SAFETY DATA SHEET
according to Regulation (EC) No. 1907/2006

SODIUM HYPOCHLORITE

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

1.1 Product identifier
Trade name: SODIUM HYPOCHLORITE

1.2 Relevant identified uses of the substance or mixture and uses advised against
Use of the Substance/Mixture: Specific use(s):
Industrial and professional use
Consumer use
Biocide
Refer to attached exposure scenario Annex.

1.3 Details of the supplier of the safety data sheet
Company: Nouryon Industrial Chemicals bv
Velperweg 76
NL 6824 BM Arnhem
Netherlands

Telephone: +31263664433
Telefax: +31263665830
E-mail address: industrialchemicals.sds@nouryon.com

1.4 Emergency telephone number
Emergency telephone number: 24 hours emergency response number: +31 57 06 79211

SECTION 2: HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture
Classification (REGULATION (EC) No 1272/2008)
Corrosive to metals, 1, H290
Skin corrosion, 1B, H314
Serious eye damage, 1, H318
Short-term (acute) aquatic hazard, 1, H400
Long-term (chronic) aquatic hazard, 2, H411

For the full text of the H-statements mentioned in this Section, see Section 16.

2.2 Label elements

Labelling (REGULATION (EC) No 1272/2008)

Pictogram:

Signal word: Danger

Hazard statements:
- H290 May be corrosive to metals.
- H314 Causes severe skin burns and eye damage.
- H410 Very toxic to aquatic life with long lasting effects.

Precautionary statements:

Prevention:
- P273 Avoid release to the environment.
- P280 Wear protective gloves/ protective clothing/ eye protection/ face protection.

Response:
- P301 + P330 + P331 IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.
- P303 + P361 + P353 IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water.
- P305 + P351 + P338 + P310 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a POISON CENTER/doctor.
- P390 Absorb spillage to prevent material damage.

For the full list of P-statements please see section 16.

Hazardous components which must be listed on the label:
Sodium hypochlorite 7681-52-9

Additional Labelling:
EUH031 Contact with acids liberates toxic gas.

2.3 Other hazards

No further data available.
PBT and vPvB assessment : This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.
SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS

3.2 Mixtures

Pure substance/mixture : Mixture

Hazardous substance

<table>
<thead>
<tr>
<th>Chemical name</th>
<th>PBT vPvB OEL</th>
<th>CAS-No.</th>
<th>EC-No.</th>
<th>REACH No.</th>
<th>Classification (REGULATION (EC) No 1272/2008)</th>
<th>Concentration [%]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sodium hypochlorite</td>
<td>7681-52-9</td>
<td>231-668-3</td>
<td>01-2119488154-34</td>
<td>Met. Corr. 1; H290 Skin Corr. 1B; H314 Eye Dam. 1; H318 Aquatic Acute 1; H400 Aquatic Chronic 1; H410 M-Factor (Acute): 10 M-Factor (Chronic): 1</td>
<td>10 - 20</td>
<td></td>
</tr>
<tr>
<td>Sodium hydroxide</td>
<td>1310-73-2</td>
<td>215-185-5</td>
<td>01-2119457892-27</td>
<td>Met. Corr. 1; H290 Skin Corr. 1A; H314 Eye Dam. 1; H318</td>
<td>&lt;= 0.8</td>
<td></td>
</tr>
</tbody>
</table>

Remarks : Further information:
Biocidal active substance:
150 g/l: 12.8% Active Chlorine
170 g/l: 14.2% Active Chlorine

For the full text of the H-Statements mentioned in this Section, see Section 16.

REACH - Candidate List of Substances of Very High Concern for Authorisation (Article 59).
Status : Not applicable

SECTION 4: FIRST AID MEASURES

4.1 Description of first aid measures

General advice : Immediate medical attention is required.
Move out of dangerous area.
Show this safety data sheet to the doctor in attendance.

If inhaled : If breathed in, move person into fresh air.
Consult a physician after significant exposure.
Obtain medical attention.

In case of skin contact : Take off contaminated clothing and shoes immediately.
Rinse immediately with plenty of water.
Immediate medical treatment is necessary as untreated wounds from corrosion of the skin heal slowly and with difficulty.
SODIUM HYPOCHLORITE

In case of eye contact  :  Rinse with plenty of water. Get medical attention immediately. Continue to rinse during transport. Remove contact lenses. Protect unharmed eye. Keep eye wide open while rinsing. Small amounts splashed into eyes can cause irreversible tissue damage and blindness.

If swallowed  :  Clean mouth with water and drink afterwards plenty of water. Never give anything by mouth to an unconscious person. Take victim immediately to hospital. Do not induce vomiting! May cause chemical burns in mouth and throat.

4.2 Most important symptoms and effects, both acute and delayed

Symptoms  :  Skin contact may provoke the following symptoms: corrosive effects

Risks  :  Causes severe skin burns and eye damage. Liquid causes severe inflammation of conjunctiva and may cause severe damage of the cornea.

Causes serious eye damage.
Causes severe burns.

4.3 Indication of any immediate medical attention and special treatment needed

Treatment  :  Treat symptomatically. In the event of an emergency, the patient may have been exposed to chlorine gas liberated from the product.

SECTION 5: FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media  :  Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.

5.2 Special hazards arising from the substance or mixture

Specific hazards during firefighting / Specific hazards arising from the chemical  :  Water spray may be ineffective unless used by experienced firefighters. Do not allow run-off from fire fighting to enter drains or water courses. Heating or fire conditions liberates toxic gas.

Combustion products  :  No hazardous combustion products are known

5.3 Advice for firefighters

Special protective equipment for firefighters  :  In the event of fire, wear self-contained breathing apparatus.

Further information  :  Collect contaminated fire extinguishing water separately. This must not be discharged into drains. Fire residues and contaminated fire extinguishing water must
be disposed of in accordance with local regulations.

SECTION 6: ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures

Personal precautions: Use personal protective equipment. Wear respiratory protection. Ensure adequate ventilation.

Emergency measures on accidental release: Evacuate personnel to safe areas. Only qualified personnel equipped with suitable protective equipment may intervene. Prevent unauthorised persons entering the zone.

6.2 Environmental precautions

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

6.3 Methods and materials for containment and cleaning up

Methods for cleaning up / Methods for containment: Soak up with inert absorbent material (e.g. sand, silica gel, acid binder, universal binder, sawdust). Keep in suitable, closed containers for disposal.

6.4 Reference to other sections

For disposal considerations see section 13. For personal protection see section 8.

SECTION 7: HANDLING AND STORAGE

7.1 Precautions for safe handling

Advice on safe handling: For personal protection see section 8. Avoid formation of aerosol. Do not breathe vapours or spray mist. Smoking, eating and drinking should be prohibited in the application area. Dispose of rinse water in accordance with local and national regulations.

Advice on protection against fire and explosion: Normal measures for preventive fire protection.

7.2 Conditions for safe storage, including any incompatibilities

Requirements for storage areas and containers: Keep container tightly closed in a dry and well-ventilated place. Store in closed dark containers made of anti-corrosive material.

Advice on common storage: Do not store near acids. Keep away from metals.

Other data: Risk of decomposition.
7.3 Specific end use(s)
Specific use(s) : Refer to attached exposure scenario Annex.

SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

<table>
<thead>
<tr>
<th>Components with workplace control parameters</th>
</tr>
</thead>
<tbody>
<tr>
<td>Components</td>
</tr>
<tr>
<td>------------</td>
</tr>
<tr>
<td>Sodium hydroxide</td>
</tr>
</tbody>
</table>

ACGIH: American Conference of Governmental Industrial Hygienists
AGW: Arbeitsplatzgrenzwert
BEI: Biological Exposure Index
MAC: Maximum Allowable Concentration
NIOSH: National Institute for Occupational Safety and Health
OEL: OEL: Occupational exposure limit.
STEL: Short term exposure limit
TRGS: Technische Regel für Gefahrstoffe
TWA: Time Weighted Average

Derived No Effect Level (DNEL) according to Regulation (EC) No. 1907/2006

<table>
<thead>
<tr>
<th>Substance name</th>
<th>End Use</th>
<th>Exposure routes</th>
<th>Potential health effects</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sodium hypochlorite</td>
<td>Workers</td>
<td>Inhalation</td>
<td>Acute systemic effects</td>
<td>3.1 mg/m³</td>
</tr>
<tr>
<td>Sodium hypochlorite</td>
<td>Workers</td>
<td>Inhalation</td>
<td>Acute local effects</td>
<td>3.1 mg/m³</td>
</tr>
<tr>
<td>Sodium hypochlorite</td>
<td>Workers</td>
<td>Inhalation</td>
<td>Long-term systemic effects</td>
<td>1.55 mg/m³</td>
</tr>
<tr>
<td>Sodium hypochlorite</td>
<td>Workers</td>
<td>Inhalation</td>
<td>Long-term local effects</td>
<td>1.55 mg/m³</td>
</tr>
<tr>
<td>Sodium hypochlorite</td>
<td>Workers</td>
<td>Skin contact</td>
<td>Long-term local effects</td>
<td>0.5 %</td>
</tr>
<tr>
<td>Sodium hypochlorite</td>
<td>Consumers</td>
<td>Inhalation</td>
<td>Acute systemic effects</td>
<td>3.1 mg/m³</td>
</tr>
<tr>
<td>Sodium hypochlorite</td>
<td>Consumers</td>
<td>Inhalation</td>
<td>Acute local effects</td>
<td>3.1 mg/m³</td>
</tr>
<tr>
<td>Sodium hypochlorite</td>
<td>Consumers</td>
<td>Inhalation</td>
<td>Long-term systemic effects</td>
<td>1.55 mg/m³</td>
</tr>
<tr>
<td>Sodium hypochlorite</td>
<td>Consumers</td>
<td>Ingestion</td>
<td>Long-term systemic effects</td>
<td>0.26 mg/kg bw/day</td>
</tr>
<tr>
<td>Sodium hypochlorite</td>
<td>Consumers</td>
<td>Skin contact</td>
<td>Long-term local effects</td>
<td>0.5 %</td>
</tr>
<tr>
<td>Sodium hypochlorite</td>
<td>Consumers</td>
<td>Inhalation</td>
<td>Long-term local effects</td>
<td>1.55 mg/m³</td>
</tr>
<tr>
<td>Sodium hydroxide</td>
<td>Workers</td>
<td>Inhalation</td>
<td>Long-term local effects</td>
<td>1.0 mg/m³</td>
</tr>
<tr>
<td>Sodium hydroxide</td>
<td>Consumers</td>
<td>Inhalation</td>
<td>Long-term local effects</td>
<td>1.0 mg/m³</td>
</tr>
</tbody>
</table>

Predicted No Effect Concentration (PNEC) according to Regulation (EC) No. 1907/2006

<table>
<thead>
<tr>
<th>Substance name</th>
<th>Environmental Compartment</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sodium hypochlorite</td>
<td>Fresh water</td>
<td>0.00021 mg/l</td>
</tr>
<tr>
<td>Sodium hypochlorite</td>
<td>Marine water</td>
<td>0.000042 mg/l</td>
</tr>
<tr>
<td>Sodium hypochlorite</td>
<td>Sewage treatment plant</td>
<td>0.03 mg/l</td>
</tr>
</tbody>
</table>
8.2 Exposure controls

**Engineering controls**
Effective exhaust ventilation system
Ensure that eyewash stations and safety showers are close to the workstation location.

**Personal protective equipment**

- **Respiratory protection**: In the case of vapour or aerosol formation use a respirator with an approved filter.
  - Combination filter:
  - Gas cartridge B (acid gases, grey).
  - P3 filter

- **Hand protection**: PVC
  - Rubber gloves

- **Eye protection**: Tightly fitting safety goggles
  - Wear face-shield and protective suit for abnormal processing problems.

- **Skin and body protection**: Protective suit

- **Hygiene measures**: Handle in accordance with good industrial hygiene and safety practice.
  - Wash hands before breaks and at the end of workday.

**Environmental exposure controls**

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

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**SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES**

9.1 Information on basic physical and chemical properties

**Appearance**

- **Form**: liquid
  - Aqueous solution

- **Colour**: yellow

- **Odour**: irritating

- **Odour Threshold**: No data available

**Safety data**

- **pH**: 13.5 at 150 g/l solution in water at 20 °C

- **Melting point/freezing point**: < -16 °C
Boiling point: Not relevant, Decomposes on heating.
Flash point: Not applicable
Evaporation rate: not determined
Flammability (solid, gas): Not applicable
Flammability (liquids): The product is not flammable.
Lower explosion limit: Not applicable
Upper explosion limit: Not applicable
Vapour pressure: 17 hPa at 20 °C
Relative vapour density: not determined
Density: 1.220 kg/m3 at 20 °C
Relative density: 1.22 at 20 °C
Water solubility: completely miscible
Solubility in other solvents: not determined
Partition coefficient: n-octanol/water: Not applicable
Auto-ignition temperature: Not applicable
Decomposition temperature: Decomposes on heating.
Viscosity, dynamic: 2.65 mPa.s at 20 °C
Viscosity, kinematic: not determined
Explosive properties: Not explosive
Oxidizing properties: Oxidizing Material

9.2 Other information
Corrosive to metals: Corrosive to metals

This safety datasheet only contains information relating to safety and does not replace any product information or product specification.

SECTION 10: STABILITY AND REACTIVITY
10.1 Reactivity
Stable under normal conditions.
10.2 Chemical stability
Risk of decomposition.
10.3 Possibility of hazardous reactions
Contact with acids liberates toxic gas. Heating can release hazardous gases.

10.4 Conditions to avoid
Conditions to avoid: Extremes of temperature and direct sunlight. UV light causes decomposition.

10.5 Incompatible materials
Materials to avoid: Iron, Copper, Acids, Nickel

10.6 Hazardous decomposition products
Hazardous decomposition products: Chlorine dioxide gas may evolve from solution. Oxygen
Thermal decomposition: Decomposes on heating.

SECTION 11: TOXICOLOGICAL INFORMATION
11.1 Information on toxicological effects
Product information:
Acute toxicity: Not classified based on available information.
Skin corrosion/irritation: Causes severe burns.
Serious eye damage/eye irritation: Causes serious eye damage.
Respiratory or skin sensitisation: Respiratory sensitisation: Not classified based on available information. Skin sensitisation: Not classified based on available information.
Germ cell mutagenicity: Not classified based on available information.
Carcinogenicity: Not classified based on available information.
Reproductive toxicity: Not classified based on available information.
STOT - single exposure: Not classified based on available information.
STOT - repeated exposure: Not classified based on available information.
Aspiration hazard: Not classified based on available information.
Further information: No further data available.

