SAFETY DATA SHEET

Caustic Soda Solution (Concentration 30-50%)  

Date issued: 21st December 2011  
Revision: 1

1. Identification of the substance/preparation and of the company/undertaking

1.1. Product Identifiers
Trade name: CAUSTIC SODA SOLUTION (50%), (Sodium Hydroxide Solution 50%)  
REACH Registration number 01-2119457892-27-0006  
CAS number 1310-73-2  
EC index number 011-002-00-6  
EINECS number 215-185-5  
Molar mass 40.00 g/mol  
Formula NaOH

1.2. Product Identifiers
Relevant identified uses of the substance or mixture and uses advised against  
-Material for industrial applications  
-Manufacture of liquid substance  
-Manufacture of solid substance  
-Industrial and professional use  
-Consumer end use

1.3. Supplier’s details
-Company: Goulding Chemicals Ltd.  
-Address: Centre Park Road, Marina, Cork, Ireland  
-Telephone: +353(021)4911611  
-Fax: +353(021)4911660  
-Contact Email croninm@gouldings.ie

1.4. Emergency telephone number
-Emergency telephone number (outside of office hours): +353(021)4911619

2. Hazards identification

2.1. Classification of the substance or mixture
Classification (1272/2008/CE):  
Skin Corrosion, Category 1A (H314)  
Corrosive to metals, Category 1 (H290)

Classification (2006/121/EC, 1999/45/EC):  
Causes severe burns.

2.2 Label elements
Hazardous components which must be listed on the label: Sodium hydroxide
Labelling (1272/2008/CE):  

Danger

Hazard statements:
H314 Causes severe skin burns and eye damage.
H290 May be corrosive to metals.
2. Hazards identification continued

Precautionary statements:
P260    Do not breathe dust or mist.
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.
P305+ P351+ P338    IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P308    IF exposed or concerned:
P310    Immediately call a POISON CENTER or a doctor/physician.

Labelling and classification in accordance with the EC Dangerous Preparations Directive (1999/45/EC) and subsequent amendments

C    Corrosive
Contains: sodium hydroxide
R-phrase(s): R35 Causes severe burns.
S-phrase(s): S26 In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
S37/39    Wear suitable gloves and eye/face protection.
S45    In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).

3. Composition/information on ingredients

3.2 Type of product: Mixture

Hazardous components
Sodium hydroxide (caustic soda)
Concentration (%): 30-50
CAS-No.: 1310-73-2
EINECS-No.: 215-185-5
Index-No.: 011-002-00-6

Specific threshold concentration (GHS):
Skin Corr. 1A H314 >=5%
Skin Corr. 1B H314 2-<5%
Skin Irrit. 2 H315 0.5-<2%
Eye Irrit. 2 H319 0.5-<2%

Classification (37/548/EEC): C R35

Specific threshold concentration
Xi R36/38 0.5-<2%
C R34 2-<5%
C R35 >=5%
4. First-aid measures

FIRST AID MEASURES

4.1 Description of first aid measures

General advice: Remove victims from the danger zone without endangering your own safety. Remove contaminated clothing (including underwear and shoes) immediately.

If inhaled: Bring accident victims out into the fresh air. If patient has difficulty in breathing, administer oxygen, keep the patient calm and warm. Call a physician immediately.

In case of skin contact: After contact with skin, wash immediately with plenty of water. Apply sterile protective bandage; consult GP.

In case of eye contact: Hold the eyes open and rinse with preferably lukewarm water for a sufficiently long period of time (at least 10 minutes). Contact an ophthalmologist.

If swallowed: If swallowed, rinse mouth with water (only if the person is conscious). DO NOT induce the patient to vomit, medical advice is required.

4.2 Most important symptoms and effects, both acute and delayed

Notes to physician: See Section 11 for information on toxicology.

4.3 Indication of any immediate medical attention and special treatment needed

Therapeutic measures: Basic first aid, decontamination, symptomatic treatment. Treat with a corticoid metered aerosol depending on the amount inhaled.

5. Fire-fighting measures

5.1 Suitable extinguishing media: Carbon dioxide (CO2), foam, extinguishing powder, in cases of larger fires, water spray should be used.

Unsuitable extinguishing media: High volume water jet.

5.2 Special hazards arising from the substance or mixture:

Burning releases carbon monoxide, carbon dioxide, oxides of nitrogen and traces of hydrogen cyanide. In the event of fire and/or explosion do not breathe fumes.

5.3 Advice for fire-fighters:

During fire-fighting respirator with independent air-supply and airtight garment is required. Fight fire in early stages if safe to do so. Containers at risk of fire should be cooled with water and, if possible removed from the danger area. Do not allow contaminated extinguishing water to enter the soil, ground-water or surface waters.

6. Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures:

Put on protective equipment (see Section 8). Ensure adequate ventilation/exhaust extraction. Keep unauthorized persons away.

6.2.1 Environmental precautions: Do not flush into surface water or sanitary sewers system.

6.3 Methods and material for containment and cleaning up:

Take up with absorbent for chemicals or, if necessary with dry sand. Fill into labelled, sealable containers. Also place used cleaning materials into closable receptacles.

6.4 Reference to other sections: For further disposal measures see Section 13.
7. Handling and storage

7.1 Precautions for safe handling:
Handle and open container with care. Provide sufficient air exchange and/or exhaust in work rooms.
Organize work procedures so that workers are not exposed to the effects of the products.
Vent waste air only via suitable separator or scrubbers.

