3

Section 1: Identification of the substance/mixture and of the company/undertaking

1.1. Product identifier

Product name: CAUSTIC SODA ANHYDROUS

REACH registered number(s): 01-2119457892-27-XXXX

CAS number: 1310-73-2

EINECS number: 215-185-5

Index number: 011-002-00-6

Synonyms: SODIUM HYDROXIDE SOLID

PEARL OF CAUSTIC SODA

CAUSTIC SODA PEARL

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

Use of substance / mixture: pH Adjustment. Detergents Chemical manufacturing. Animal Feed Processing.

1.3. Details of the supplier of the safety data sheet

Company name: Monarch Chemicals Limited

New Road

Sheerness

Kent

ME12 1LZ

United Kingdom

Tel: 01795 583333 (09:00 - 17:00 Mon-Fri)

Fax: 01795 583300

Email: sales@monarchchemicals.co.uk

1.4. Emergency telephone number

Emergency tel: 07711 009064 (Out of Hours)

Section 2: Hazards identification

2.1. Classification of the substance or mixture

Classification under CLP: Skin Corr. 1A: H314; Met. Corr. 1: H290

Classification under CHIP: C: R35

Most important adverse effects: May be corrosive to metals. Causes severe skin burns and eye damage.

2.2. Label elements

Label elements under CLP:

Hazard statements: * H290: May be corrosive to metals.

H314: Causes severe skin burns and eye damage.

Signal words: * Danger

[cont...]

Hazard pictograms: * GHS05: Corrosion

Precautionary statements: * P260: Do not breathe dust/fume/gas/mist/vapours/spray.
P280: Wear protective gloves/protective clothing/eye protection/face protection.
P301+330+331: IF SWALLOWED: rinse mouth. Do NOT induce vomiting.
P303+361+353: IF ON SKIN (or hair): Remove immediately all contaminated clothing. Rinse skin with water/shower.
P305+351+338: 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.

2.3. Other hazards

Other hazards: Hygroscopic: readily absorbs water from air.

PBT: This substance is not identified as a PBT substance.

Section 3: Composition/information on ingredients

3.1. Substances

Chemical identity: SODIUM HYDROXIDE

Section 4: First aid measures

4.1. Description of first aid measures

Skin contact: Remove all contaminated clothes and footwear immediately unless stuck to skin. Drench the affected skin with running water for 10 minutes or longer if substance is still on skin. Transfer to hospital if there are burns or symptoms of poisoning.

Eye contact: Bathe the eye with running water for 15 minutes. Transfer to hospital for specialist examination.

Ingestion: Wash out mouth with water. Do not induce vomiting. Give 1 cup of water to drink every 10 minutes. Transfer to hospital as soon as possible.

Inhalation: * Remove casualty from exposure ensuring one's own safety whilst doing so. If conscious, ensure the casualty sits or lies down. If unconscious and breathing is OK, place in the recovery position. If unconscious, check for breathing and apply artificial respiration if necessary. Transfer to hospital as soon as possible.

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

Skin contact: Causes burns. Severe burns may occur. Progressive ulceration will occur if treatment is not immediate.

Eye contact: There may be severe pain. The eyes may water profusely. Corneal burns may occur. May cause permanent damage.

Ingestion: Causes burns to the gastrointestinal tract. Corrosive burns may appear around the lips. There may be soreness and redness of the mouth and throat. There may be difficulty

[cont...]

swallowing. Nausea and stomach pain may occur. There may be vomiting. Blood may be vomited. Lethal dose for man is approximately 5g.

Inhalation: Corrosive to the mucous membrane. Prolonged or repeated exposure may cause ulceration and perforation of the nasal septum. There may be a feeling of tightness in the chest with shortness of breath. Exposure may cause coughing or wheezing. There may be congestion of the lungs causing severe shortness of breath. There may be loss of consciousness. Onset of symptoms may be delayed by a few hours.

Delayed / immediate effects: Immediate effects can be expected after short-term exposure.

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

Immediate / special treatment: * Eye bathing equipment should be available on the premises. A decontamination shower should be available on the premises. Speed of treatment is essential. In case of inhalation of dust the onset of symptoms may be delayed by 24 hrs so medical supervision is recommended.