Toxicology data for the components:
Sodium hypochlorite
Acute toxicity:
Acute oral toxicity: LD50: 1.100 mg/kg
Species: Rat
Method: OECD Test Guideline 401

Acute inhalation toxicity: LC50 (Rat): 10.5 mg/l
Exposure time: 1 h
Test atmosphere: vapour
Method: OECD Test Guideline 403
Assessment: The component/mixture is minimally toxic after short term inhalation.

Acute dermal toxicity: LD50: > 20,000 mg/kg
Species: Rabbit
Method: OECD Test Guideline 402

Skin corrosion/irritation: Classification: Causes burns.
Species: Rabbit
Result: Mild skin irritation
Method: OECD Test Guideline 404
Aqueous solution (5,25%)

Serious eye damage/eye irritation: Classification: Causes severe skin burns and eye damage.
Species: Rabbit
Result: Eye irritation
Method: OECD Test Guideline 405
Aqueous solution (5%)

Respiratory or skin sensitisation: Buehler Test
Species: Guinea pig
Result: Not sensitizing.
Method: OECD Test Guideline 406

Repeated dose toxicity: Species: Rat, males
NOAEL: 50 mg/kg bw/day
Application Route: Oral
Exposure time: 90 d
Method: OECD Test Guideline 408

Species: Rat, females
NOAEL: 57,2 mg/kg bw/day
Application Route: Oral
Exposure time: 90 d
Method: OECD Test Guideline 408

Species: Rat, male and female
LOAEL: mg/m3, <= 3
Application Route: Inhalation
Exposure time: 30 d
Method: OECD Test Guideline 412

Germ cell mutagenicity

Genotoxicity in vitro: Ames test
Salmonella typhimurium
Result: negative
Method: OECD Test Guideline 471

Chromosome aberration test in vitro
Chinese hamster lung fibroblasts
Result: positive, Ambiguous results
Method: OECD Test Guideline 473

Chromosome aberration test in vitro
Human fibroblasts
Result: Ambiguous results
Method: OECD Test Guideline 473

Genotoxicity in vivo

Chromosome aberration test in vivo
Species: Mouse
Method: OECD Test Guideline 474
Result: negative

Chromosome aberration test in vivo
Species: Mouse
Method: OECD Test Guideline 475
Result: negative

DNA damage and/or repair
Species: Rat
Result: negative

in vivo mouse sperm head abnormality assay
Species: Mouse
Result: Ambiguous results

Carcinogenicity

Species: Rat
Application Route: Oral
Exposure time: 2 years
Method: OECD Test Guideline 453
Result: Animal testing did not show any carcinogenic effects.

Species: Rat
Application Route: Oral
Exposure time: 2 years
Method: OECD Test Guideline 451
Result: Animal testing did not show any carcinogenic effects.

Reproductive toxicity/Fertility

Species: Rat
Application Route: Oral
General Toxicity - Parent: No observed adverse effect level: 
\[ \geq 5 \text{ mg/kg bw/day} \]
General Toxicity F1: No observed adverse effect level: \[ \geq 5 \text{ mg/kg bw/day} \]
Method: OECD Test Guideline 415

Reproductive toxicity/Development/Teratogenicity

Species: Rat
Application Route: Oral
Teratogenicity: No observed adverse effect level: \[ \geq 5,7 \text{ mg/kg bw/day} \]
Method: OECD Test Guideline 414

**Sodium hydroxide**

**Acute toxicity:**
- Skin corrosion/irritation: Result: Causes severe burns.
- Serious eye damage/eye irritation: Result: Risk of serious damage to eyes.
- Respiratory or skin sensitisation: Result: Does not cause skin sensitisation.
- Germ cell mutagenicity: In vivo tests did not show mutagenic effects, Tests on bacterial or mammalian cell cultures did not show mutagenic effects.

**CMR effects Mutagenicity**
- In vitro tests did not show mutagenic effects

**Genotoxicity in vitro**
- In vitro tests did not show mutagenic effects

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**SECTION 12: ECOLOGICAL INFORMATION**

**Product information:**

**Ecotoxicology Assessment**
- Additional ecological information: An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.
  - Very toxic to aquatic life with long lasting effects.
  - Toxic to aquatic life with long lasting effects.

**12.1 Toxicity**

**Components:**

- Ecotoxicology Assessment
- Sodium hydroxide
- Long-term (chronic) aquatic hazard: This product has no known ecotoxicological effects.

**Test result**

**Sodium hypochlorite**
- Toxicity to fish
  - LC50: 0.06 mg/l
  - Exposure time: 96 h
  - Species: Oncorhynchus mykiss (rainbow trout)
  - Test Type: Fresh water

  - LC50: 0.032 mg/l
  - Exposure time: 96 h
  - Species: Oncorhynchus kisutch
  - Test Type: Marine water

**Toxicity to daphnia and other aquatic invertebrates**
- EC50: 0.141 mg/l
  - Exposure time: 48 h
  - Species: Daphnia magna (Water flea)
  - Test Type: Fresh water
  - Method: OECD Test Guideline 202

- EC50: 0.035 mg/l
  - Exposure time: 48 h
  - Species: Ceriodaphnia dubia (water flea)
SODIUM HYPOCHLORITE

Test Type: Fresh water
Method: OECD Test Guideline 202

EC50: 0.026 mg/l
Exposure time: 48 h
Species: Crassostrea virginica
Test Type: Marine water

Toxicity to algae :
NOEC: 0.0021 mg/l
Exposure time: 7 d
Species: algae
Test Type: flow-through test
Fresh water

EC50: 0.0499 mg/l
Exposure time: 7 d
Species: algae
Test Type: flow-through test
Fresh water

M-Factor (Acute) : 10
M-Factor (Chronic) : 1

Toxicity to bacteria :
EC50: > 3 mg/l
Exposure time: 3 h
Species: activated sludge
Test Type: static test

EC50: 77.1 mg/l
Exposure time: 3 h
Species: activated sludge
Test Type: static test
Method: OECD Test Guideline 209

EC10: 46.9 mg/l
Exposure time: 3 h
Species: activated sludge
Test Type: static test
Method: OECD Test Guideline 209

Toxicity to fish (Chronic toxicity) :
NOEC: 0.04 mg/l
Exposure time: 28 d
Species: Menidia peninsulae
Test Type: Marine water

Toxicity to daphnia and other aquatic invertebrates (Chronic toxicity) :
NOEC: 0.007 mg/l
Exposure time: 15 d
Species: Crassostrea virginica
Test Type: Marine water

Sodium hydroxide

Toxicity to daphnia and other aquatic invertebrates :
EC50: 40.4 mg/l
Exposure time: 48 h
Species: Ceriodaphnia (water flea)
12.2 Persistence and degradability

**Product information** : No information available.

**Components:**
- **Sodium hypochlorite**
  - Biodegradability : Result: hydrolyses
- **Sodium hydroxide**
  - Biodegradability : Result: Not applicable inorganic

12.3 Bioaccumulative potential

**Product information** : No information available.

**Components:**
- **Sodium hypochlorite**
  - Bioaccumulation : Does not bioaccumulate.
- **Sodium hydroxide**
  - Bioaccumulation : Does not bioaccumulate.

12.4 Mobility in soil

**Product information** : No information available.

**Components:**
- **Sodium hypochlorite**
  - Mobility : Can be leached out from soil.
- **Sodium hydroxide**
  - Mobility : Can be leached out from soil.

**Distribution among environmental compartments** : Transport to air is not expected.

12.5 Results of PBT and vPvB assessment

**Product information:**

**PBT and vPvB assessment** : This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

**Components:**
- **Sodium hypochlorite**
  - PBT and vPvB assessment : This substance is not considered to be persistent, bioaccumulating and toxic (PBT). This substance is not considered to be very persistent and very bioaccumulating (vPvB).
- **Sodium hydroxide**
  - PBT and vPvB assessment : This substance is not considered to be a PBT (Persistent, Bioaccumulation, Toxic) This substance is not considered to be vPvB (very Persistent nor very Bioaccumulating).
12.6 Other adverse effects

Product information : No information available.

Components:
- Sodium hypochlorite
  Biochemical Oxygen Demand (BOD) : No data available
- Sodium hydroxide
  Biochemical Oxygen Demand (BOD) : Not applicable

SECTION 13: DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Waste Code : European Waste Catalogue Code: 16 09 04*

Product : The product should not be allowed to enter drains, water courses or the soil. Do not contaminate ponds, waterways or ditches with chemical or used container. Hazardous waste Dispose of contents/container in accordance with local regulation.

Contaminated packaging : Empty remaining contents. Dispose of as unused product.

SECTION 14: TRANSPORT INFORMATION

14.1 UN number

ADR : UN 1791
RID : UN 1791
IMDG-Code : UN 1791
IATA-DGR : UN 1791

14.2 Proper shipping name

ADR : HYPOCHLORITE SOLUTION
RID : HYPOCHLORITE SOLUTION
IMDG-Code : HYPOCHLORITE SOLUTION
IATA-DGR : Hypochlorite solution

14.3 Transport hazard class

ADR : 8
RID : 8
IMDG-Code : 8
IATA-DGR : 8

14.4 Packing group

ADR Packing group : II
Classification Code : C9
Hazard Identification Number : 80
Labels : 8
Tunnel restriction code : (E)
SODIUM HYPOCHLORITE

Packing group : II
Classification Code : C9
Hazard Identification Number : 80
Labels : 8

IMDG-Code
Packing group : II
Labels : 8
EmS Code : F-A, S-B
Remarks : Handle with care.

IATA-DGR
Packing instruction (cargo aircraft) : 855
Packing instruction (passenger aircraft) : 851
Packing instruction (LQ) : Y840
Packing group : II
Labels : 8
Remarks : Handle with care.

14.5 Environmental hazards
ADR
Environmentally hazardous : yes
RID
Environmentally hazardous : yes
IMDG-Code
Marine pollutant : yes (Sodium hypochlorite)
IATA-DGR
Environmentally hazardous : yes

14.6 Special precautions for user
Remarks : Handle with care.

14.7 Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code
Not applicable for product as supplied.

SECTION 15: REGULATORY INFORMATION

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

<table>
<thead>
<tr>
<th>E1</th>
<th>ENVIRONMENTAL HAZARDS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Quantity 1</td>
</tr>
<tr>
<td></td>
<td>100 t</td>
</tr>
</tbody>
</table>

Notification status
DSL : YES. All components of this product are on the Canadian DSL
AICS : YES. On the inventory, or in compliance with the inventory
NZIoC : NO. Not in compliance with the inventory
ENCS : YES. On the inventory, or in compliance with the inventory
ISHL : YES. On the inventory, or in compliance with the inventory
SODIUM HYPOCHLORITE

15.2 Chemical safety assessment
Sodium hypochlorite: A Chemical Safety Assessment has been carried out for this substance.
Sodium hydroxide: A Chemical Safety Assessment has been carried out for this substance.

SECTION 16: OTHER INFORMATION

Full text of H-statements referred to under sections 2 and 3.
H290: May be corrosive to metals.
H314: Causes severe skin burns and eye damage.
H318: Causes serious eye damage.
H400: Very toxic to aquatic life.
H410: Very toxic to aquatic life with long lasting effects.
H411: Toxic to aquatic life with long lasting effects.

Classification procedure:
Corrosive to metals, 1, H290, Based on product data or assessment
Skin corrosion, 1B, H314, Calculation method
Serious eye damage, 1, H318, Calculation method
Short-term (acute) aquatic hazard, 1, H400, Calculation method
Long-term (chronic) aquatic hazard, 2, H411, Calculation method

Full list of P-statements.
Prevention:
P234 Keep only in original container.
P260 Do not breathe dust/ fume/ gas/ mist/ vapours/ spray.
P264 Wash skin thoroughly after handling.
P273 Avoid release to the environment.
P280 Wear protective gloves/ protective clothing/ eye protection/ face protection.

Response:
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.
P304 + P340 IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.
P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P310 Immediately call a POISON CENTER/doctor.
P390 Absorb spillage to prevent material damage.
P391 Collect spillage.

Storage:
SODIUM HYPOCHLORITE

P406  Store in corrosive resistant/?. container with a resistant inner liner.

P501  Dispose of contents/ container to an approved waste disposal plant.

Full text of other abbreviations

IS OEL : Iceland. Regulation on occupational exposure limits.
IS OEL / STEL : Short term exposure

ADN - European Agreement concerning the International Carriage of Dangerous Goods by Inland Waterways; ADR - European Agreement concerning the International Carriage of Dangerous Goods by Road; AICS - Australian Inventory of Chemical Substances; ASTM - American Society for the Testing of Materials; bw - Body weight; CLP - Classification Labelling Packaging Regulation; Regulation (EC) No 1272/2008; CMR - Carcinogen, Mutagen or Reproductive Toxicant; DIN - Standard of the German Institute for Standardisation; DSL - Domestic Substances List (Canada); ECHA - European Chemicals Agency; EC-Number - European Community number; ECx - Concentration associated with x% response; ELx - Loading rate associated with x% response; EmS - Emergency Schedule; ENCS - Existing and New Chemical Substances (Japan); ErCx - Concentration associated with x% growth rate response; GHS - Globally Harmonized System; GLP - Good Laboratory Practice; IARC - International Agency for Research on Cancer; IATA - International Air Transport Association; IBC - International Code for the Construction and Equipment of Ships carrying Dangerous Chemicals in Bulk; IC50 - Half maximal inhibitory concentration; ICAO - International Civil Aviation Organization; IECSC - Inventory of Existing Chemical Substances in China; IMDG - International Maritime Dangerous Goods; IMO - International Maritime Organization; ISHL - Industrial Safety and Health Law (Japan); ISO - International Organisation for Standardization; KECI - Korea Existing Chemicals Inventory; LC50 - Lethal Concentration to 50 % of a test population; LD50 - Lethal Dose to 50% of a test population (Median Lethal Dose); MARPOL - International Convention for the Prevention of Pollution from Ships; n.o.s. - Not Otherwise Specified; NO(A)EC - No Observed (Adverse) Effect Concentration; NO(A)EL - No Observed (Adverse) Effect Level; NOELR - No Observable Effect Loading Rate; NZIoC - New Zealand Inventory of Chemicals; OECD - Organization for Economic Co-operation and Development; OPPTS - Office of Chemical Safety and Pollution Prevention; PBT - Persistent, Bioaccumulative and Toxic substance; PICCS - Philippines Inventory of Chemicals and Chemical Substances; (Q)SAR - (Quantitative) Structure Activity Relationship; REACH - Regulation (EC) No 1907/2006 of the European Parliament and of the Council concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals; RID - Regulations concerning the International Carriage of Dangerous Goods by Road; SADT - Self-Accelerating Decomposition Temperature; SDS - Safety Data Sheet; SVHC - Substance of Very High Concern; TCSI - Taiwan Chemical Substance Inventory; TRGS - Technical Rule for Hazardous Substances; TSCA - Toxic Substances Control Act (United States); UN - United Nations; vPvB - Very Persistent and Very Bioaccumulative

Further information

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.
Annex:

Manufacture

Formulation [mixing] of preparations and/or re-packaging

Industrial use as intermediate

Industrial use in textile industry.