Precautions should generally be taken against electrostatic charges according to the equipment used and the way the product is handled and packaged.

The precautions required in the handling of irritant or corrosive substances must be taken. Contact with skin and eyes and inhalation of vapors must be avoided under all circumstances.

Careful attention to industrial and personal hygiene is essential. Keep away from foodstuffs, drinks and tobacco. Wash hands before breaks and at the end of work day. Keep working clothes separately. Change contaminated or soaked clothing immediately. If the suit becomes contaminated, first take a shower with the suit on.

Keep away from incompatible products and naked flames/heat.
Do not discharge the waste into drains.

The general conditions of use are further specified in the exposure scenarios which may be found in the attached annex.

7.2 Conditions for safe storage, including any incompatibilities:
Store in a dry, well-ventilated, bunded area. Keep in properly labelled closed containers. Keep away from incompatible products and naked flames/heat. Protect against frost.
Min. Storage temperature: 25°C for 50% solution, 20°C for 30% & 47% solutions. Mild steel tanks must be stress relieved if storing material above 40°C for concentrations of 30% or more, or above 60°C for lower concentrations.

Keep away from: - combustible materials, -(strong) acids, - metals
Suitable packaging material:
- stainless steel  - nickel
- polyethylene     - polypropylene
- glass           - stoneware/porcelain
Non suitable packaging material:
- lead           - aluminium  - copper
- zinc           - bronze     - tin

7.3 Specific end use(s):
For further information contact the supplier.

8. Exposure Controls/Personal Protection

8.1 Control parameters
Components with workplace control parameters

<table>
<thead>
<tr>
<th>Substance</th>
<th>CAS-No.</th>
<th>Basis</th>
<th>Type</th>
<th>Value</th>
<th>Ceiling Limit Value</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sodium Hydroxide (Caustic Soda)</td>
<td>1310-73-2</td>
<td>EH40 WEL</td>
<td>STEL</td>
<td>2mg/m³</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

For technical protective measures to limit exposure see also Section 7 “Handling and storage”. The general RMMs are further specified in the exposure scenarios which may be found in the attached annex.
8. Exposure Controls/Personal Protection continued

Derived No Effect Level (DNEL) or Derived Minimal Effect Level (DMEL):
Sodium hydroxide (caustic soda)

Worker (short-term)
DNEL Dermal - local effects: < 2 %
DNEL Inhalation - local effects: No data available

Worker (long-term)
DNEL Dermal - local effects: No data available
DNEL Inhalation - local effects: 1 mg/m³ air
Most sensitive endpoint: Irritation (respiratory tract)

Predicted No Effect Concentration (PNEC):
Sodium hydroxide (caustic soda)

Freshwater: Not applicable
Marine water: Not applicable
Sediment: Not relevant
Soil: Not relevant
STP (sewage-treatment plant): Not applicable
Oral: Not relevant

8.2 Exposure controls
Respiratory protection:
Recommendations regarding respiratory protection can be found in the individual exposure scenarios in the appendix.

Hand protection:
Suitable materials for safety gloves; EN 374:
Nitrile rubber- NBR: thickness >= 0,35mm; breakthrough time>=480min.
Polyvinyl chloride- PVC: thickness >=0,5mm; breakthrough time>=480min.
Polychloroprene- CR: thickness >=0,5mm; breakthrough time>=480min.
Butyl rubber lIR: thickness>= 0,5mm; breakthrough time>=480min.
Fluorinated rubber- FKM: thickness>=0,4mm; breakthrough time>=480min.
Recommendation: contaminated gloves should be disposed of.

Eye protection:
Wear eye/face protection.

Skin and body protection:
Impervious protective clothing. On possible contact with the product (sampling, product leakage): full protection or chemical protection clothing.

9. Physical and Chemical Properties

9.1 Information on basic physical and chemical properties
Appearance: liquid
Colour: colourless
Odour: odourless
Odour Threshold: not established
pH: >14 at 100g/l at 20°C
Melting point/range: 12°C (50%), 8°C (47%), 1°C (30%)
Boiling point/range: 145°C (50%), 140°C (47%), 118°C (30%)
9. Physical and Chemical Properties continued

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flash point:</td>
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</tr>
<tr>
<td>Evaporation rate:</td>
<td>not established</td>
</tr>
<tr>
<td>Flammability (solid, gas):</td>
<td>not applicable</td>
</tr>
<tr>
<td>Burning number:</td>
<td>not applicable</td>
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<tr>
<td>Vapour pressure:</td>
<td>not established</td>
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<tr>
<td>Vapour density:</td>
<td>not established</td>
</tr>
<tr>
<td>Density:</td>
<td>30% 1.33 at 15.5°C</td>
</tr>
<tr>
<td></td>
<td>47% 1.50 at 15.5°C</td>
</tr>
<tr>
<td></td>
<td>50% 1.53 at 15.5°C</td>
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<tr>
<td>Surface tension:</td>
<td>not established</td>
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<tr>
<td>Partition coefficient (n-octanol/water):</td>
<td>not established</td>
</tr>
<tr>
<td>Autoignition temperature:</td>
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</tr>
<tr>
<td>Ignition temperature:</td>
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<tr>
<td>Decomposition temperature:</td>
<td>not established</td>
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<tr>
<td>Viscosity, dynamic:</td>
<td>79 mPa.s at 20°C</td>
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<tr>
<td>Explosive properties:</td>
<td>not established</td>
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<tr>
<td>Dust explosion class:</td>
<td>not applicable</td>
</tr>
<tr>
<td>Oxidising properties:</td>
<td>not established</td>
</tr>
</tbody>
</table>

9.2 Other information

Miscibility with water: miscible

10. Stability and Reactivity

10.1 Reactivity:
- Exothermic reaction with water.
- Violent exothermic reaction with strong acids.
- Reacts with some metals to release hydrogen.