Section 5: Fire-fighting measures

5.1. Extinguishing media

Extinguishing media: * Use water spray to cool containers. Suitable extinguishing media for the surrounding fire should be used.

5.2. Special hazards arising from the substance or mixture

Exposure hazards: Corrosive. The product does not support combustion. In combustion emits toxic fumes. May produce flammable Hydrogen gas when in contact with metals, with obvious explosion hazards.

5.3. Advice for fire-fighters

Advice for fire-fighters: Wear self-contained breathing apparatus. Wear protective clothing to prevent contact with skin and eyes.

Section 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

Personal precautions: Wear suitable protective clothing. Do not attempt to take action without suitable protective clothing - see section 8 of SDS. Remove all incompatible materials as outlined in section 10 of SDS. Do not create dust.

6.2. Environmental precautions

Environmental precautions: Do not discharge into drains or rivers.

6.3. Methods and material for containment and cleaning up

Clean-up procedures: * Transfer to a closable, labelled salvage container for disposal by an appropriate method. Wash the spillage site with large amounts of water. Avoid all incompatible materials in clean-up procedure - see section 10 of SDS.

[cont...]

6.4. Reference to other sections

Reference to other sections: * Refer to section 8 of SDS. Refer to section 13 of SDS.

Section 7: Handling and storage

7.1. Precautions for safe handling

Handling requirements: Ensure there is sufficient ventilation of the area. Wear suitable protective clothing. Avoid the formation or spread of dust in the air. Avoid contact with the material and breathing its dust. Prevent contact with water. Ensure that contaminated clothing is thoroughly laundered prior to re-use.

7.2. Conditions for safe storage, including any incompatibilities

Storage conditions: Store in cool, well ventilated area. Keep container tightly closed. Avoid contact with water or humidity. Avoid incompatible materials and conditions - see section 10 of SDS. Do not store near foodstuffs.

Suitable packaging: Plastic. Plastic-lined. Do not use Aluminium and its alloys. Do not use Zinc and its alloys. Do not use Lead, or light metal drums. Do not use Tin or its alloys.

7.3. Specific end use(s)

Specific end use(s): No data available.

Section 8: Exposure controls/personal protection

8.1. Control parameters

Workplace exposure limits: **Respirable dust**

State	8 hour TWA:	15 min. STEL:	8 hour TWA:	15 min. STEL:
UK	-	2 mg/m3	4 mg/m-3	-

Hazardous ingredients:

SODIUM HYDROXIDE

Workplace exposure limits: **Respirable dust**

State	8 hour TWA:	15 min. STEL:	8 hour TWA:	15 min. STEL:
UK	2 mg/m3	2 mg/m3	-	-

8.2. Exposure controls

Engineering measures: Ensure there is sufficient ventilation of the area. Ensure all engineering measures mentioned in section 7 of SDS are in place.

Respiratory protection: Respiratory protective device with particle filter. Particle filter class P3S (EN143).

Hand protection: Gloves (alkali-resistant).

Eye protection: Safety goggles. Face-shield. Ensure eye bath is to hand.

Skin protection: Wear full chemical suit. Protective clothing. Wear wellingtons. Ensure safety shower is to hand.

[cont...]

Environmental: * No special requirement.

Section 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

State: Beads, pellets or flakes.

Colour: White

Odour: Odourless

Oxidising: Non-oxidising (by EC criteria)

Solubility in water: Highly soluble

Also soluble in: Alcohol. Glycerol Ether

Boiling point/range°C: 1390

Melting point/range°C: 318

Flash point°C: >93

Relative density: ~ 2.13 (1.175 Bulk)

pH: Highly Alkaline.

9.2. Other information

Section 10: Stability and reactivity

10.1. Reactivity

Reactivity: Stable under recommended transport or storage conditions.

10.2. Chemical stability

Chemical stability: Stable under normal conditions. Hygroscopic.

10.3. Possibility of hazardous reactions

Hazardous reactions: Hazardous reactions will not occur under normal transport or storage conditions. Decomposition may occur on exposure to conditions or materials listed below.

10.4. Conditions to avoid

Conditions to avoid: Moist air. Humidity. Moisture.