Industrial use in sewage and cooling or heating water treatment

Industrial use in pulp and paper

Industrial cleaning use

Professional cleaning use

Consumer use
1. Short title of Exposure Scenario: Manufacture

<table>
<thead>
<tr>
<th>Main User Groups</th>
<th>SU 3: Industrial uses: Uses of substances as such or in preparations at industrial sites</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sectors of end-use</td>
<td>SU8: Manufacture of bulk, large scale chemicals (including petroleum products)</td>
</tr>
<tr>
<td>Environmental Release Categories</td>
<td>ERC1: Manufacture of the substance</td>
</tr>
<tr>
<td>Process categories</td>
<td>PROC1: Use in closed process, no likelihood of exposure</td>
</tr>
<tr>
<td></td>
<td>PROC2: Use in closed, continuous process with occasional controlled exposure</td>
</tr>
<tr>
<td></td>
<td>PROC3: Use in closed batch process (synthesis or formulation)</td>
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<tr>
<td></td>
<td>PROC4: Use in batch and other process (synthesis) where opportunity for exposure arises</td>
</tr>
<tr>
<td></td>
<td>PROC8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities</td>
</tr>
<tr>
<td></td>
<td>PROC8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities</td>
</tr>
<tr>
<td></td>
<td>PROC9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing)</td>
</tr>
</tbody>
</table>

2.1 Contributing scenario controlling environmental exposure for: ERC1: Manufacture of the substance

**Amount used**

| Annual amount per site | 342600 tonnes/year |

**Other given operational conditions affecting environmental exposure**

| Number of emission days per year | 360 |
| Remarks | Product applied in aqueous process solution with negligible volatilization. Free available chlorine in effluent is measured as total residual chlorine (TRC) and is calculated to be below 1.0E-13 mg/L. No release to air from process expected because hypochlorite solution is non volatile., No release to soil from process expected. |

**Technical conditions and measures / Organizational measures**

| Water | Risk to the environment is driven by freshwater exposure. Onsite wastewater treatment required. Prevent discharge of substance directly to the environment and waste water treatment is required. |
| Remarks | Common practices vary across sites but releases expected are negligible to waste water and soil (sodium hypochlorite is destroyed rapidly in contact with organic as well as inorganic material). |

**Conditions and measures related to municipal sewage treatment plant**
Type of Sewage Treatment Plant: Municipal Sewage Treatment Plant
Flow rate of sewage treatment plant effluent: 2,000 m³/day
Effectiveness (of a measure): 100 %
Sludge Treatment: No application of sewage sludge to soil

Conditions and measures related to external treatment of waste for disposal
Waste treatment: External treatment and disposal of waste should comply with applicable local and/or national regulations.

2.2 Contributing scenario controlling worker exposure for: PROC1: Use in closed process, no likelihood of exposure

Product characteristics
Concentration of the Substance in Mixture/Article: Covers the percentage of the substance in the product up to 25 %.

Frequency and duration of use
Frequency of use: 240 days/year
Remarks: Covers daily exposures up to 8 hours

Other operational conditions affecting workers exposure
Outdoor / Indoor: Indoor

Technical conditions and measures
Handle substance within a closed system., Process under low containment.

2.3 Contributing scenario controlling worker exposure for: PROC2: Use in closed, continuous process with occasional controlled exposure

Product characteristics
Concentration of the Substance in Mixture/Article: Covers the percentage of the substance in the product up to 25 %.

Frequency and duration of use
Frequency of use: 240 days/year
Remarks: Covers daily exposures up to 8 hours

Other operational conditions affecting workers exposure
Outdoor / Indoor: Indoor

Technical conditions and measures
Provide extraction ventilation at points where emissions occur., Process under low containment.

Organisational measures to prevent /limit releases, dispersion and exposure
Avoid frequent and direct contact with substance., Regular cleaning of equipment, work area and clothing., Supervision in place to check that the RMMs in place are being used correctly and OCs followed.

2.4 Contributing scenario controlling worker exposure for: PROC3: Use in closed batch process (synthesis or formulation)
Product characteristics
Concentration of the Substance in Mixture/Article: Covers the percentage of the substance in the product up to 25%.

Frequency and duration of use
Frequency of use: 240 days/year
Remarks: Covers daily exposures up to 8 hours

Other operational conditions affecting workers exposure
Outdoor / Indoor: Indoor

Technical conditions and measures
Provide extraction ventilation at points where emissions occur., Process under low containment.

Organisational measures to prevent /limit releases, dispersion and exposure
Avoid frequent and direct contact with substance., Regular cleaning of equipment, work area and clothing., Supervision in place to check that the RMMs in place are being used correctly and OCs followed.

2.5 Contributing scenario controlling worker exposure for: PROC4: Use in batch and other process (synthesis) where opportunity for exposure arises

Product characteristics
Concentration of the Substance in Mixture/Article: Covers the percentage of the substance in the product up to 25%.

Frequency and duration of use
Frequency of use: 240 days/year
Remarks: Covers daily exposures up to 8 hours

Other operational conditions affecting workers exposure
Outdoor / Indoor: Indoor

Technical conditions and measures
Provide extraction ventilation at points where emissions occur., Process under low containment.

Organisational measures to prevent /limit releases, dispersion and exposure
Avoid frequent and direct contact with substance., Regular cleaning of equipment, work area and clothing., Supervision in place to check that the RMMs in place are being used correctly and OCs followed.

2.6 Contributing scenario controlling worker exposure for: PROC8a: Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at non-dedicated facilities

Product characteristics
Concentration of the Substance in Mixture/Article: Covers the percentage of the substance in the product up to 25%.

Frequency and duration of use
Frequency of use: 240 days/year

Other operational conditions affecting workers exposure
**2.7 Contributing scenario controlling worker exposure for: PROC8b: Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at dedicated facilities**

**Product characteristics**
- Concentration of the Substance in Mixture/Article: Covers the percentage of the substance in the product up to 25%.

**Frequency and duration of use**
- Frequency of use: 240 days/year

**Other operational conditions affecting workers exposure**
- Outdoor / Indoor: Indoor

**Technical conditions and measures**
- Provide extraction ventilation at points where emissions occur., Process under low containment.

**Organisational measures to prevent /limit releases, dispersion and exposure**
- Avoid carrying out activities involving exposure for more than 6 hours., Avoid frequent and direct contact with substance., Regular cleaning of equipment, work area and clothing., Supervision in place to check that the RMMs in place are being used correctly and OCs followed.

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**2.8 Contributing scenario controlling worker exposure for: PROC9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing)**

**Product characteristics**
- Concentration of the Substance in Mixture/Article: Covers the percentage of the substance in the product up to 25%.

**Frequency and duration of use**
- Frequency of use: 240 days/year
- Remarks: Covers daily exposures up to 8 hours

**Other operational conditions affecting workers exposure**
- Outdoor / Indoor: Indoor

**Technical conditions and measures**
- Provide extraction ventilation at points where emissions occur., Process under low containment.

**Organisational measures to prevent /limit releases, dispersion and exposure**
- Avoid frequent and direct contact with substance., Regular cleaning of equipment, work area and clothing., Supervision in place to check that the RMMs in place are being used correctly and OCs followed.
3. Exposure estimation and reference to its source

<table>
<thead>
<tr>
<th>Workers</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Contributing Scenario</td>
<td>Exposure Assessment Method</td>
<td>Specific conditions</td>
<td>Value</td>
<td>Level of Exposure</td>
</tr>
<tr>
<td>PROC1</td>
<td>ART</td>
<td>Long term inhalation</td>
<td>0,02 mg/m³</td>
<td>0,01</td>
</tr>
<tr>
<td>PROC2</td>
<td>ART</td>
<td>Long term inhalation</td>
<td>1,10 mg/m³</td>
<td>0,71</td>
</tr>
<tr>
<td>PROC3</td>
<td>ART</td>
<td>Long term inhalation</td>
<td>1,10 mg/m³</td>
<td>0,71</td>
</tr>
<tr>
<td>PROC4</td>
<td>ART</td>
<td>Long term inhalation</td>
<td>1,20 mg/m³</td>
<td>0,77</td>
</tr>
<tr>
<td>PROC8a</td>
<td>ART</td>
<td>Long term inhalation</td>
<td>1,25 mg/m³</td>
<td>0,81</td>
</tr>
<tr>
<td>PROC8b</td>
<td>ART</td>
<td>Long term inhalation</td>
<td>1,25 mg/m³</td>
<td>0,81</td>
</tr>
<tr>
<td>PROC9</td>
<td>ART</td>
<td>Long term inhalation</td>
<td>0,91 mg/m³</td>
<td>0,59</td>
</tr>
</tbody>
</table>

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: Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at non-dedicated facilities
PROC8b: Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at dedicated facilities
PROC9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing)
EE8 - Qualitative approach used to conclude safe use.

Predicted exposure concentrations (PECs)
According the previous qualitative assessment, the worst case exposure concentration in waste water treatment plant is 1.0E-13 mg/L. The PECs for the other compartments are not applicable, because sodium hypochlorite is destroyed rapidly in contact with organic as well as inorganic material and furthermore is a non-volatile substance.

Indirect exposure of humans via the environment (oral)
Hypochlorite will not reach the environment via the sewage treatment system, as the quick transformation of the applied hypochlorite (as free available chlorine, FAC) in the sewage system ensures the absence of any human exposure to hypochlorite. Also in recreational zones located close to discharge points of chlorinated waste water, the potential for exposure to hypochlorite originating from waste water treatment is negligible as the emission of unreacted hypochlorite is non-existent.

Due to the physico-chemical properties of sodium hypochlorite no indirect exposure is thought to occur via the human food chain. Thus no indirect exposure to sodium hypochlorite is thought to occur via the environment.
4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the Exposure Scenario

Guidance is based on assumed operating conditions which may not be applicable to all sites. Thus scaling is deemed necessary to define appropriate site-specific risk management measures. If scaling reveals a condition of unsafe use (i.e., RCRs > 1), additional RMMs or a site-specific chemical safety assessment is required.
1. Short title of Exposure Scenario: Formulation [mixing] of preparations and/or re-packaging

Main User Groups: SU 3: Industrial uses: Uses of substances as such or in preparations at industrial sites

Sectors of end-use: SU10: Formulation [mixing] of preparations and/or re-packaging

Environmental Release Categories: ERC2: Formulation of preparations

Process categories:
- 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 for formulation of preparations and articles (multistage and/ or significant contact)
- PROC8a: Transfer of substance or preparation (charging/ discharging) from/to vessels/large containers at non-dedicated facilities
- PROC8b: Transfer of substance or preparation (charging/ discharging) from/to vessels/large containers at dedicated facilities
- PROC9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing)
- CS100: Production or preparation or articles by tabletting, compression, extrusion or pelletisation
- PROC15: Use as laboratory reagent

2.1 Contributing scenario controlling environmental exposure for: ERC2: Formulation of preparations

Product characteristics
- Concentration of the Substance in Mixture/Article: Covers the percentage of the substance in the product up to 25%.

Environment factors not influenced by risk management
- Dilution Factor (River): 10
- Dilution Factor (Coastal Areas): 100

Other given operational conditions affecting environmental exposure
- Continuous exposure
  - Number of emission days per year: 360
  - Remarks: Indoor use, Outdoor use
- Remarks: Product applied in aqueous process solution with negligible volatilization. Free available chlorine in effluent is measured as total residual chlorine (TRO) and is calculated to be below 1.0E-13 mg/L. No release to air from process expected because hypochlorite solution is non volatile., No release to
Technical conditions and measures / Organizational measures

Water
- Risk to the environment is driven by freshwater exposure. Onsite wastewater treatment required. Prevent discharge of substance directly to the environment and waste water treatment is required.

Remarks
- Common practices vary across sites but releases expected are negligible to waste water and soil (sodium hypochlorite is destroyed rapidly in contact with organic as well as inorganic material). Prevent environmental discharge consistent with regulatory requirements.

Conditions and measures related to municipal sewage treatment plant
Remarks
- Waste water treatment is required.

Conditions and measures related to external treatment of waste for disposal
Waste treatment
- External treatment and disposal of waste should comply with applicable local and/or national regulations.

2.2 Contributing scenario controlling worker exposure for: PROC1: Use in closed process, no likelihood of exposure

Product characteristics
Concentration of the Substance in Mixture/Article
- Covers the percentage of the substance in the product up to 25%.

Frequency and duration of use
Frequency of use
- 240 days/year
Remarks
- Covers daily exposures up to 8 hours

Other operational conditions affecting workers exposure
Outdoor / Indoor
- Indoor

Technical conditions and measures
Handle substance within a closed system., Process under low containment.

2.3 Contributing scenario controlling worker exposure for: PROC2: Use in closed, continuous process with occasional controlled exposure

Product characteristics
Concentration of the Substance in Mixture/Article
- Covers the percentage of the substance in the product up to 25%.

Frequency and duration of use
Frequency of use
- 240 days/year
Remarks
- Covers daily exposures up to 8 hours

Other operational conditions affecting workers exposure
Outdoor / Indoor
- Indoor

Technical conditions and measures
Provide extraction ventilation at points where emissions occur., Process under low containment.
Organisational measures to prevent /limit releases, dispersion and exposure
Avoid frequent and direct contact with substance., Regular cleaning of equipment, work area and clothing., Supervision in place to check that the RMMs in place are being used correctly and OCs followed.

2.4 Contributing scenario controlling worker exposure for: PROC3: Use in closed batch process (synthesis or formulation)

Product characteristics
Concentration of the Substance in Mixture/Article : Covers the percentage of the substance in the product up to 25 %.

Frequency and duration of use
Frequency of use : 240 days/year
Remarks : Covers daily exposures up to 8 hours

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor

Technical conditions and measures
Provide extraction ventilation at points where emissions occur., Process under low containment.

Organisational measures to prevent /limit releases, dispersion and exposure
Avoid frequent and direct contact with substance., Regular cleaning of equipment, work area and clothing., Supervision in place to check that the RMMs in place are being used correctly and OCs followed.