10.2 Stability:
- Stable under recommended storage conditions.
- Hygroscopic.
- Absorbs atmospheric CO2.

10.3 Possibility of hazardous reactions

Reacts with (some) metals e.g. Aluminium, Magnesium, Zinc: release of highly flammable gases/vapours (hydrogen).
On heating: release of corrosive gases/vapours.
Reacts violently with Acids.

10.4 Conditions to avoid:
- Over heating
- Freezing
- Direct sunlight
- Moisture

10.5 Materials to avoid:
- Combustible materials
- Strong acids
- Metals
- Oxidising agents

10.6 Hazardous Decomposition Products:

Reacts with (some) metals: release of highly flammable gases/vapours (hydrogen).
On heating: release of corrosive gases/vapours.
No hazardous decomposition if stored and handled correctly.
11. Toxicological Information

Toxicological studies on the product are not yet available. Please find below the data available to us:

11.1 Information on toxicological effects

**Acute toxicity, oral:** sodium hydroxide (caustic soda)  No valid data available.

**Acute toxicity, dermal:** sodium hydroxide (caustic soda)  No valid data available.

**Acute toxicity, inhalation:** sodium hydroxide (caustic soda)  No valid data available.

**Primary skin irritation:** sodium hydroxide (caustic soda)  In vitro test system
Classification: Causes severe burns.  Result: Corrosive
Method: In Vitro Membrane Barrier Test Method for Skin Corrosion - CORROSITEX

**Primary mucosae irritation:** sodium hydroxide (caustic soda)  rabbit
Classification: Causes severe burns.  Result: Risk of serious damage to eyes.

**Sensitisation:** sodium hydroxide (caustic soda)  No known sensitising effect

**Subacute, subchronic and prolonged toxicity:** sodium hydroxide (caustic soda)  No valid data available.

**Carcinogenicity:** sodium hydroxide (caustic soda)  No data available.

**Reproductive toxicity/Fertility:** sodium hydroxide (caustic soda)  No data available.

**Reproductive toxicity/Teratogenicity:** sodium hydroxide (caustic soda)  No data available.

**Genotoxicity in vitro:** sodium hydroxide (caustic soda)
- Test type: Salmonella/microsome test (Ames test)  Result: No indication of mutagenic effects.
- Test type: Chromosome aberration test in vitro  Result: negative

**Genotoxicity in vivo:** sodium hydroxide (caustic soda)  No valid data available.

**STOT evaluation – one-time exposure:** sodium hydroxide (caustic soda)
Based on available data, the classification criteria are not met.

**STOT evaluation – repeated exposure:** sodium hydroxide (caustic soda)
Based on available data, the classification criteria are not met.

**Aspiration toxicity:** sodium hydroxide (caustic soda)
Based on available data, the classification criteria are not met.

**CMR Assessment:** sodium hydroxide (caustic soda)
- Carcinogenicity: Based on available data, the classification criteria are not met.
- Mutagenicity: Tests on bacterial or mammalian cell cultures did not show mutagenic effects.
- Teratogenicity: Based on available data, the classification criteria are not met.
- Reproductive toxicity/Fertility: Based on available data, the classification criteria are not met.

**Toxicology Assessment:** sodium hydroxide (caustic soda)
Acute effects: The product causes burns of eyes, skin and mucous membranes.

**Additional information:** sodium hydroxide (caustic soda)
May cause caustic burns to the mouth, throat or stomach if swallowed. After swallowing danger of stomach perforation. On inhalation: Irritation of mucous membrane, coughing and shortness of breath.
12. Ecological Information

Do not allow to escape into waterways, wastewater or soil.

Ecotoxicological studies of the product are not available.

Please find below the data available to us:

12.1 Toxicity

Acute Fish toxicity:
sodium hydroxide (caustic soda)
LC50 35 - 189 mg/l
Species: Fish
Effect concentrations in the aquatic environment are attributable to a change in pH value.

Acute toxicity for daphnia:
sodium hydroxide (caustic soda)
EC50 40.4 mg/l
Species: Ceriodaphnia sp.
Exposure duration: 48 h
Effect concentrations in the aquatic environment are attributable to a change in pH value.

Acute toxicity for algae:
sodium hydroxide (caustic soda)
No data available.
Effect concentrations in the aquatic environment are attributable to a change in pH value.

Acute bacterial toxicity:
sodium hydroxide (caustic soda)  No valid data available.
Effect concentrations in the aquatic environment are attributable to a change in pH value.

Ecotoxicology Assessment:
sodium hydroxide (caustic soda)
Neutralisation will reduce ecotoxic effects.
A chronic aquatic toxicity is not expected.
Not expected to adsorb on soil.
Neutralization is normally necessary before waste water is discharged into water treatment plants.

12.2 Persistence and degradability

Biodegradability:
sodium hydroxide (caustic soda)  The methods for determining the biological degradability are not applicable to inorganic substances.