10.5. Incompatible materials

Materials to avoid: Can react violently with water. May react with certain metals to liberate flammable Hydrogen gas. Acids. Chlorinated hydrocarbons. Organic materials. Aluminium. Aluminium Alloys Zinc. Zinc Alloys Tin. Tin Alloys Lead

10.6. Hazardous decomposition products

Haz. decomp. products: * In combustion emits toxic fumes. Liberates flammable/explosive hydrogen gas when reacts with metals.

Section 11: Toxicological information

11.1. Information on toxicological effects

Toxicity values:

[cont...]

Route	Species	Test	Value	Units
ORL	RBT	LDLO	500	mg/kg
IPR	MUS	LD50	40	mg/kg

Relevant hazards for substance:

Hazard	Route	Basis
Skin corrosion/irritation	DRM	Based on test data

Symptoms / routes of exposure

Skin contact: Causes burns. Severe burns may occur. Progressive ulceration will occur if treatment is not immediate.

Eye contact: There may be severe pain. The eyes may water profusely. Corneal burns may occur. May cause permanent damage.

Ingestion: Causes burns to the gastrointestinal tract. Corrosive burns may appear around the lips. There may be soreness and redness of the mouth and throat. There may be difficulty swallowing. Nausea and stomach pain may occur. There may be vomiting. Blood may be vomited. Lethal dose for man is approximately 5g.

Inhalation: Corrosive to the mucous membrane. Prolonged or repeated exposure may cause ulceration and perforation of the nasal septum. There may be a feeling of tightness in the chest with shortness of breath. Exposure may cause coughing or wheezing. There may be congestion of the lungs causing severe shortness of breath. There may be loss of consciousness. Onset of symptoms may be delayed by a few hours.

Delayed / immediate effects: Immediate effects can be expected after short-term exposure.

Section 12: Ecological information

12.1. Toxicity

Ecotoxicity values:

Species	Test	Value	Units
FISH	96H LC50	43	mg/l

12.2. Persistence and degradability

Persistence and degradability: Product degrades readily by reaction with the natural carbon dioxide in the air.

12.3. Bioaccumulative potential

Bioaccumulative potential: The product does not bioaccumulate.

12.4. Mobility in soil

Mobility: Non-volatile. Soluble in water.

[cont...]

12.5. Results of PBT and vPvB assessment

PBT identification: This substance is not identified as a PBT substance.

12.6. Other adverse effects

Other adverse effects: Harmful to aquatic organisms. Harmful to flora. Harmful to fauna. Do not allow to enter watercourses or soils. Spillage in sewers or waterways must be avoided. Large doses causes high/low pH which may affect effluent and sewage treatment processes. Discharge of large quantities may kill fish and other aquatic life due to increase/decrease in pH.

Section 13: Disposal considerations

13.1. Waste treatment methods

Disposal operations: * Transfer to a suitable container and arrange for collection by specialised disposal company.

Disposal of packaging: Contaminated containers must not be treated as household waste. Where practical, containers and packaging should be recycled by a licenced contactor.

NB: The user's attention is drawn to the possible existence of regional or national regulations regarding disposal.

Section 14: Transport information

14.1. UN number

UN number: UN1823

14.2. UN proper shipping name

Shipping name: SODIUM HYDROXIDE, SOLID

14.3. Transport hazard class(es)

Transport class: 8

14.4. Packing group

Packing group: II

14.5. Environmental hazards

Environmentally hazardous: No **Marine pollutant:** No

14.6. Special precautions for user

Special precautions: No special precautions.

Tunnel code: E

Transport category: 2

Section 15: Regulatory information

[cont...]

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

15.2. Chemical Safety Assessment

Chemical safety assessment: A chemical safety assessment has been carried out for the substance or the mixture by the supplier.

Section 16: Other information

Other information

Other information: * This safety data sheet is prepared in accordance with Commission Regulation (EU) No 453/2010.

* indicates text in the SDS which has changed since the last revision.

WARNING: For professional use only.

Phrases used in s.2 and 3: H290: May be corrosive to metals.

H314: Causes severe skin burns and eye damage.

R35: Causes severe burns.

Legal disclaimer: The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. This company shall not be held liable for any damage resulting from handling or from contact with the above product.