2.5 Contributing scenario controlling worker exposure for: PROC4: Use in batch and other process (synthesis) where opportunity for exposure arises

Product characteristics
Concentration of the Substance in Mixture/Article : Covers the percentage of the substance in the product up to 25 %.

Frequency and duration of use
Frequency of use : 240 days/year
Remarks : Covers daily exposures up to 8 hours

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor

Technical conditions and measures
Provide extraction ventilation at points where emissions occur., Process under low containment.

Organisational measures to prevent /limit releases, dispersion and exposure
Avoid frequent and direct contact with substance., Regular cleaning of equipment, work area and clothing., Supervision in place to check that the RMMs in place are being used correctly and OCs followed.
2.6 Contributing scenario controlling worker exposure for: PROC5: Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact)

Product characteristics
Concentration of the Substance in Mixture/Article: Covers the percentage of the substance in the product up to 25%.

Frequency and duration of use
Frequency of use: 240 days/year
Remarks: Covers daily exposures up to 8 hours

Other operational conditions affecting workers exposure
Outdoor / Indoor: Indoor

Technical conditions and measures
Provide extraction ventilation at points where emissions occur., Process under low containment.

Organisational measures to prevent /limit releases, dispersion and exposure
Avoid frequent and direct contact with substance., Regular cleaning of equipment, work area and clothing., Supervision in place to check that the RMMs in place are being used correctly and OCs followed.

2.7 Contributing scenario controlling worker exposure for: PROC8a: Transfer of substance or preparation (charging/ discharging) from/to vessels/large containers at non-dedicated facilities

Product characteristics
Concentration of the Substance in Mixture/Article: Covers the percentage of the substance in the product up to 25%.

Frequency and duration of use
Frequency of use: 240 days/year

Other operational conditions affecting workers exposure
Outdoor / Indoor: Indoor

Technical conditions and measures
Provide extraction ventilation at points where emissions occur., Process under low containment.

Organisational measures to prevent /limit releases, dispersion and exposure
Avoid carrying out activities involving exposure for more than 6 hours., Avoid frequent and direct contact with substance., Regular cleaning of equipment, work area and clothing., Supervision in place to check that the RMMs in place are being used correctly and OCs followed.

2.8 Contributing scenario controlling worker exposure for: PROC8b: Transfer of substance or preparation (charging/ discharging) from/to vessels/large containers at dedicated facilities

Product characteristics
Concentration of the Substance in Mixture/Article: Covers the percentage of the substance in the product up to 25%.
Frequency and duration of use
Frequency of use : 240 days/year

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor

Technical conditions and measures
Provide extraction ventilation at points where emissions occur., Process under low containment.

Organisational measures to prevent /limit releases, dispersion and exposure
Avoid carrying out activities involving exposure for more than 6 hours., Avoid frequent and direct contact with substance., Regular cleaning of equipment, work area and clothing., Supervision in place to check that the RMMs in place are being used correctly and OCs followed.

2.9 Contributing scenario controlling worker exposure for: PROC9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing)

Product characteristics
Concentration of the Substance in Mixture/Article : Covers the percentage of the substance in the product up to 25 %.

Frequency and duration of use
Frequency of use : 240 days/year
Remarks : Covers daily exposures up to 8 hours

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor

Technical conditions and measures
Provide extraction ventilation at points where emissions occur., Process under low containment.

Organisational measures to prevent /limit releases, dispersion and exposure
Avoid frequent and direct contact with substance., Regular cleaning of equipment, work area and clothing., Supervision in place to check that the RMMs in place are being used correctly and OCs followed.

2.10 Contributing scenario controlling worker exposure for: CS100: Production or preparation or articles by tabletting, compression, extrusion or pelletisation

Product characteristics
Concentration of the Substance in Mixture/Article : Covers the percentage of the substance in the product up to 25 %.

Frequency and duration of use
Frequency of use : 240 days/year
Remarks : Covers daily exposures up to 8 hours

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor

Technical conditions and measures
Provide extraction ventilation at points where emissions occur., Process under medium containment.

Organisational measures to prevent /limit releases, dispersion and exposure
Avoid frequent and direct contact with substance., Regular cleaning of equipment, work area and clothing., Supervision in place to check that the RMMs in place are being used correctly and OCs followed.

2.11 Contributing scenario controlling worker exposure for: PROC15: Use as laboratory reagent

Product characteristics
Concentration of the Substance in Mixture/Article: Covers the percentage of the substance in the product up to 25 %.

Frequency and duration of use
Frequency of use: 240 days/year
Remarks: Covers daily exposures up to 8 hours

Other operational conditions affecting workers exposure
Outdoor / Indoor: Indoor

Technical conditions and measures
Provide extraction ventilation at points where emissions occur.

Organisational measures to prevent /limit releases, dispersion and exposure
Avoid frequent and direct contact with substance., Regular cleaning of equipment, work area and clothing., Supervision in place to check that the RMMs in place are being used correctly and OCs followed.

3. Exposure estimation and reference to its source

| Workers |
|---|---|---|---|---|---|
| Contributing Scenario | Exposure Assessment Method | Specific conditions | Value | Level of Exposure | RCR |
| PROC1 | ART | Long term inhalation | 0,02 mg/m³ | 0,01 |
| PROC2 | ART | Long term inhalation | 1,10 mg/m³ | 0,71 |
| PROC3 | ART | Long term inhalation | 1,10 mg/m³ | 0,71 |
| PROC4 | ART | Long term inhalation | 1,20 mg/m³ | 0,77 |
| PROC5 | ART | Long term inhalation | 1,25 mg/m³ | 0,81 |
| PROC8a | ART | Long term inhalation | 1,25 mg/m³ | 0,81 |
| PROC8b | ART | Long term inhalation | 1,25 mg/m³ | 0,81 |
| PROC9 | ART | Long term | 0,91 mg/m³ | 0,59 |
CS100: Production or preparation or articles by tabletting, compression, extrusion or pelletisation
PROC1: Use in closed process, no likelihood of exposure
PROC15: Use as laboratory reagent
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
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PROC8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities
PROC9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing)

EE8 - Qualitative approach used to conclude safe use.

Predicted exposure concentrations (PECs)
According the previous qualitative assessment, the worst case exposure concentration in waste water treatment plant is 1.0E-13 mg/L. The PECs for the other compartments are not applicable, because sodium hypochlorite is destroyed rapidly in contact with organic as well as inorganic material and furthermore is a non-volatile substance.

Indirect exposure of humans via the environment (oral)
Hypochlorite will not reach the environment via the sewage treatment system, as the quick transformation of the applied hypochlorite (as free available chlorine, FAC) in the sewage system ensures the absence of any human exposure to hypochlorite. Also in recreational zones located close to discharge points of chlorinated waste water, the potential for exposure to hypochlorite originating from waste water treatment is negligible as the emission of unreacted hypochlorite is non-existent.

Due to the physico-chemical properties of sodium hypochlorite no indirect exposure is thought to occur via the human food chain. Thus no indirect exposure to sodium hypochlorite is thought to occur via the environment.

4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the Exposure Scenario

Guidance is based on assumed operating conditions which may not be applicable to all sites. Thus scaling is deemed necessary to define appropriate site-specific risk management measures. If scaling reveals a condition of unsafe use (i.e., RCRs > 1), additional RMMs or a site-specific chemical safety assessment is required.
1. Short title of Exposure Scenario: Industrial use as intermediate

Main User Groups: SU 3: Industrial uses: Uses of substances as such or in preparations at industrial sites

Sectors of end-use: SU8, SU9: Manufacture of bulk, large scale chemicals (including petroleum products), Manufacture of fine chemicals

Environmental Release Categories: ERC6a: Use of intermediate

Chemical product category: PC19: Intermediate

Process categories:
- 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: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities
- PROC8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities
- PROC9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing)

2.1 Contributing scenario controlling environmental exposure for: ERC6a: Use of intermediate

Product characteristics:
- Concentration of the Substance in Mixture/Article: Covers the percentage of the substance in the product up to 25%.

Environment factors not influenced by risk management:
- Dilution Factor (River): 10
- Dilution Factor (Coastal Areas): 100

Other given operational conditions affecting environmental exposure:
- Continuous exposure: 360
  - Remarks: Indoor use, Outdoor use
  - Remarks: Reactions with organic intermediates in controlled closed systems. Sodium hypochlorite solution is filled into the reaction vessels through closed systems. No release in environment is expected. In worst case the free available chlorine in effluent is measured as total residual chlorine (TRC) and is anticipated to be below 1.0E-13 mg/L

Technical conditions and measures / Organizational measures:
- Water: Risk to the environment is driven by freshwater exposure.
  - Remarks: Onsite wastewater treatment required. Prevent discharge of
Remarks

Common release control mechanisms (all sites fall under IPPC BREF) and specific local regulations respected to minimize risk. Common practices vary across sites but no releases are expected. Off-gas from the reactor is usually treated in a thermal exhaust air decontaminator before release into the atmosphere. Prevent environmental discharge consistent with regulatory requirements.

Conditions and measures related to municipal sewage treatment plant

Remarks

Waste water treatment is required to remove any residual organic compounds and remaining available chlorine.

Conditions and measures related to external treatment of waste for disposal

Waste treatment

External treatment and disposal of waste should comply with applicable local and/or national regulations.

2.2 Contributing scenario controlling worker exposure for: PROC1: Use in closed process, no likelihood of exposure

Product characteristics

Concentration of the Substance in Mixture/Article

Covers the percentage of the substance in the product up to 25%.

Frequency and duration of use

Frequency of use

240 days/year

Remarks

Covers daily exposures up to 8 hours

Other operational conditions affecting workers exposure

Outdoor / Indoor

Indoor

Technical conditions and measures

Handle substance within a closed system., Process under low containment.

2.3 Contributing scenario controlling worker exposure for: PROC2: Use in closed, continuous process with occasional controlled exposure

Product characteristics

Concentration of the Substance in Mixture/Article

Covers the percentage of the substance in the product up to 25%.

Frequency and duration of use

Frequency of use

240 days/year

Remarks

Covers daily exposures up to 8 hours

Other operational conditions affecting workers exposure

Outdoor / Indoor

Indoor

Technical conditions and measures

Provide extraction ventilation at points where emissions occur., Process under low containment.

Organisational measures to prevent /limit releases, dispersion and exposure

Avoid frequent and direct contact with substance., Regular cleaning of equipment, work area and
clothing., Supervision in place to check that the RMMs in place are being used correctly and OCs followed.

## 2.4 Contributing scenario controlling worker exposure for: PROC3: Use in closed batch process (synthesis or formulation)

### Product characteristics
- **Concentration of the Substance in Mixture/Article**: Covers the percentage of the substance in the product up to 25%.

### Frequency and duration of use
- **Frequency of use**: 240 days/year
- **Remarks**: Covers daily exposures up to 8 hours

### Other operational conditions affecting workers exposure
- **Outdoor / Indoor**: Indoor

### Technical conditions and measures
- Provide extraction ventilation at points where emissions occur., Process under low containment.

### Organisational measures to prevent /limit releases, dispersion and exposure
- Avoid frequent and direct contact with substance., Regular cleaning of equipment, work area and clothing., Supervision in place to check that the RMMs in place are being used correctly and OCs followed.

## 2.5 Contributing scenario controlling worker exposure for: PROC4: Use in batch and other process (synthesis) where opportunity for exposure arises

### Product characteristics
- **Concentration of the Substance in Mixture/Article**: Covers the percentage of the substance in the product up to 25%.

### Frequency and duration of use
- **Frequency of use**: 240 days/year
- **Remarks**: Covers daily exposures up to 8 hours

### Other operational conditions affecting workers exposure
- **Outdoor / Indoor**: Indoor

### Technical conditions and measures
- Provide extraction ventilation at points where emissions occur., Process under low containment.

### Organisational measures to prevent /limit releases, dispersion and exposure
- Avoid frequent and direct contact with substance., Regular cleaning of equipment, work area and clothing., Supervision in place to check that the RMMs in place are being used correctly and OCs followed.

## 2.6 Contributing scenario controlling worker exposure for: PROC8a: Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at non-dedicated facilities
SODIUM HYPOCHLORITE

Product characteristics
Concentration of the Substance in Mixture/Article: Covers the percentage of the substance in the product up to 25%.

Frequency and duration of use
Frequency of use: 240 days/year

Other operational conditions affecting workers exposure
Outdoor / Indoor: Indoor

Technical conditions and measures
Provide extraction ventilation at points where emissions occur., Process under low containment.

Organisational measures to prevent /limit releases, dispersion and exposure
Avoid carrying out activities involving exposure for more than 6 hours., Avoid frequent and direct contact with substance., Regular cleaning of equipment, work area and clothing., Supervision in place to check that the RMMs in place are being used correctly and OCs followed.

2.7 Contributing scenario controlling worker exposure for: PROC8b: Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at dedicated facilities

Product characteristics
Concentration of the Substance in Mixture/Article: Covers the percentage of the substance in the product up to 25%.

Frequency and duration of use
Frequency of use: 240 days/year

Other operational conditions affecting workers exposure
Outdoor / Indoor: Indoor

Technical conditions and measures
Provide extraction ventilation at points where emissions occur., Process under low containment.

Organisational measures to prevent /limit releases, dispersion and exposure
Avoid carrying out activities involving exposure for more than 6 hours., Avoid frequent and direct contact with substance., Regular cleaning of equipment, work area and clothing., Supervision in place to check that the RMMs in place are being used correctly and OCs followed.

2.8 Contributing scenario controlling worker exposure for: PROC9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing)

Product characteristics
Concentration of the Substance in Mixture/Article: Covers the percentage of the substance in the product up to 25%.

Frequency and duration of use
Frequency of use: 240 days/year
Remarks: Covers daily exposures up to 8 hours

Other operational conditions affecting workers exposure
Technical conditions and measures
Provide extraction ventilation at points where emissions occur., Process under low containment.

Organisational measures to prevent /limit releases, dispersion and exposure
Avoid frequent and direct contact with substance., Regular cleaning of equipment, work area and clothing., Supervision in place to check that the RMMs in place are being used correctly and OCs followed.