Stability in water:
sodium hydroxide (caustic soda)  Not applicable

Photodegradation:
sodium hydroxide (caustic soda)  No data available

Volatility (Henry's Law constant):
sodium hydroxide (caustic soda)  The substance has to be scored as non-volatile from water.
12. Ecological Information continued

12.3 Bioaccumulative potential

Bioaccumulation:
sodium hydroxide (caustic soda)  An accumulation in aquatic organisms is not to be expected.

12.4 Mobility:
Distribution among environmental compartments:
sodium hydroxide (caustic soda)
Adsorption/Soil
Mobile in soils

Environmental distribution:
sodium hydroxide (caustic soda)  The target compartment is water.

12.5 Results of PBT and vPvB assessment
sodium hydroxide (caustic soda)
This substance does not meet the criteria for classification as PBT or vPvB.

12.6 Other adverse effects:
sodium hydroxide (caustic soda)
Toxic effect on fish, plankton and on sedentary organisms, also through shifting of pH value.
Causes no biological oxygen consumption.
No inhibition of activity of waste bacteria after neutralization.

13. Disposal Considerations

Dispose in accordance with applicable international, national and local laws, ordinances and statutes.
For disposal within the EC, the appropriate code according to the European Waste Catalogue (EWC) should be used.

13.1 Waste treatment methods
After containers have been emptied as thoroughly as possible (e.g. by pouring, scraping or draining until “drip-dry”), they can be sent to an appropriate collection point set up within the framework of the existing take-back scheme of the chemical industry.
Containers must be recycled in compliance with national legislation and environmental regulations.

No disposal into surface or waste water.
## 14. Transport Information

### ADR/RID

<table>
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<th>Value</th>
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<tr>
<td>UN Number</td>
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<tr>
<td>Description of the goods</td>
<td>Sodium Hydroxide Solution</td>
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<tr>
<td>Packaging group</td>
<td>II</td>
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<tr>
<td>Hazard identification No</td>
<td>80</td>
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<td>Hazard label</td>
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<tr>
<td>Environmentally Hazardous</td>
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</table>

Limited quantity regulations applicable in accordance with chapter 3.4 ADR/RID in compliance with threshold value.

### ADN

<table>
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### ADNR_TS

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<td>Sodium Hydroxide Solution</td>
</tr>
<tr>
<td>Packaging group</td>
<td>II</td>
</tr>
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<td>Hazard identification No</td>
<td>8</td>
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<td>Hazard label</td>
<td>8 (N3)</td>
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<td>Environmentally Hazardous</td>
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### IATA

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<td>UN Number</td>
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<tr>
<td>Description of the goods</td>
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<tr>
<td>Class</td>
<td>8</td>
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<tr>
<td>Packaging group</td>
<td>II</td>
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<tr>
<td>Hazard label</td>
<td>8</td>
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<tr>
<td>Packing Instruction (cargo aircraft):</td>
<td>855</td>
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<tr>
<td>Packing Instruction (passenger aircraft):</td>
<td>851</td>
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</table>

### IMDG

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<th>Description</th>
<th>Value</th>
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<tbody>
<tr>
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<td>Description of the goods</td>
<td>Sodium Hydroxide Solution</td>
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<tr>
<td>Class</td>
<td>8</td>
</tr>
<tr>
<td>Packing Group</td>
<td>II</td>
</tr>
<tr>
<td>IMDG-Labels</td>
<td>8</td>
</tr>
<tr>
<td>Marine Pollutant</td>
<td>No</td>
</tr>
</tbody>
</table>

Special precautions for user: Corrosive.

Keep away from foodstuffs, acids and alkalis.
15. Regulatory Information

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

Any existing national regulations on the handling of irritant or corrosive substances must be observed.

National provisions:
Relevant Statutory Instruments

- ADR 2011

EU Legislation:
Classification (1272/2008/CE):
Classification and labelling according to Regulation (EC) No 1272/2008 – Annex VI and after evaluation of available test data

Skin Corrosion, Category 1A (H314)
Corrosive to metals, Category 1 (H290)

Labelling (1272/2008/CE):

Danger

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

Precautionary statements:
P260 Do not breathe dust or mist.
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.
P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P308 IF exposed or concerned:
P310 Immediately call a POISON CENTER or a doctor/physician.
15. Regulatory Information continued

**Classification**  Classification and labelling according with Directives 67/548/EEC and 1999/45/EC

**Labelling (2006/121/EC, 1999/45/EC):**
Labelling and classification in accordance with the EC Dangerous Preparations Directive (1999/45/EC) and subsequent amendments

<table>
<thead>
<tr>
<th>C</th>
<th>Corrosive</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contains:</td>
<td>sodium hydroxide</td>
</tr>
<tr>
<td>R-phrases</td>
<td>35 Causes severe burns</td>
</tr>
<tr>
<td>S-phrases</td>
<td>(01/02) (Keep locked up and out of the reach of children)</td>
</tr>
<tr>
<td></td>
<td>26 In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.</td>
</tr>
<tr>
<td></td>
<td>37/39 Wear suitable gloves and eye/face protection.</td>
</tr>
<tr>
<td></td>
<td>45 In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).</td>
</tr>
</tbody>
</table>