Exposure Scenario 1: Manufacturing of liquid NaOH

List of all use descriptors

Sector of use (SU):	SU 3, 8 Manufacture of bulk, large-scale substances
Product category (PC):	not applicable
Process category (PROC):	PROC1 Use in closed process, no likelihood of exposure
	PROC2 Use in closed, continuous process with occasional controlled exposure
	PROC3 Use in closed batch process (synthesis or formulation)
	PROC4 Use in batch and other process (synthesis) where opportunity for exposure arises
	PROC8a/b Transfer of chemicals from/to vessels/large containers at (non)dedicated facilities
	PROC9 Transfer of chemicals into small containers (dedicated filling line)
Article category (AC):	not applicable
Environmental Release Category (ERC):	ERC1 Manufacture of substances

EU Risk Assessment

An EU risk assessment has been performed based on the Existing Substances Regulation (Council Regulation 793/93). A comprehensive risk assessment report has been finalised in 2007 and is available via internet:
http://ecb.jrc.ec.europa.eu/DOCUMENTS/Existing-Chemicals/RISK_ASSESSMENT/REPORT/sodiumhydroxidereport416.pdf

Contributing exposure scenario controlling environmental exposure

Product characteristics

Liquid NaOH, all concentrations

Frequency and duration of use

Continuous

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

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

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

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

Contributing exposure scenario controlling worker exposure

Product characteristic

Liquid NaOH, all concentrations

Frequency and duration of use/exposure

8 hours/day, 200 days/year

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

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

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

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

Local exhaust ventilation and/or general ventilation is good practice

Organisational measures to prevent /limit releases, dispersion and exposure

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

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

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

Exposure estimation and reference to its source

Worker exposure:

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

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

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

Environmental exposure:

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

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

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

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

Bioaccumulation will not occur.

Exposure Scenario 2: Manufacturing of solid NaOH

List of all use descriptors

Sector of use (SU):	SU 3, 8 Manufacture of bulk, large-scale substances
Product category (PC):	not applicable
Process category (PROC):	PROC1 Use in closed process, no likelihood of exposure
	PROC2 Use in closed, continuous process with occasional controlled exposure
	PROC3 Use in closed batch process (synthesis or formulation)
	PROC4 Use in batch and other process (synthesis) where opportunity for exposure arises
	PROC8a/b Transfer of chemicals from/to vessels/large containers at (non)dedicated facilities
	PROC9 Transfer of chemicals into small containers (dedicated filling line)
Article category (AC):	not applicable
Environmental Release Category (ERC):	ERC1 Manufacture of substances

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 safer procedures instructed by the employer.
- The employer has also to ascertain that the required PPE is available and used according to instructions

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

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

Exposure estimation and reference to its source

Worker exposure:

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

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

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

Environmental exposure:

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

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

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

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

Bioaccumulation will not occur.

Exposure Scenario 3: Industrial and Professional Use of NaOH

List of all use descriptors

Sector of use (SU): SU 1-24

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

Product category (PC): PC 0-40

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

Process category (PROC): PROC1 Use in closed process, no likelihood of exposure
PROC2 Use in closed, continuous process with occasional controlled exposure
PROC3 Use in closed batch process (synthesis or formulation)
PROC4 Use in batch and other process (synthesis) where opportunity for exposure arises
PROC5 Mixing or blending in batch processes (multistage and/or significant contact)
PROC8a/b Transfer of chemicals from/to vessels/large containers at (non)dedicated facilities
PROC9 Transfer of chemicals into small containers (dedicated filling line)
PROC10 Roller application or brushing
PROC11Non industrial spraying
PROC13 Treatment of articles by dipping and pouring
PROC15 Use of laboratory reagents in small scale laboratories

The process categories mentioned above are assumed to be the most important ones but other process categories could also be possible (PROC 1 – 27).

Article category (AC): not applicable

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

Environmental Release Category (ERC): ERC1 Manufacture of substances
ERC2 Formulation of preparations
ERC4 Industrial use of processing aids in processes and products, not becoming part of articles
ERC6A Industrial use resulting in manufacture of another substance (use of intermediates)
ERC6B Industrial use of reactive processing aids
ERC7 Industrial use of substances in closed systems
ERC8A Wide dispersive indoor use of processing aids in open systems
ERC8B Wide dispersive indoor use of reactive substances in open systems
ERC8D Wide dispersive outdoor use of processing aids in open systems
ERC9A Wide dispersive indoor use of substances in closed systems

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

Further explanations

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

EU Risk Assessment

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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

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 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.