3. Exposure estimation and reference to its source

<table>
<thead>
<tr>
<th>Workers</th>
<th>Exposure Assessment Method</th>
<th>Specific conditions</th>
<th>Value</th>
<th>Level of Exposure</th>
<th>RCR</th>
</tr>
</thead>
<tbody>
<tr>
<td>PROC1</td>
<td>ART</td>
<td>Long term inhalation</td>
<td>0,02 mg/m3</td>
<td>0,01</td>
<td></td>
</tr>
<tr>
<td>PROC2</td>
<td>ART</td>
<td>Long term inhalation</td>
<td>1,10 mg/m3</td>
<td>0,71</td>
<td></td>
</tr>
<tr>
<td>PROC3</td>
<td>ART</td>
<td>Long term inhalation</td>
<td>1,10 mg/m3</td>
<td>0,71</td>
<td></td>
</tr>
<tr>
<td>PROC4</td>
<td>ART</td>
<td>Long term inhalation</td>
<td>1,20 mg/m3</td>
<td>0,77</td>
<td></td>
</tr>
<tr>
<td>PROC8a</td>
<td>ART</td>
<td>Long term inhalation</td>
<td>1,25 mg/m3</td>
<td>0,81</td>
<td></td>
</tr>
<tr>
<td>PROC8b</td>
<td>ART</td>
<td>Long term inhalation</td>
<td>1,25 mg/m3</td>
<td>0,81</td>
<td></td>
</tr>
<tr>
<td>PROC9</td>
<td>ART</td>
<td>Long term inhalation</td>
<td>0,91 mg/m3</td>
<td>0,59</td>
<td></td>
</tr>
</tbody>
</table>

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: Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at non-dedicated facilities
PROC8b: Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at dedicated facilities
PROC9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing)

EE8 - Qualitative approach used to conclude safe use.

Predicted exposure concentrations (PECs)
According the previous qualitative assessment, the worst case exposure concentration in waste water treatment plant is 1.0E-13 mg/L. The PECs for the other compartments are not applicable, because sodium hypochlorite is destroyed rapidly in contact with organic as well as inorganic material and furthermore is a non-volatile substance.

Indirect exposure of humans via the environment (oral)
Hypochlorite will not reach the environment via the sewage treatment system, as the quick transformation of the applied hypochlorite (as free available chlorine, FAC) in the sewage system ensures the absence of any human exposure to hypochlorite. Also in recreational zones located close to discharge points of chlorinated waste water, the potential for exposure to hypochlorite originating from waste water treatment is negligible as the emission of unreacted hypochlorite is non-existent.

Due to the physico-chemical properties of sodium hypochlorite no indirect exposure is thought to occur via the human food chain. Thus no indirect exposure to sodium hypochlorite is thought to occur via the environment.

4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the Exposure Scenario

Guidance is based on assumed operating conditions which may not be applicable to all sites. Thus scaling is deemed necessary to define appropriate site-specific risk management measures. If scaling reveals a condition of unsafe use (i.e., RCRs > 1), additional RMMs or a site-specific chemical safety assessment is required.

Main User Groups: SU 3: Industrial uses: Uses of substances as such or in preparations at industrial sites
Sectors of end-use: SU5: Manufacture of textiles, leather, fur
Environmental Release Categories: ERC6b: Use of reactive processing aid at industrial site (no inclusion into or onto article)
Chemical product category: PC34: Textile dyes and impregnating products
Process categories: 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 for formulation of preparations and articles (multistage and/or significant contact)
PROC8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities
PROC8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities
PROC9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing)
PROC13: Treatment of articles by dipping and pouring

2.1 Contributing scenario controlling environmental exposure for: ERC6b: Use of reactive processing aid at industrial site (no inclusion into or onto article)

Product characteristics
Concentration of the Substance in Mixture/Article: Covers the percentage of the substance in the product up to 25%.

Environment factors not influenced by risk management
Dilution Factor (River): 10
Dilution Factor (Coastal Areas): 100

Other given operational conditions affecting environmental exposure
Continuous exposure
Number of emission days per year: 360
Remarks: Indoor use, Outdoor use
Remarks: Sulphite must be use in part of dechlorination process leading to negligible releases of NaClO in water. No release in environment is expected. In worst case the free available chlorine in effluent is measured as total residual chlorine (TRC) and is anticipated to be below 1.0E-13 mg/L
SODIUM HYPOCHLORITE

Technical conditions and measures / Organizational measures

Air
- Wool chlorination is performed in an acidic environment, in which gaseous chlorine formation is unavoidable. This requires a high degree of enclosure of the plants, the presence of abatement system of gaseous emission and a neutralisation stage.

Remarks
- Common release control mechanisms (all sites fall under IPPC BREF) and specific local regulations respected to minimize risk. Common practices vary across sites but no releases are expected. Off-gas from the reactor is usually treated in a thermal exhaust air decontaminator before release into the atmosphere., Prevent environmental discharge consistent with regulatory requirements.

Conditions and measures related to municipal sewage treatment plant

Remarks
- Waste water treatment is required to remove any residual organic compounds and remaining available chlorine.

Conditions and measures related to external treatment of waste for disposal

Waste treatment
- External treatment and disposal of waste should comply with applicable local and/or national regulations.

2.2 Contributing scenario controlling worker exposure for: PROC1: Use in closed process, no likelihood of exposure

Product characteristics
- Concentration of the Substance in Mixture/Article: Covers the percentage of the substance in the product up to 25 %.

Frequency and duration of use
- Frequency of use: 240 days/year
- Remarks: Covers daily exposures up to 8 hours

Other operational conditions affecting workers exposure
- Outdoor / Indoor: Indoor

Technical conditions and measures
- Handle substance within a closed system., Process under low containment.

2.3 Contributing scenario controlling worker exposure for: PROC2: Use in closed, continuous process with occasional controlled exposure

Product characteristics
- Concentration of the Substance in Mixture/Article: Covers the percentage of the substance in the product up to 25 %.

Frequency and duration of use
- Frequency of use: 240 days/year
- Remarks: Covers daily exposures up to 8 hours

Other operational conditions affecting workers exposure
- Outdoor / Indoor: Indoor
Provide extraction ventilation at points where emissions occur. Process under low containment.

Organisational measures to prevent /limit releases, dispersion and exposure
Avoid frequent and direct contact with substance. Regular cleaning of equipment, work area and clothing. Supervision in place to check that the RMMs in place are being used correctly and OCs followed.

2.4 Contributing scenario controlling worker exposure for: PROC3: Use in closed batch process (synthesis or formulation)

| Product characteristics | Concentration of the Substance in Mixture/Article | Covers the percentage of the substance in the product up to 25 %.
| Frequency and duration of use | Frequency of use | 240 days/year
| Remarks | Covers daily exposures up to 8 hours
| Other operational conditions affecting workers exposure | Outdoor / Indoor | Indoor

Technical conditions and measures
Provide extraction ventilation at points where emissions occur. Process under low containment.

Organisational measures to prevent /limit releases, dispersion and exposure
Avoid frequent and direct contact with substance. Regular cleaning of equipment, work area and clothing. Supervision in place to check that the RMMs in place are being used correctly and OCs followed.

2.5 Contributing scenario controlling worker exposure for: PROC4: Use in batch and other process (synthesis) where opportunity for exposure arises

| Product characteristics | Concentration of the Substance in Mixture/Article | Covers the percentage of the substance in the product up to 25 %.
| Frequency and duration of use | Frequency of use | 240 days/year
| Remarks | Covers daily exposures up to 8 hours
| Other operational conditions affecting workers exposure | Outdoor / Indoor | Indoor

Technical conditions and measures
Provide extraction ventilation at points where emissions occur. Process under low containment.

Organisational measures to prevent /limit releases, dispersion and exposure
Avoid frequent and direct contact with substance. Regular cleaning of equipment, work area and clothing. Supervision in place to check that the RMMs in place are being used correctly and OCs followed.
2.6 Contributing scenario controlling worker exposure for: PROC5: Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact)

Product characteristics
Concentration of the Substance in Mixture/Article: Covers the percentage of the substance in the product up to 25%.

Frequency and duration of use
Frequency of use: 240 days/year
Remarks: Covers daily exposures up to 8 hours

Other operational conditions affecting workers exposure
Outdoor / Indoor: Indoor

Technical conditions and measures
Provide extraction ventilation at points where emissions occur., Process under low containment.

Organisational measures to prevent/limit releases, dispersion and exposure
Avoid frequent and direct contact with substance., Regular cleaning of equipment, work area and clothing., Supervision in place to check that the RMMs in place are being used correctly and OCs followed.

2.7 Contributing scenario controlling worker exposure for: PROC8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities

Product characteristics
Concentration of the Substance in Mixture/Article: Covers the percentage of the substance in the product up to 25%.

Frequency and duration of use
Frequency of use: 240 days/year

Other operational conditions affecting workers exposure
Outdoor / Indoor: Indoor

Technical conditions and measures
Provide extraction ventilation at points where emissions occur., Process under low containment.

Organisational measures to prevent/limit releases, dispersion and exposure
Avoid carrying out activities involving exposure for more than 6 hours., Avoid frequent and direct contact with substance., Regular cleaning of equipment, work area and clothing., Supervision in place to check that the RMMs in place are being used correctly and OCs followed.

2.8 Contributing scenario controlling worker exposure for: PROC8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities

Product characteristics
Concentration of the Substance in Mixture/Article: Covers the percentage of the substance in the product up to 25%.
2.9 Contributing scenario controlling worker exposure for: PROC9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing)

Product characteristics
   Concentration of the Substance in Mixture/Article : Covers the percentage of the substance in the product up to 25%.

Frequency and duration of use
   Frequency of use : 240 days/year
   Remarks : Covers daily exposures up to 8 hours

Other operational conditions affecting workers exposure
   Outdoor / Indoor : Indoor

Technical conditions and measures
   Provide extraction ventilation at points where emissions occur., Process under low containment.

Organisational measures to prevent /limit releases, dispersion and exposure
   Avoid carrying out activities involving exposure for more than 6 hours., Avoid frequent and direct contact with substance., Regular cleaning of equipment, work area and clothing., Supervision in place to check that the RMMs in place are being used correctly and OCs followed.

2.10 Contributing scenario controlling worker exposure for: PROC13: Treatment of articles by dipping and pouring

Product characteristics
   Concentration of the Substance in Mixture/Article : Covers the percentage of the substance in the product up to 25%.

Frequency and duration of use
   Frequency of use : 240 days/year
   Remarks : Covers daily exposures up to 8 hours

Other operational conditions affecting workers exposure
   Outdoor / Indoor : Indoor

Technical conditions and measures
Provide extraction ventilation at points where emissions occur. Process under medium containment. Minimise exposure by ventilated partial enclosure of the operator or equipment.

Organisational measures to prevent /limit releases, dispersion and exposure
Avoid frequent and direct contact with substance. Regular cleaning of equipment, work area and clothing. Supervision in place to check that the RMMs in place are being used correctly and OCs followed.

### 3. Exposure estimation and reference to its source

#### Workers

<table>
<thead>
<tr>
<th>Contributing Scenario</th>
<th>Exposure Assessment Method</th>
<th>Specific conditions</th>
<th>Value</th>
<th>Level of Exposure</th>
<th>RCR</th>
</tr>
</thead>
<tbody>
<tr>
<td>PROC1</td>
<td>ART</td>
<td>Long term inhalation</td>
<td>0,02 mg/m³</td>
<td>0,01</td>
<td></td>
</tr>
<tr>
<td>PROC2</td>
<td>ART</td>
<td>Long term inhalation</td>
<td>1,10 mg/m³</td>
<td>0,71</td>
<td></td>
</tr>
<tr>
<td>PROC3</td>
<td>ART</td>
<td>Long term inhalation</td>
<td>1,10 mg/m³</td>
<td>0,71</td>
<td></td>
</tr>
<tr>
<td>PROC4</td>
<td>ART</td>
<td>Long term inhalation</td>
<td>1,20 mg/m³</td>
<td>0,77</td>
<td></td>
</tr>
<tr>
<td>PROC5</td>
<td>ART</td>
<td>Long term inhalation</td>
<td>1,25 mg/m³</td>
<td>0,81</td>
<td></td>
</tr>
<tr>
<td>PROC8a</td>
<td>ART</td>
<td>Long term inhalation</td>
<td>1,25 mg/m³</td>
<td>0,81</td>
<td></td>
</tr>
<tr>
<td>PROC8b</td>
<td>ART</td>
<td>Long term inhalation</td>
<td>1,25 mg/m³</td>
<td>0,81</td>
<td></td>
</tr>
<tr>
<td>PROC9</td>
<td>ART</td>
<td>Long term inhalation</td>
<td>0,91 mg/m³</td>
<td>0,59</td>
<td></td>
</tr>
<tr>
<td>PROC13</td>
<td>ART</td>
<td>Long term inhalation</td>
<td>0,70 mg/m³</td>
<td>0,45</td>
<td></td>
</tr>
</tbody>
</table>

PROC1: Use in closed process, no likelihood of exposure
PROC13: Treatment of articles by dipping and pouring
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 for formulation of preparations and articles (multistage and/ or significant contact)
PROC8a: Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at non-dedicated facilities
PROC8b: Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at dedicated facilities
PROC9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing)

EE8 - Qualitative approach used to conclude safe use.

Predicted exposure concentrations (PECs)
According the previous qualitative assessment, the worst case exposure concentration in waste water treatment plant is 1.0E-13 mg/L. The PECs for the other compartments are not applicable, because
sodium hypochlorite is destroyed rapidly in contact with organic as well as inorganic material and furthermore is a non-volatile substance.

Indirect exposure of humans via the environment (oral)
Hypochlorite will not reach the environment via the sewage treatment system, as the quick transformation of the applied hypochlorite (as free available chlorine, FAC) in the sewage system ensures the absence of any human exposure to hypochlorite. Also in recreational zones located close to discharge points of chlorinated waste water, the potential for exposure to hypochlorite originating from waste water treatment is negligible as the emission of unreacted hypochlorite is non-existent.

Due to the physico-chemical properties of sodium hypochlorite no indirect exposure is thought to occur via the human food chain. Thus no indirect exposure to sodium hypochlorite is thought to occur via the environment.

4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the Exposure Scenario

Guidance is based on assumed operating conditions which may not be applicable to all sites. Thus scaling is deemed necessary to define appropriate site-specific risk management measures. If scaling reveals a condition of unsafe use (i.e., RCRs > 1), additional RMMs or a site-specific chemical safety assessment is required.
1. Short title of Exposure Scenario: Industrial use in sewage and cooling or heating water treatment

Main User Groups: SU 3: Industrial uses: Uses of substances as such or in preparations at industrial sites

Sectors of end-use: SU23: Electricity, steam, gas water supply and sewage treatment

Environmental Release Categories: ERC6b: Use of reactive processing aid at industrial site (no inclusion into or onto article)

Chemical product category: PC20: Processing aids such as pH-regulators, flocculants, precipitants, neutralization agents
PC37: Water treatment chemicals

Process categories: 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 for formulation of preparations and articles (multistage and/or significant contact)
PROC8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities
PROC8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities
PROC9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing)

2.1 Contributing scenario controlling environmental exposure for: ERC6b: Use of reactive processing aid at industrial site (no inclusion into or onto article)

Product characteristics:
Concentration of the Substance in Mixture/Article: Covers the percentage of the substance in the product up to 25%.