15.2 Chemical Safety Assessment
A Chemical Safety Assessment has been carried out for: sodium hydroxide (caustic soda)

16. Other information

<table>
<thead>
<tr>
<th>PBT-substances:</th>
<th>Persistent, bioaccumulative and toxic substances</th>
</tr>
</thead>
<tbody>
<tr>
<td>DSD:</td>
<td>Dangerous Substance Directive</td>
</tr>
<tr>
<td>DPD:</td>
<td>Dangerous Preparation Directive</td>
</tr>
<tr>
<td>CLP (EU-GHS):</td>
<td>Classification, labelling and packaging</td>
</tr>
<tr>
<td></td>
<td>(Globally Harmonised System in Europe)</td>
</tr>
<tr>
<td>Met. Corr.:</td>
<td>Substance or mixture corrosive to metals</td>
</tr>
<tr>
<td>Skin Corr.:</td>
<td>Skin corrosion</td>
</tr>
</tbody>
</table>

**Note:**
The information contained in this data sheet is copied from the safety data sheet provided by the manufacturer. The information is given in good faith and to the best of our knowledge but no guarantee, implied or otherwise, is made.
Annex - Exposure Scenario

- Manufacturing of liquid substance (ES1)
- Manufacturing of solid substance (ES2)
- Industrial and professional use (ES3)
- Consumer end use (ES4)

1. Short title of Exposure Scenario

- Manufacturing of liquid substance (ES1)
  Sector of use: Industrial uses: Uses of substances as such or in preparations at industrial sites, Manufacture of bulk, large scale chemicals (including petroleum products) (SU 3, SU 8)
  Process category: Use in closed process, no likelihood of exposure, Use in closed, continuous process with occasional controlled exposure, Use in closed batch process (synthesis or formulation), Use in batch and other process (synthesis) where opportunity for exposure arises, Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at non-dedicated facilities, Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at dedicated facilities, Transfer of substance or preparation into small containers (dedicated filling line, including weighing) (PROC1, PROC2, PROC3, PROC4, PROC8a, PROC8b, PROC9)
  Environmental release category: Manufacture of substances (ERC1)

Substance: sodium hydroxide (caustic soda) (ES1)

2. Description of activities/process(es) covered in the Exposure Scenario

Only the uses defined in the short title and the use descriptors listed in chapter 1 above are regarded as safe/covered within this Exposure Scenario. In case of mixtures the other chapters may also contain additional information about further uses that are not safe/covered within this scenario.

3. Operational conditions

Duration and frequency
Workers
Covers daily exposures up to 8 hours (unless stated differently).
Covers use up to: 200 days/year
Environment
Continuous exposure

4.1 Physical form
Liquid substance

4.2 Concentration of substance in the mixture
All concentrations covered.

4.3 Amount used per time or per activity
Not relevant
5. Other operational conditions

**Human factors not influenced by risk management**
None identified for this scenario.

**Environmental factors not influenced by risk management**
None identified for this scenario.

6. Risk Management Measures

6.1.1 Occupational measures

**Organizational protective measures**: 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 the substance and c) to follow the safety procedures instructed by the employer.

**Technical protective measures**: Replacing, where appropriate, 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).
- Local exhaust ventilation and/or general ventilation is good practice.

**Personal protective measures**: If vapors form, respirators must be used. In the event of vapors up to 0.5 % vol. percent, use a filtered respirator with DIN EN 141 B-P2 (color code grey/white) combination filter and with DIN 141 B-P3 combination filter up to 1 % vol. At higher concentrations or under uncertain conditions a respirator with independent air supply must be used. Wearing of permeation resistant gloves with suitable materials for safety gloves is required. Chemical resistant goggles must be worn. If splashes are likely to occur, wear tightly fitting safety goggles, faceshield. Wear suitable protective clothing, aprons, shield and suits. If splashes are likely to occur, wear: Rubber or plastic boots.

6.1.2 Consumer related measures
No consumer uses identified.

6.2 Environment related measures
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.

7. Waste related measures

Liquid waste should be reused or discharged to the industrial wastewater and further neutralized if needed.
8. Prediction of exposure

8.1. Health

Short term exposure:

Workers (inhalation)
Method: Provided in EU-RAR (2007)*
Short term stationary sample measurement : 0.33 mg/m³

Workers (dermal)
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 the substance was not quantified.

Long term exposure:

Workers (inhalation)
Method: Provided in EU-RAR (2007)*
Stationary Air Sample measurement : 0.14 mg/m³

Workers (dermal)
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 the substance was not quantified.

8.2. Environment

PEC
Air : Not relevant
Freshwater : Not relevant
Effects of NaOH to aquatic organisms are caused by possible pH changes related to OH-ions, as the toxicity of the Na+ ion is expected to be insignificant compared to the potential pH effect. If RMMs are implemented no exposure is expected.
Marine water : Not relevant
Sediment : Not relevant
Soil : Not relevant
STP (sewage-treatment plant) : Not relevant
Secondary poisoning : Not relevant
Humans via the environment : Not relevant

Based on the applied RMMs the risk towards humans and the environment is sufficiently controlled (RCR 1).


9. Guidance to downstream user

Not relevant
1. Short title of Exposure Scenario

- Manufacturing of solid substance (ES2)

Sector of use: Industrial uses: Uses of substances as such or in preparations at industrial sites, Manufacture of bulk, large scale chemicals (including petroleum products) (SU 3, SU8)

Process category: Use in closed process, no likelihood of exposure, Use in closed, continuous process with occasional controlled exposure, Use in closed batch process (synthesis or formulation), Use in batch and other process (synthesis) where opportunity for exposure arises, Transfer of substance or preparation (charging/ discharging) from/to vessels/large containers at non-dedicated facilities, Transfer of substance or preparation (charging/ discharging) from/to vessels/large containers at dedicated facilities, Transfer of substance or preparation into small containers (dedicated filling line, including weighing) (PROC1, PROC2, PROC3, PROC4, PROC8a, PROC8b, PROC9)

Environmental release category: Manufacture of substances (ERC1)

Substance: sodium hydroxide (caustic soda) (ES2)

2. Description of activities/process(es) covered in the Exposure Scenario

Only the uses defined in the short title and the use descriptors listed in chapter 1 above are regarded as safe/covered within this Exposure Scenario. In case of mixtures the other chapters may also contain additional information about further uses that are not safe/covered within this scenario.

3. Operational conditions

Duration and frequency

Workers
Covers daily exposures up to 8 hours (unless stated differently). Covers use up to: 200 days/year

Environment
Continuous exposure

4.1 Physical form

Solid substance

4.2 Concentration of substance in the mixture

All concentrations covered.

4.3 Amount used per time or per activity

Not relevant

5. Other operational conditions

Human factors not influenced by risk management
None identified for this scenario.

Environmental factors not influenced by risk management
None identified for this scenario.
6. Risk Management Measures

6.1.1 Occupational measures
Organizational protective measures: 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 the substance and c) to follow the safety procedures instructed by the employer.

Technical protective measures: Replacing, where appropriate, 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).
Local exhaust ventilation and/or general ventilation is good practice.

Personal protective measures: If product dust is present, wear an anti-dust mask with at least a P2 filter. Wearing of permeation resistant gloves with suitable materials for safety gloves is required. Chemical resistant goggles must be worn. If splashes are likely to occur, wear tightly fitting safety goggles, faceshield. Wear suitable protective clothing, aprons, shield and suits. If splashes are likely to occur, wear: Rubber or plastic boots.

6.1.2 Consumer related measures
No consumer uses identified.

6.2 Environment related measures
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.

7. Waste related measures
No solid waste occurs. Liquid waste should be reused or discharged to the industrial wastewater and further neutralized if needed.

8. Prediction of exposure

8.1. Health
Short term exposure:
Workers (inhalation)
Method: Provided in EU-RAR (2007)*
Personal air sample measurement: 0.27 mg/m³
Workers (dermal)
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 the substance was not quantified.

Long term exposure:
Workers (inhalation)
Method: Provided in EU-RAR (2007)*
Personal air sample measurement: 0.27 mg/m³
Workers (dermal)
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 the substance was not quantified.
8.2. Environment

PEC
Air : Not relevant
Freshwater : Not relevant
Effects of NaOH to aquatic organisms are caused by possible pH changes related to OH-ions, as the toxicity of the Na+ ion is expected to be insignificant compared to the potential pH effect. If RMMs are implemented no exposure is expected.
Marine water : 0 Not relevant
Sediment : Not relevant
Soil : Not relevant
STP (sewage-treatment plant) : Not relevant
Secondary poisoning : Not relevant
Humans via the environment : Not relevant

Based on the applied RMMs the risk towards humans and the environment is sufficiently controlled (RCR 1).


9. Guidance to downstream user
Not relevant

---------------------------------------------------------------------------------------------------

1. Short title of Exposure Scenario

- Industrial and professional use (ES3)
Sector of use : Used for different purposes in a variety of sectors and categories. (SU 1-24)
Product category : Used for different purposes in a variety of sectors and categories. (PC 0-40)
Process category : Use in closed process, no likelihood of exposure, Use in closed, continuous process with occasional controlled exposure, Use in closed batch process (synthesis or formulation), Use in batch and other process (synthesis) where opportunity for exposure arises, Mixing or blending in batch processes for formulation of preparations and articles (multistage and/ or significant contact), Industrial spraying, Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at non-dedicated facilities, Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at dedicated facilities, Transfer of substance or preparation into small containers (dedicated filling line, including weighing), Roller application or brushing, Non industrial spraying, Treatment of articles by dipping and pouring, Production of preparations or articles by tableting, compression, extrusion, pelletisation, Use as laboratory reagent, Hand-mixing with intimate contact and only PPE available, Open processing and transfer operations with minerals/ metals at elevated temperature, High (mechanical) energy work-up of substances bound in materials and/ or articles, The categories mentioned above are assumed to be the most important ones but other categories could also be possible. (PROC1, PROC2, PROC3, PROC4, PROC5, PROC7, PROC8a, PROC8b, PROC9, PROC10, PROC11, PROC13, PROC14, PROC15, PROC19, PROC23, PROC24, -)
Environmental release category: Manufacture of substances, Formulation of preparations, Industrial use of processing aids in processes and products, not becoming part of articles, Industrial use resulting in manufacture of another substance (use of intermediates), Industrial use of reactive processing aids, Industrial use of substances in closed systems, Wide dispersive indoor use of processing aids in open systems, Wide dispersive indoor use of reactive substances in open systems, Wide dispersive outdoor use of processing aids in open systems, Wide dispersive indoor use of substances in closed systems, The categories mentioned above are assumed to be the most important ones but other categories could also be possible. (ERC1, ERC2, ERC4, ERC6a, ERC6b, ERC7, ERC8a, ERC8b, ERC8d, ERC9a, -)