Environment factors not influenced by risk management:
Dilution Factor (River): 10
Dilution Factor (Coastal Areas): 100

Other given operational conditions affecting environmental exposure:
Continuous exposure:
Number of emission days per year: 360
Remarks: Indoor use, Outdoor use
Remarks: Cooling water process must follow IPPC reference document on the application of best available techniques (BAT) to industrial cooling systems (European Commission, 2001).
Site-specific operational conditions to be applied are determined for both chlorine and hypochlorite in the BAT document. Chlorination processes used for disinfection of wastewater in sewage treatment require a chlorine dose of 5 – 40 mg Cl₂/L. The chlorine dosages are designed in order to minimise the chlorine discharges to the environment.

### Technical conditions and measures / Organizational measures

**Water**
- Risk to the environment is driven by freshwater exposure. Onsite wastewater treatment required. Prevent discharge of substance directly to the environment and waste water treatment is required.

**Remarks**
- Common practices vary across sites but no releases are expected. Prevent environmental discharge consistent with regulatory requirements.

### Conditions and measures related to municipal sewage treatment plant

**Remarks**
- Waste water treatment is required to remove any residual organic compounds and remaining available chlorine.

### Conditions and measures related to external treatment of waste for disposal

**Waste treatment**
- External treatment and disposal of waste should comply with applicable local and/or national regulations.

---

### 2.2 Contributing scenario controlling worker exposure for: PROC1: Use in closed process, no likelihood of exposure

**Product characteristics**
- **Concentration of the Substance in Mixture/Article**: Covers the percentage of the substance in the product up to 25 %.

**Frequency and duration of use**
- **Frequency of use**: 240 days/year
- **Remarks**: Covers daily exposures up to 8 hours

**Other operational conditions affecting workers exposure**
- **Outdoor / Indoor**: Indoor

**Technical conditions and measures**
- Handle substance within a closed system., Process under low containment.

---

### 2.3 Contributing scenario controlling worker exposure for: PROC2: Use in closed, continuous process with occasional controlled exposure

**Product characteristics**
- **Concentration of the Substance in Mixture/Article**: Covers the percentage of the substance in the product up to 25 %.

**Frequency and duration of use**
- **Frequency of use**: 240 days/year
- **Remarks**: Covers daily exposures up to 8 hours

**Other operational conditions affecting workers exposure**
- **Outdoor / Indoor**: Indoor
## Technical conditions and measures

Provide extraction ventilation at points where emissions occur., Process under low containment.

### Organisational measures to prevent /limit releases, dispersion and exposure

Avoid frequent and direct contact with substance., Regular cleaning of equipment, work area and clothing., Supervision in place to check that the RMMs in place are being used correctly and OCs followed.

## 2.4 Contributing scenario controlling worker exposure for: PROC3: Use in closed batch process (synthesis or formulation)

### Product characteristics

| Concentration of the Substance in Mixture/Article | Covers the percentage of the substance in the product up to 25 %. |

### Frequency and duration of use

| Frequency of use | 240 days/year |
| Remarks          | Covers daily exposures up to 8 hours |

### Other operational conditions affecting workers exposure

| Outdoor / Indoor | Indoor |

### Technical conditions and measures

Provide extraction ventilation at points where emissions occur., Process under low containment.

### Organisational measures to prevent /limit releases, dispersion and exposure

Avoid frequent and direct contact with substance., Regular cleaning of equipment, work area and clothing., Supervision in place to check that the RMMs in place are being used correctly and OCs followed.

## 2.5 Contributing scenario controlling worker exposure for: PROC4: Use in batch and other process (synthesis) where opportunity for exposure arises

### Product characteristics

| Concentration of the Substance in Mixture/Article | Covers the percentage of the substance in the product up to 25 % |

### Frequency and duration of use

| Frequency of use | 240 days/year |
| Remarks          | Covers daily exposures up to 8 hours |

### Other operational conditions affecting workers exposure

| Outdoor / Indoor | Indoor |

### Technical conditions and measures

Provide extraction ventilation at points where emissions occur., Process under low containment.

### Organisational measures to prevent /limit releases, dispersion and exposure

Avoid frequent and direct contact with substance., Regular cleaning of equipment, work area and clothing., Supervision in place to check that the RMMs in place are being used correctly and OCs followed.
2.6 Contributing scenario controlling worker exposure for: PROC5: Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact)

Product characteristics
Concentration of the Substance in Mixture/Article: Covers the percentage of the substance in the product up to 25%.

Frequency and duration of use
Frequency of use: 240 days/year
Remarks: Covers daily exposures up to 8 hours

Other operational conditions affecting workers exposure
Outdoor / Indoor: Indoor

Technical conditions and measures
Provide extraction ventilation at points where emissions occur, Process under low containment.

Organisational measures to prevent /limit releases, dispersion and exposure
Avoid frequent and direct contact with substance, Regular cleaning of equipment, work area and clothing, Supervision in place to check that the RMMs in place are being used correctly and OCs followed.

2.7 Contributing scenario controlling worker exposure for: PROC8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities

Product characteristics
Concentration of the Substance in Mixture/Article: Covers the percentage of the substance in the product up to 25%.

Frequency and duration of use
Frequency of use: 240 days/year

Other operational conditions affecting workers exposure
Outdoor / Indoor: Indoor

Technical conditions and measures
Provide extraction ventilation at points where emissions occur, Process under low containment.

Organisational measures to prevent /limit releases, dispersion and exposure
Avoid carrying out activities involving exposure for more than 6 hours, Avoid frequent and direct contact with substance, Regular cleaning of equipment, work area and clothing, Supervision in place to check that the RMMs in place are being used correctly and OCs followed.

2.8 Contributing scenario controlling worker exposure for: PROC8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities

Product characteristics
Concentration of the Substance in Mixture/Article: Covers the percentage of the substance in the product up to 25%.
2.9 Contributing scenario controlling worker exposure for: PROC9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing)

Product characteristics
  Concentration of the Substance in Mixture/Article: Covers the percentage of the substance in the product up to 25 %.

Frequency and duration of use
  Frequency of use: 240 days/year
  Remarks: Covers daily exposures up to 8 hours

Other operational conditions affecting workers exposure
  Outdoor / Indoor: Indoor

Technical conditions and measures
  Provide extraction ventilation at points where emissions occur., Process under low containment.

Organisational measures to prevent /limit releases, dispersion and exposure
  Avoid carrying out activities involving exposure for more than 6 hours., Avoid frequent and direct contact with substance., Regular cleaning of equipment, work area and clothing., Supervision in place to check that the RMMs in place are being used correctly and OCs followed.

3. Exposure estimation and reference to its source

| Workers | | | | | |
|---|---|---|---|---|
| Contributing Scenario | Exposure Assessment Method | Specific conditions | Value | Level of Exposure | RCR |
| PROC1 | ART | Long term inhalation | 0,02 mg/m3 | 0,01 |
| PROC2 | ART | Long term inhalation | 1,10 mg/m3 | 0,71 |
| PROC3 | ART | Long term | 1,10 mg/m3 | 0,71 |
**Predicted exposure concentrations (PECs)**

According to the previous qualitative assessment, the worst-case exposure concentration in waste water treatment plant is $1.0 \text{E}^{-13}$ mg/L. The PECs for the other compartments are not applicable, because sodium hypochlorite is destroyed rapidly in contact with organic as well as inorganic material and furthermore is a non-volatile substance.

Indirect exposure of humans via the environment (oral)

Hypochlorite will not reach the environment via the sewage treatment system, as the quick transformation of the applied hypochlorite (as free available chlorine, FAC) in the sewage system ensures the absence of any human exposure to hypochlorite. Also in recreational zones located close to discharge points of chlorinated waste water, the potential for exposure to hypochlorite originating from waste water treatment is negligible as the emission of unreacted hypochlorite is non-existent.

Due to the physico-chemical properties of sodium hypochlorite no indirect exposure is thought to occur via the human food chain. Thus no indirect exposure to sodium hypochlorite is thought to occur via the environment.

### 4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the Exposure Scenario

Guidance is based on assumed operating conditions which may not be applicable to all sites. Thus scaling is deemed necessary to define appropriate site-specific risk management measures. If scaling reveals a condition of unsafe use (i.e., RCRs > 1), additional RMMs or a site-specific chemical safety assessment is required.

---

**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 for formulation of preparations and articles (multistage and/ or significant contact)
**PROC8a:** Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at non-dedicated facilities
**PROC8b:** Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at dedicated facilities
**PROC9:** Transfer of substance or preparation into small containers (dedicated filling line, including weighing)

EE8 - Qualitative approach used to conclude safe use.

**inhalation**

<table>
<thead>
<tr>
<th>PROC</th>
<th>ART</th>
<th>Long term inhalation</th>
<th>1.20 mg/m³</th>
<th>0.77</th>
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</thead>
<tbody>
<tr>
<td>PROC4</td>
<td>ART</td>
<td>Long term inhalation</td>
<td>1.25 mg/m³</td>
<td>0.81</td>
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<tr>
<td>PROC5</td>
<td>ART</td>
<td>Long term inhalation</td>
<td>1.25 mg/m³</td>
<td>0.81</td>
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<tr>
<td>PROC8a</td>
<td>ART</td>
<td>Long term inhalation</td>
<td>1.25 mg/m³</td>
<td>0.81</td>
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<tr>
<td>PROC8b</td>
<td>ART</td>
<td>Long term inhalation</td>
<td>1.25 mg/m³</td>
<td>0.81</td>
</tr>
<tr>
<td>PROC9</td>
<td>ART</td>
<td>Long term inhalation</td>
<td>0.91 mg/m³</td>
<td>0.59</td>
</tr>
</tbody>
</table>
1. Short title of Exposure Scenario: Industrial use in pulp and paper

Main User Groups: SU 3: Industrial uses: Uses of substances as such or in preparations at industrial sites

Sectors of end-use: SU6b: Manufacture of pulp, paper and paper products

Environmental Release Categories: ERC6b: Use of reactive processing aid at industrial site (no inclusion into or onto article)

Chemical product category: PC26: Paper and board treatment products

Process categories: 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 for formulation of preparations and articles (multistage and/ or significant contact)
PROC8a: Transfer of substance or preparation (charging/discharging) from/ to vessels/ large containers at non-dedicated facilities
PROC8b: Transfer of substance or preparation (charging/discharging) from/ to vessels/ large containers at dedicated facilities
PROC9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing)

2.1 Contributing scenario controlling environmental exposure for: ERC6b: Use of reactive processing aid at industrial site (no inclusion into or onto article)

Product characteristics
Concentration of the Substance in Mixture/Article: Covers the percentage of the substance in the product up to 25%.

Environment factors not influenced by risk management
Dilution Factor (River): 10
Dilution Factor (Coastal Areas): 100

Other given operational conditions affecting environmental exposure
Continuous exposure
Number of emission days per year: 360
Remarks: Indoor use, Outdoor use
Remarks: The concentration of hypochlorite in the system is low, and quantities are determined so that there is negligible residual free hypochlorite at the end of the cleaning process. No release in environment is expected. In worst case the free available chlorine in effluent is measured as total residual chlorine (TRC) and is anticipated to be below 1.0E-13 mg/L
Technical conditions and measures / Organizational measures

Water

: Risk to the environment is driven by freshwater exposure. Onsite wastewater treatment required. Prevent discharge of substance directly to the environment and waste water treatment is required.

Remarks

: Only two specific applications are considered acceptable in pulp and paper industry: *) disinfection of the paper machine system *) - break down of the wet strength resins., Common practices vary across sites but no releases are expected., Prevent environmental discharge consistent with regulatory requirements.

Conditions and measures related to municipal sewage treatment plant

Remarks

: Waste water treatment is required to remove any residual organic compounds and remaining available chlorine.

Conditions and measures related to external treatment of waste for disposal

Waste treatment

: External treatment and disposal of waste should comply with applicable local and/or national regulations.

2.2 Contributing scenario controlling worker exposure for: PROC1: Use in closed process, no likelihood of exposure

Product characteristics

Concentration of the Substance in Mixture/Article

: Covers the percentage of the substance in the product up to 25 %.

Frequency and duration of use

Frequency of use

: 240 days/year

Remarks

: Covers daily exposures up to 8 hours

Other operational conditions affecting workers exposure

Outdoor / Indoor

: Indoor

Technical conditions and measures

Handle substance within a closed system., Process under low containment.

2.3 Contributing scenario controlling worker exposure for: PROC2: Use in closed, continuous process with occasional controlled exposure

Product characteristics

Concentration of the Substance in Mixture/Article

: Covers the percentage of the substance in the product up to 25 %.

Frequency and duration of use

Frequency of use

: 240 days/year

Remarks

: Covers daily exposures up to 8 hours

Other operational conditions affecting workers exposure

Outdoor / Indoor

: Indoor

Technical conditions and measures

Provide extraction ventilation at points where emissions occur., Process under low containment.
Organisational measures to prevent /limit releases, dispersion and exposure
Avoid frequent and direct contact with substance., Regular cleaning of equipment, work area and clothing., Supervision in place to check that the RMMs in place are being used correctly and OCs followed.

2.4 Contributing scenario controlling worker exposure for: PROC3: Use in closed batch process (synthesis or formulation)

Product characteristics
- Concentration of the Substance in Mixture/Article: Covers the percentage of the substance in the product up to 25 %.

Frequency and duration of use
- Frequency of use: 240 days/year
- Remarks: Covers daily exposures up to 8 hours

Other operational conditions affecting workers exposure
- Outdoor / Indoor: Indoor

Technical conditions and measures
Provide extraction ventilation at points where emissions occur., Process under low containment.

Organisational measures to prevent /limit releases, dispersion and exposure
Avoid frequent and direct contact with substance., Regular cleaning of equipment, work area and clothing., Supervision in place to check that the RMMs in place are being used correctly and OCs followed.

2.5 Contributing scenario controlling worker exposure for: PROC4: Use in batch and other process (synthesis) where opportunity for exposure arises

Product characteristics
- Concentration of the Substance in Mixture/Article: Covers the percentage of the substance in the product up to 25 %.

Frequency and duration of use
- Frequency of use: 240 days/year
- Remarks: Covers daily exposures up to 8 hours

Other operational conditions affecting workers exposure
- Outdoor / Indoor: Indoor

Technical conditions and measures
Provide extraction ventilation at points where emissions occur., Process under low containment.

Organisational measures to prevent /limit releases, dispersion and exposure
Avoid frequent and direct contact with substance., Regular cleaning of equipment, work area and clothing., Supervision in place to check that the RMMs in place are being used correctly and OCs followed.
2.6 Contributing scenario controlling worker exposure for: PROC5: Mixing or blending in batch processes for formulation of preparations and articles (multistage and/ or significant contact)

Product characteristics
Concentration of the Substance in Mixture/Article: Covers the percentage of the substance in the product up to 25%.

Frequency and duration of use
Frequency of use: 240 days/year
Remarks: Covers daily exposures up to 8 hours

Other operational conditions affecting workers exposure
Outdoor / Indoor: Indoor

Technical conditions and measures
Provide extraction ventilation at points where emissions occur., Process under low containment.

Organisational measures to prevent /limit releases, dispersion and exposure
Avoid frequent and direct contact with substance., Regular cleaning of equipment, work area and clothing., Supervision in place to check that the RMMs in place are being used correctly and OCs followed.

2.7 Contributing scenario controlling worker exposure for: PROC8a: Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at non-dedicated facilities

Product characteristics
Concentration of the Substance in Mixture/Article: Covers the percentage of the substance in the product up to 25%.

Frequency and duration of use
Frequency of use: 240 days/year

Other operational conditions affecting workers exposure
Outdoor / Indoor: Indoor

Technical conditions and measures
Provide extraction ventilation at points where emissions occur., Process under low containment.

Organisational measures to prevent /limit releases, dispersion and exposure
Avoid carrying out activities involving exposure for more than 6 hours., Avoid frequent and direct contact with substance., Regular cleaning of equipment, work area and clothing., Supervision in place to check that the RMMs in place are being used correctly and OCs followed.

2.8 Contributing scenario controlling worker exposure for: PROC8b: Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at dedicated facilities

Product characteristics
Concentration of the Substance in Mixture/Article: Covers the percentage of the substance in the product up to 25%.
Frequency and duration of use
Frequency of use : 240 days/year

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor

Technical conditions and measures
 Provide extraction ventilation at points where emissions occur., Process under low containment.

Organisational measures to prevent /limit releases, dispersion and exposure
 Avoid carrying out activities involving exposure for more than 6 hours., Avoid frequent and direct contact with substance., Regular cleaning of equipment, work area and clothing., Supervision in place to check that the RMMs in place are being used correctly and OCs followed.

2.9 Contributing scenario controlling worker exposure for: PROC9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing)

Product characteristics
Concentration of the Substance in Mixture/Article : Covers the percentage of the substance in the product up to 25 %.

Frequency and duration of use
Frequency of use : 240 days/year
Remarks : Covers daily exposures up to 8 hours

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor

Technical conditions and measures
 Provide extraction ventilation at points where emissions occur., Process under low containment.

Organisational measures to prevent /limit releases, dispersion and exposure
 Avoid frequent and direct contact with substance., Regular cleaning of equipment, work area and clothing., Supervision in place to check that the RMMs in place are being used correctly and OCs followed.

3. Exposure estimation and reference to its source

Workers

<table>
<thead>
<tr>
<th>Contributing Scenario</th>
<th>Exposure Assessment Method</th>
<th>Specific conditions</th>
<th>Value</th>
<th>Level of Exposure</th>
<th>RCR</th>
</tr>
</thead>
<tbody>
<tr>
<td>PROC1</td>
<td>ART</td>
<td>Long term inhalation</td>
<td>0,02 mg/m3</td>
<td>0,01</td>
<td></td>
</tr>
<tr>
<td>PROC2</td>
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<td>Long term inhalation</td>
<td>1,10 mg/m3</td>
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<tr>
<td>PROC3</td>
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<td>Long term inhalation</td>
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<tr>
<td>PROC</td>
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<td>ART</td>
<td>Long term inhalation</td>
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<tr>
<td>PROC8b</td>
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</tr>
<tr>
<td>PROC9</td>
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<td>0,91 mg/m³</td>
<td>0,59</td>
<td></td>
</tr>
</tbody>
</table>

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 for formulation of preparations and articles (multistage and/or significant contact)
PROC8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities
PROC8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities
PROC9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing)

EE8 - Qualitative approach used to conclude safe use.

Predicted exposure concentrations (PECs)
According to the previous qualitative assessment, the worst case exposure concentration in waste water treatment plant is 1.0E-13 mg/L. The PECs for the other compartments are not applicable, because sodium hypochlorite is destroyed rapidly in contact with organic as well as inorganic material and furthermore is a non-volatile substance.

Indirect exposure of humans via the environment (oral)
Hypochlorite will not reach the environment via the sewage treatment system, as the quick transformation of the applied hypochlorite (as free available chlorine, FAC) in the sewage system ensures the absence of any human exposure to hypochlorite. Also in recreational zones located close to discharge points of chlorinated waste water, the potential for exposure to hypochlorite originating from waste water treatment is negligible as the emission of unreacted hypochlorite is non-existent.

Due to the physico-chemical properties of sodium hypochlorite no indirect exposure is thought to occur via the human food chain. Thus no indirect exposure to sodium hypochlorite is thought to occur via the environment.

4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the Exposure Scenario

Guidance is based on assumed operating conditions which may not be applicable to all sites. Thus scaling is deemed necessary to define appropriate site-specific risk management measures. If scaling reveals a condition of unsafe use (i.e., RCRs > 1), additional RMMs or a site-specific chemical safety assessment is required.
1. Short title of Exposure Scenario: Industrial cleaning use

Main User Groups: SU 3: Industrial uses: Uses of substances as such or in preparations at industrial sites
Sectors of end-use: SU4: Manufacture of food products
Environmental Release Categories: ERC6b: Use of reactive processing aid at industrial site (no inclusion into or onto article)
Chemical product category: PC35: Washing and cleaning products
Process categories: PROC5: Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact)
PROC7: Industrial spraying
PROC8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities
PROC9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing)
PROC10: Roller application or brushing
PROC13: Treatment of articles by dipping and pouring

2.1 Contributing scenario controlling environmental exposure for: ERC6b: Use of reactive processing aid at industrial site (no inclusion into or onto article)

Product characteristics
Concentration of the Substance in Mixture/Article: Covers the percentage of the substance in the product up to 25 %.

Environment factors not influenced by risk management
Dilution Factor (River): 10
Dilution Factor (Coastal Areas): 100

Other given operational conditions affecting environmental exposure
Continuous exposure
Number of emission days per year: 360
Remarks: Indoor use, Outdoor use
Remarks: Avoid releases to the environment (surface waters or soil) or to wastewaters. However sodium hypochlorite is shown to disappear rapidly from all use scenarios presented, by either rapid reduction in factory effluent or in the sewer. Thus, no releases in environment are expected. In worst case the free available chlorine in effluent is measured as total residual chlorine (TRC) and is anticipated to be below 1.0E-13 mg/L.

Technical conditions and measures / Organizational measures
Water: Risk to the environment is driven by freshwater exposure. Onsite wastewater treatment required. Prevent discharge of substance directly to the environment and waste water treatment is required.
Remarks: Common practices vary across sites and should comply with
Biocide Directive 98/8/EC., Prevent environmental discharge consistent with regulatory requirements.

**Conditions and measures related to municipal sewage treatment plant**

Remarks: Waste water treatment is required to remove any residual organic compounds and remaining available chlorine.

**Conditions and measures related to external treatment of waste for disposal**

Waste treatment: External treatment and disposal of waste should comply with applicable local and/or national regulations.

### 2.2 Contributing scenario controlling worker exposure for: PROC5: Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact)

**Product characteristics**

Concentration of the Substance in Mixture/Article: Covers the percentage of the substance in the product up to 25%.

**Frequency and duration of use**

Frequency of use: 240 days/year

Remarks: Covers daily exposures up to 8 hours

**Other operational conditions affecting workers exposure**

Outdoor / Indoor: Indoor

**Technical conditions and measures**

Provide extraction ventilation at points where emissions occur., Process under low containment.

**Organisational measures to prevent /limit releases, dispersion and exposure**

Avoid frequent and direct contact with substance., Regular cleaning of equipment, work area and clothing., Supervision in place to check that the RMMs in place are being used correctly and OCs followed.

### 2.3 Contributing scenario controlling worker exposure for: PROC7: Industrial spraying

**Product characteristics**

Concentration of the Substance in Mixture/Article: Covers the percentage of the substance in the product up to 25%.

**Frequency and duration of use**

Frequency of use: 240 days/year

**Other operational conditions affecting workers exposure**

Outdoor / Indoor: Indoor

**Technical conditions and measures**

Provide extraction ventilation at points where emissions occur., Process under medium containment., Minimise exposure by ventilated complete enclosure of the operator or equipment.

**Organisational measures to prevent /limit releases, dispersion and exposure**

Avoid carrying out activities involving exposure for more than 4 hours per day., Avoid frequent and direct contact with substance., Regular cleaning of equipment, work area and clothing., Supervision in place to check that the RMMs in place are being used correctly and OCs followed.
2.4 Contributing scenario controlling worker exposure for: PROC8a: Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at non-dedicated facilities

Product characteristics
Concentration of the Substance in Mixture/Article : Covers the percentage of the substance in the product up to 25 %.

Frequency and duration of use
Frequency of use : 240 days/year

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor

Technical conditions and measures
Provide extraction ventilation at points where emissions occur., Process under low containment.

Organisational measures to prevent /limit releases, dispersion and exposure
Avoid carrying out activities involving exposure for more than 6 hours., Avoid frequent and direct contact with substance., Regular cleaning of equipment, work area and clothing., Supervision in place to check that the RMMs in place are being used correctly and OCs followed.

2.5 Contributing scenario controlling worker exposure for: PROC9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing)

Product characteristics
Concentration of the Substance in Mixture/Article : Covers the percentage of the substance in the product up to 25 %.

Frequency and duration of use
Frequency of use : 240 days/year
Remarks : Covers daily exposures up to 8 hours

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor

Technical conditions and measures
Provide extraction ventilation at points where emissions occur., Process under low containment.

Organisational measures to prevent /limit releases, dispersion and exposure
Avoid frequent and direct contact with substance., Regular cleaning of equipment, work area and clothing., Supervision in place to check that the RMMs in place are being used correctly and OCs followed.

2.6 Contributing scenario controlling worker exposure for: PROC10: Roller application or brushing

Product characteristics
Concentration of the Substance in : Covers the percentage of the substance in the product up to
Mixture/Article  25 %.

Frequency and duration of use
   Frequency of use   :  240 days/year
   Remarks            :  Covers daily exposures up to 8 hours

Other operational conditions affecting workers exposure
   Outdoor / Indoor   :  Indoor

Technical conditions and measures
   Provide extraction ventilation at points where emissions occur., Process under medium containment.

Organisational measures to prevent /limit releases, dispersion and exposure
   Avoid frequent and direct contact with substance., Regular cleaning of equipment, work area and clothing., Supervision in place to check that the RMMs in place are being used correctly and OCs followed.

2.7 Contributing scenario controlling worker exposure for: PROC13: Treatment of articles by dipping and pouring

Product characteristics
   Concentration of the Substance in Mixture/Article : Covers the percentage of the substance in the product up to 25 %.

Frequency and duration of use
   Frequency of use   :  240 days/year
   Remarks            :  Covers daily exposures up to 8 hours

Other operational conditions affecting workers exposure
   Outdoor / Indoor   :  Indoor

Technical conditions and measures
   Provide extraction ventilation at points where emissions occur., Process under medium containment., Minimise exposure by ventilated partial enclosure of the operator or equipment.

Organisational measures to prevent /limit releases, dispersion and exposure
   Avoid frequent and direct contact with substance., Regular cleaning of equipment, work area and clothing., Supervision in place to check that the RMMs in place are being used correctly and OCs followed.

3. Exposure estimation and reference to its source

Workers

<table>
<thead>
<tr>
<th>Contributing Scenario</th>
<th>Exposure Assessment Method</th>
<th>Specific conditions</th>
<th>Value</th>
<th>Level of Exposure</th>
<th>RCR</th>
</tr>
</thead>
<tbody>
<tr>
<td>PROC5</td>
<td>ART</td>
<td>Long term inhalation</td>
<td>1.25 mg/m3</td>
<td>0.81</td>
<td></td>
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<tr>
<td>PROC7</td>
<td>ART</td>
<td>Long term inhalation</td>
<td>1.20 mg/m3</td>
<td>0.77</td>
<td></td>
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</table>
**SODIUM HYPOCHLORITE**

<table>
<thead>
<tr>
<th>Procedure Code</th>
<th>Artwork Type</th>
<th>Exposure Scenario</th>
<th>Long Term Inhalation</th>
<th>Predicted Exposure Concentration</th>
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<tbody>
<tr>
<td>PROC8a</td>
<td>ART</td>
<td>Long term inhalation</td>
<td>1.25 mg/m³</td>
<td>0.81 mg/m³</td>
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<tr>
<td>PROC9</td>
<td>ART</td>
<td>Long term inhalation</td>
<td>0.91 mg/m³</td>
<td>0.59 mg/m³</td>
</tr>
<tr>
<td>PROC10</td>
<td>ART</td>
<td>Long term inhalation</td>
<td>1.00 mg/m³</td>
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<td>PROC13</td>
<td>ART</td>
<td>Long term inhalation</td>
<td>0.70 mg/m³</td>
<td>0.45 mg/m³</td>
</tr>
</tbody>
</table>

PROC10: Roller application or brushing  
PROC13: Treatment of articles by dipping and pouring  
PROC5: Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact)  
PROC7: Industrial spraying  
PROC8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities  
PROC9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing)  

EE8 - Qualitative approach used to conclude safe use.

Predicted exposure concentrations (PECs)

According to the previous qualitative assessment, the worst case exposure concentration in waste water treatment plant is 1.0E-13 mg/L. The PECs for the other compartments are not applicable, because sodium hypochlorite is destroyed rapidly in contact with organic as well as inorganic material and furthermore is a non-volatile substance.

Indirect exposure of humans via the environment (oral)

Hypochlorite will not reach the environment via the sewage treatment system, as the quick transformation of the applied hypochlorite (as free available chlorine, FAC) in the sewage system ensures the absence of any human exposure to hypochlorite. Also in recreational zones located close to discharge points of chlorinated waste water, the potential for exposure to hypochlorite originating from waste water treatment is negligible as the emission of unreacted hypochlorite is non-existent.