Substance: sodium hydroxide (caustic soda) (ES3)

<table>
<thead>
<tr>
<th>2. Description of activities/process(es) covered in the Exposure Scenario</th>
</tr>
</thead>
<tbody>
<tr>
<td>Only the uses defined in the short title and the use descriptors listed in chapter 1 above are regarded as safe/covered within this Exposure Scenario. In case of mixtures the other chapters may also contain additional information about further uses that are not safe/covered within this scenario.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>3. Operational conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Duration and frequency</strong></td>
</tr>
<tr>
<td>Workers</td>
</tr>
<tr>
<td>Covers daily exposures up to 8 hours (unless stated differently).</td>
</tr>
<tr>
<td>Covers use up to: 200 days/year</td>
</tr>
<tr>
<td>Environment</td>
</tr>
<tr>
<td>Continuous exposure</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>4.1 Physical form</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solid and liquid applications, Dustiness: Low</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>4.2 Concentration of substance in the mixture</th>
</tr>
</thead>
<tbody>
<tr>
<td>All concentrations covered.</td>
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</tbody>
</table>

<table>
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<tr>
<th>4.3 Amount used per time or per activity</th>
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</thead>
<tbody>
<tr>
<td>Not relevant</td>
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</tbody>
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<table>
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<tr>
<th>5. Other operational conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Human factors not influenced by risk management</td>
</tr>
<tr>
<td>None identified for this scenario.</td>
</tr>
<tr>
<td>Environmental factors not influenced by risk management</td>
</tr>
<tr>
<td>None identified for this scenario.</td>
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</tbody>
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<thead>
<tr>
<th>6. Risk Management Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.1.1 Occupational measures</td>
</tr>
<tr>
<td>Contributing Scenario</td>
</tr>
<tr>
<td>Worker (Industrial) - For products containing the solid or liquid substance at concentrations &gt; 2%:</td>
</tr>
</tbody>
</table>

**Organizational protective measures:** 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 the substance and c) to follow the safety procedures instructed by the employer.
Technical protective measures: Replacing, where appropriate, 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).
Local exhaust ventilation and/or general ventilation is good practice.

Personal protective measures: If product dust is present, wear an anti-dust mask with at least a P2 filter. If vapors form, respirators must be used. At higher concentrations or under uncertain conditions a respirator with independent air supply must be used. Wearing of permeation resistant gloves with suitable materials for safety gloves is required. If splashes are likely to occur, wear tightly fitting safety goggles, faceshield. Wear suitable protective clothing, aprons, shield and suits. If splashes are likely to occur, wear: Rubber or plastic boots.

Contributing Scenario
Worker (Professional) - For products containing the solid or liquid substance at concentrations > 2%:

Organizational protective measures: Where possible for professional use, use of specific dispensers and pumps specifically designed to prevent splashes/spills/exposure to occur.

Personal protective measures: If product dust is present, wear an anti-dust mask with at least a P2 filter. If vapors form, respirators must be used. At higher concentrations or under uncertain conditions a respirator with independent air supply must be used. Wearing of permeation resistant gloves with suitable materials for safety gloves is required. These are butyl-rubber, PVC, polychloroprene with natural latex liner, material thickness: 0.5 mm, breakthrough time: > 480 min OR nitrile-rubber, fluorinated rubber, material thickness: 0.35-0.4 mm, breakthrough time: > 480 min.
If splashes are likely to occur, wear tightly fitting safety goggles, faceshield. Wear suitable protective clothing, aprons, shield and suits. If splashes are likely to occur, wear: Rubber or plastic boots.

6.1.2 Consumer related measures
No consumer uses identified.

6.2 Environment related measures
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.

7. Waste related measures
No solid waste occurs.
Liquid waste should be reused or discharged to the industrial wastewater and further neutralized if needed.

8. Prediction of exposure

8.1. Health
Short term exposure:
Workers (inhalation)
Method: Provided in EU-RAR (2007)*
Based on 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.
Workers (dermal)
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 the substance was not quantified.

Long term exposure:
Workers (inhalation)
Method: Provided in EU-RAR (2007)*
Based on 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.
Method: In addition to the measured exposure data the ECETOC TRA tool has been used to estimate the inhalation exposure.

Liquid substance
PROC 1 : 0.17 mg/m³
PROC 2 : 0.17 mg/m³
PROC 3 : 0.17 mg/m³
PROC 4 : 0.17 mg/m³
PROC 5 : 0.17 mg/m³
PROC 7 : 0.17 mg/m³
PROC 8a : 0.17 mg/m³
PROC 8b : 0.17 mg/m³
PROC 9 : 0.17 mg/m³
PROC 10 : 0.17 mg/m³
PROC 11 : 0.17 mg/m³
PROC 13 : 0.17 mg/m³
PROC 14 : 0.17 mg/m³
PROC 15 : 0.17 mg/m³
PROC 19 : 0.17 mg/m³
PROC 23 : 0.17 mg/m³
PROC 24 : 0.17 mg/m³

Solid substance
PROC 1 : 0.01 mg/m³
PROC 2 : 0.01 mg/m³
PROC 3 : 0.1 mg/m³
PROC 4 : 0.2 mg/m³
(PROC 5 : 0.2 mg/m³)
(with LEV (90% efficiency))
PROC 8a : 0.5 mg/m³
PROC 8b : 0.5 mg/m³
PROC 9 : 0.5 mg/m³
PROC 10 : 0.5 mg/m³
PROC 11 : 0.2 mg/m³
(PROC 13 : 0.5 mg/m³)
(with LEV (90% efficiency))
PROC 14 : 0.2 mg/m³
(PROC 15 : 0.1 mg/m³)
(PROC 19 : 0.5 mg/m³)
(PROC 23 : 0.4 mg/m³)
(with LEV (90% efficiency) and RPE (90% efficiency))
PROC 24 : 0.5 mg/m³
(with LEV (90% efficiency) and RPE (90% efficiency))
Workers (dermal)
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 the substance was not quantified.

8.2. Environment
PEC
Air: Not relevant
Freshwater: Not relevant
Effects of NaOH to aquatic organisms are caused by possible pH changes related to OH-ions, as the toxicity of the Na+ ion is expected to be insignificant compared to the potential pH effect. If RMMs are implemented no exposure is expected.
Marine water: Not relevant
Sediment: Not relevant
Soil: Not relevant
STP (sewage-treatment plant): Not relevant
Secondary poisoning: Not relevant
Humans via the environment: Not relevant

Based on the applied RMMs the risk towards humans and the environment is sufficiently controlled (RCR 1).


9. Guidance to downstream user
A downstream user may evaluate whether he operates within the conditions set in the exposure scenario by using the information provided in sections 1-8. This evaluation may be based on an expert judgement or on the utilisation of risk assessment tools that are recommended by ECHA.

1. Short title of Exposure Scenario
- Consumer end use (ES4)
Sector of use: Consumer uses: Private households (= general public = consumers) (SU 21)
Product category: Used for different purposes in a variety of sectors and categories. (PC 0-40)
Environmental release category: Wide dispersive indoor use of processing aids in open systems, Wide dispersive indoor use of reactive substances in open systems, Wide dispersive outdoor use of processing aids in open systems, Wide dispersive indoor use of substances in closed systems, The categories mentioned above are assumed to be the most important ones but other categories could also be possible. (ERC8a, ERC8b, ERC8d, ERC9a, -)
Substance: sodium hydroxide (caustic soda) (ES4)
2. **Description of activities/process(es) covered in the Exposure Scenario**

Only the uses defined in the short title and the use descriptors listed in chapter 1 above are regarded as safe/covered within this Exposure Scenario. In case of mixtures the other chapters may also contain additional information about further uses that are not safe/covered within this scenario.

3. **Operational conditions**

**Duration and frequency**
- **Consumers**
  - 5 minutes/event
  - Covers use up to: 1 event(s)/day
- **Environment**
  - Continuous exposure

4. **Physical form**

Solid and liquid applications, Dustiness: Low

4.1 **Concentration of substance in the mixture**

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

4.3 **Amount used per time or per activity**

Covers use up to 120 g/activity

5. **Other operational conditions**

**Human factors not influenced by risk management**

None identified for this scenario.

**Environmental factors not influenced by risk management**

None identified for this scenario.

6. **Risk Management Measures**

6.1.1 **Occupational measures**

Not applicable.

6.1.2 **Consumer related measures**

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 the substance 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.

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, it should be advisable to use these products in the absence of children or other potential sensitive groups. To prevent improper use of the substance, instructions for use should contain a warning against dangerous mixtures.

Do not apply product into ventilator openings or slots. For products containing the solid or liquid substance at concentrations > 2%: If product dust is present, wear an anti-dust mask with at least a P2 filter. If vapors form, respirators must be used. Wearing of permeation resistant gloves with suitable materials for safety gloves is required. If splashes are likely to occur, wear tightly fitting safety goggles, faceshield.
6.2 Environment related measures
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.

7. Waste related measures
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 from alkaline batteries includes emptying the electrolyte, collection and neutralisation with sulphuric acid and carbon dioxide.

8. Prediction of exposure
8.1. Health
Short term exposure:
Workers (inhalation)
Method: The Consexpo model has been used to estimate consumer exposures unless otherwise indicated.
Most critical use (spray oven cleaner) : < 1.6 mg/m³
Workers (dermal)
Not applicable.
Long term exposure:
The substance is not expected to be systemically available in the body under normal handling and use conditions and therefore systemic effects after dermal or inhalation exposure are not expected to occur.

8.2. Environment
PEC
Air : Not relevant
Freshwater : Not relevant
Consumer uses are related to already diluted products which will further be neutralized quickly in the sewer, well before reaching a STP or surface water.
Marine water : Not relevant
Sediment : Not relevant
Soil : Not relevant
STP (sewage-treatment plant) : Not relevant
Secondary poisoning : Not relevant
Humans via the environment : Not relevant
Based on the applied RMMs the risk towards humans and the environment is sufficiently controlled (RCR 1).

9. Guidance to downstream user
A downstream user may evaluate whether he operates within the conditions set in the exposure scenario by using the information provided in sections 1-8. This evaluation may be based on an expert judgement or on the utilisation of risk assessment tools that are recommended by ECHA

Revision History

<table>
<thead>
<tr>
<th>Changes</th>
<th>Responsible</th>
<th>Date</th>
</tr>
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<tr>
<td>Rev.1: Sections 1,7,8,10,11,12,14,&amp;15 updated. Exposure Scenarios added.</td>
<td>M.Cronin</td>
<td>21 Dec.11</td>
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