Due to the physico-chemical properties of sodium hypochlorite no indirect exposure is thought to occur via the human food chain. Thus no indirect exposure to sodium hypochlorite is thought to occur via the environment.

**4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the Exposure Scenario**

Guidance is based on assumed operating conditions which may not be applicable to all sites. Thus scaling is deemed necessary to define appropriate site-specific risk management measures. If scaling reveals a condition of unsafe use (i.e., RCRs > 1), additional RMMs or a site-specific chemical safety assessment is required.
1. Short title of Exposure Scenario: Professional cleaning use

Main User Groups: SU 22: Professional uses: Public domain (administration, education, entertainment, services, craftsmen)

Sectors of end-use: SU 22: Professional uses: Public domain (administration, education, entertainment, services, craftsmen)

Environmental Release Categories: ERC8a, ERC8b, ERC8d, ERC8e: 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 outdoor use of reactive substances in open systems

Chemical product category: PC35: Washing and cleaning products

Process categories:
- PROC5: Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact)
- PROC9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing)
- PROC10: Roller application or brushing
- PROC11: Non-industrial spraying
- PROC13: Treatment of articles by dipping and pouring
- PROC15: Use as laboratory reagent

2.1 Contributing scenario controlling environmental exposure for: ERC8a, ERC8b, ERC8d, ERC8e: 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 outdoor use of reactive substances in open systems

Product characteristics
- Concentration of the Substance in Mixture/Article: Covers the percentage of the substance in the product up to 5%.

Environment factors not influenced by risk management
- Dilution Factor (River): 10
- Dilution Factor (Coastal Areas): 100

Other given operational conditions affecting environmental exposure
- Continuous exposure: 360

Remarks: Avoid releases to the environment (surface waters or soil) or to wastewaters. However sodium hypochlorite is shown to disappear rapidly from all use scenarios presented, by either rapid reduction in factory effluent or in the sewer. Thus, no releases in environment are expected. In worst case the free available chlorine in effluent is measured as total residual.
chlorine (TRC) and is anticipated to be below 1.0E-13 mg/L.

Technical conditions and measures / Organizational measures
Remarks: NaClO must be reduced completely to sodium chloride during the process avoiding critical releases in environment.
Common practices vary across sites and should comply with Biocide Directive 98/8/EC. Prevent environmental discharge consistent with regulatory requirements.

Conditions and measures related to municipal sewage treatment plant
Remarks: Waste water treatment is required to remove any residual organic compounds and remaining available chlorine.

Conditions and measures related to external treatment of waste for disposal
Waste treatment: External treatment and disposal of waste should comply with applicable local and/or national regulations.

2.2 Contributing scenario controlling worker exposure for: PROC5: Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact)

Product characteristics
Concentration of the Substance in Mixture/Article: Covers the percentage of the substance in the product up to 5%.

Frequency and duration of use
Frequency of use: 240 days/year

Other operational conditions affecting workers exposure
Outdoor / Indoor: Indoor
Outdoor / Indoor: Outdoor

Technical conditions and measures
Provide a good standard of general ventilation. Natural ventilation is from doors, windows etc. Controlled ventilation means air is supplied or removed by a powered fan. Process under low containment.

Organisational measures to prevent /limit releases, dispersion and exposure
Avoid frequent and direct contact with substance. Regular cleaning of equipment, work area and clothing. Supervision in place to check that the RMMs in place are being used correctly and OCs followed.

2.3 Contributing scenario controlling worker exposure for: PROC9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing)

Product characteristics
Concentration of the Substance in Mixture/Article: Covers the percentage of the substance in the product up to 5%.

Frequency and duration of use
Frequency of use: 240 days/year
Remarks: Covers daily exposures up to 8 hours
Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor
Outdoor / Indoor : Outdoor

Technical conditions and measures
Provide a good standard of general ventilation. Natural ventilation is from doors, windows etc. Controlled ventilation means air is supplied or removed by a powered fan., Process under low containment.

Organisational measures to prevent /limit releases, dispersion and exposure
Avoid frequent and direct contact with substance., Regular cleaning of equipment, work area and clothing., Supervision in place to check that the RMMs in place are being used correctly and OCs followed.

2.4 Contributing scenario controlling worker exposure for: PROC10: Roller application or brushing

Product characteristics
Concentration of the Substance in Mixture/Article : Covers the percentage of the substance in the product up to 5%.

Frequency and duration of use
Frequency of use : 240 days/year

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor
Outdoor / Indoor : Outdoor

Technical conditions and measures
Provide a good standard of general ventilation. Natural ventilation is from doors, windows etc. Controlled ventilation means air is supplied or removed by a powered fan., Process under low containment.

Organisational measures to prevent /limit releases, dispersion and exposure
Avoid carrying out activities involving exposure for more than 4 hours per day., Avoid frequent and direct contact with substance., Regular cleaning of equipment, work area and clothing., Supervision in place to check that the RMMs in place are being used correctly and OCs followed.

2.5 Contributing scenario controlling worker exposure for: PROC11: Non-industrial spraying

Product characteristics
Concentration of the Substance in Mixture/Article : Covers the percentage of the substance in the product up to 5%.

Frequency and duration of use
Frequency of use : 240 days/year

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor
Outdoor / Indoor : Outdoor

Technical conditions and measures
SODIUM HYPOCHLORITE

Provide a good standard of general ventilation. Natural ventilation is from doors, windows etc. Controlled ventilation means air is supplied or removed by a powered fan., Process under low containment.

Organisational measures to prevent /limit releases, dispersion and exposure
Avoid carrying out activities involving exposure for more than 1 hour per day., Avoid frequent and direct contact with substance., Regular cleaning of equipment, work area and clothing., Supervision in place to check that the RMMs in place are being used correctly and OCs followed.

2.6 Contributing scenario controlling worker exposure for: PROC13: Treatment of articles by dipping and pouring

Product characteristics
- Concentration of the Substance in Mixture/Article: Covers the percentage of the substance in the product up to 5%.

Frequency and duration of use
- Frequency of use: 240 days/year

Other operational conditions affecting workers exposure
- Outdoor / Indoor: Indoor
- Outdoor / Indoor: Outdoor

Technical conditions and measures
Provide a good standard of general ventilation. Natural ventilation is from doors, windows etc. Controlled ventilation means air is supplied or removed by a powered fan., Process under low containment.

Organisational measures to prevent /limit releases, dispersion and exposure
Avoid carrying out activities involving exposure for more than 4 hours per day., Avoid frequent and direct contact with substance., Regular cleaning of equipment, work area and clothing., Supervision in place to check that the RMMs in place are being used correctly and OCs followed.

2.7 Contributing scenario controlling worker exposure for: PROC15: Use as laboratory reagent

Product characteristics
- Concentration of the Substance in Mixture/Article: Covers the percentage of the substance in the product up to 5%.

Frequency and duration of use
- Frequency of use: 240 days/year
- Remarks: Covers daily exposures up to 8 hours

Other operational conditions affecting workers exposure
- Outdoor / Indoor: Indoor
- Outdoor / Indoor: Outdoor

Technical conditions and measures
Provide a good standard of general ventilation. Natural ventilation is from doors, windows etc. Controlled ventilation means air is supplied or removed by a powered fan., Process under low containment.
Organisational measures to prevent /limit releases, dispersion and exposure
Avoid frequent and direct contact with substance., Regular cleaning of equipment, work area and clothing., Supervision in place to check that the RMMs in place are being used correctly and OCs followed.

3. Exposure estimation and reference to its source

<table>
<thead>
<tr>
<th>Workers</th>
<th>Exposure Assessment Method</th>
<th>Specific conditions</th>
<th>Value</th>
<th>Level of Exposure</th>
<th>RCR</th>
</tr>
</thead>
<tbody>
<tr>
<td>PROC5</td>
<td>ART</td>
<td>Long term inhalation</td>
<td>1,00 mg/m3</td>
<td>0,65</td>
<td></td>
</tr>
<tr>
<td>PROC9</td>
<td>ART</td>
<td>Long term inhalation</td>
<td>1,10 mg/m3</td>
<td>0,71</td>
<td></td>
</tr>
<tr>
<td>PROC10</td>
<td>ART</td>
<td>Long term inhalation</td>
<td>1,20 mg/m3</td>
<td>0,77</td>
<td></td>
</tr>
<tr>
<td>PROC11</td>
<td>ART</td>
<td>Long term inhalation</td>
<td>1,00 mg/m3</td>
<td>0,65</td>
<td></td>
</tr>
<tr>
<td>PROC13</td>
<td>ART</td>
<td>Long term inhalation</td>
<td>1,20 mg/m3</td>
<td>0,77</td>
<td></td>
</tr>
<tr>
<td>PROC15</td>
<td>ART</td>
<td>Long term inhalation</td>
<td>0,85 mg/m3</td>
<td>0,55</td>
<td></td>
</tr>
</tbody>
</table>

PROC10: Roller application or brushing
PROC11: Non-industrial spraying
PROC13: Treatment of articles by dipping and pouring
PROC15: Use as laboratory reagent
PROC5: Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact)
PROC9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing)

EE8 - Qualitative approach used to conclude safe use.

Predicted exposure concentrations (PECs)
According the previous qualitative assessment, the worst case exposure concentration in waste water treatment plant is 1.0E-13 mg/L. The PECs for the other compartments are not applicable, because sodium hypochlorite is destroyed rapidly in contact with organic as well as inorganic material and furthermore is a non-volatile substance.

Indirect exposure of humans via the environment (oral)
Hypochlorite will not reach the environment via the sewage treatment system, as the quick transformation of the applied hypochlorite (as free available chlorine, FAC) in the sewage system ensures the absence of any human exposure to hypochlorite. Also in recreational zones located close to discharge points of chlorinated waste water, the potential for exposure to hypochlorite originating from waste water treatment is negligible as the emission of unreacted hypochlorite is non-existent.

Due to the physico-chemical properties of sodium hypochlorite no indirect exposure is thought to occur via the human food chain. Thus no indirect exposure to sodium hypochlorite is thought to occur via the environment.
4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the Exposure Scenario

Guidance is based on assumed operating conditions which may not be applicable to all sites. Thus scaling is deemed necessary to define appropriate site-specific risk management measures. If scaling reveals a condition of unsafe use (i.e., RCRs > 1), additional RMMs or a site-specific chemical safety assessment is required.
1. Short title of Exposure Scenario: Consumer use

Main User Groups : SU 21: Consumer uses: Private households (= general public = consumers)

Sectors of end-use : SU 21: Consumer uses: Private households (= general public = consumers)

Environmental Release Categories : ERC8a, ERC8b, ERC8d, ERC8e: 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 outdoor use of reactive substances in open systems

Chemical product category : PC34: Textile dyes and impregnating products
PC35: Washing and cleaning products
PC37: Water treatment chemicals

Process categories : Not applicable.

2.1 Contributing scenario controlling environmental exposure for: ERC8a, ERC8b, ERC8d, ERC8e: 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 outdoor use of reactive substances in open systems

Product characteristics
Concentration of the Substance in Mixture/Article : Covers percentage substance in the product up to 15%.

Environment factors not influenced by risk management
Dilution Factor (River) : 10
Dilution Factor (Coastal Areas) : 100

Other given operational conditions affecting environmental exposure
Continuous exposure
Number of emission days per year : 365

Conditions and measures related to municipal sewage treatment plant
Remarks : Household wastewater is treated in municipal sewage treatment which leads to the removal of any remaining available chlorine through reaction with organic and inorganic substances present in wastewater.

Conditions and measures related to external treatment of waste for disposal
Waste treatment : External treatment and disposal of waste should comply with applicable local and/or national regulations.

2.2 Contributing scenario controlling consumer exposure for: PC34, PC35, PC37: Textile dyes and impregnating products, Washing and cleaning products, Water treatment chemicals
**Product characteristics**

Concentration of the Substance in Mixture/Article: Covers percentage substance in the product up to 12.5%

Physical Form (at time of use): liquid

Vapour pressure: 25 hPa

**Frequency and duration of use**

- **Duration of the activity:** < 30 min
- **Frequency of use:** 2 - 7 days/week
- **Remarks:** Cleaning
- **Duration of the activity:** < 30 min
- **Frequency of use:** 1 - 7 days/week
- **Remarks:** Laundry bleaching
- **Duration of the activity:** < 30 min
- **Frequency of use:** 4 event/day
- **Remarks:** Spraying

**Human factors not influenced by risk management**

Consumers may be exposed to the formulation when dosing the product into water and to the preparation (cleaning solution; inhalation, dermal, oral). Exposure to the solution predominantly occurs through misuse, such as poor rinsing, spilling on skin or drinking of the cleaning solution.

**Other given operational conditions affecting consumers exposure**

- **Outdoor / Indoor:** Indoor
- **Room size:** 4 m³
- **Ventilation rate per hour:** 0.5

**Conditions and measures related to protection of consumer (e.g. behavioural advice, personal protection and hygiene)**

- **Consumer Measures:** Safety and application notes on product label and/or package insert.

### 3. Exposure estimation and reference to its source

**Consumers**

<table>
<thead>
<tr>
<th>Contributing Scenario</th>
<th>Exposure Assessment Method</th>
<th>Specific conditions</th>
<th>Value</th>
<th>Level of Exposure</th>
<th>RCR</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Short term oral</td>
<td>0.0003 mg/kg bw/day</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Short term oral</td>
<td>0.0007 mg/kg bw/day</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>EASE model</td>
<td>Long term dermal</td>
<td>0.002 mg/kg bw/day</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
EE8 - Qualitative approach used to conclude safe use.

Predicted exposure concentrations (PECs)
According the previous qualitative assessment, the worst case exposure concentration in waste water treatment plant is 1.0E-13 mg/L. The PECs for the other compartments are not applicable, because sodium hypochlorite is destroyed rapidly in contact with organic as well as inorganic material and furthermore is a non-volatile substance.

Indirect exposure of humans via the environment (oral)
Hypochlorite will not reach the environment via the sewage treatment system, as the quick transformation of the applied hypochlorite (as free available chlorine, FAC) in the sewage system ensures the absence of any human exposure to hypochlorite. Also in recreational zones located close to discharge points of chlorinated waste water, the potential for exposure to hypochlorite originating from waste water treatment is negligible as the emission of unreacted hypochlorite is non-existent.

Due to the physico-chemical properties of sodium hypochlorite no indirect exposure is thought to occur via the human food chain. Thus no indirect exposure to sodium hypochlorite is thought to occur via the environment.

4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the Exposure Scenario

Not applicable