

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

sodium hypochlorite, solution 10 - 15%

Version 9.1

Print Date 2015/03/31

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MSDS code: MSHY100

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

1.1. Product identifier

Trade name : sodium hypochlorite, solution 10 - 15%
 Substance name : sodium hypochlorite, solution
 Index-No. : 017-011-00-1
 CAS-No. : 7681-52-9
 EC-No. : 231-668-3
 Registration number : 01-2119488154-34-xxxx

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

Use of the Substance/Mixture : Identified use: See table in front of appendix for a complete overview of identified uses.
 Uses advised against : At this moment we have not identified any uses advised against

1.3. Details of the supplier of the safety data sheet

Company : Brenntag UK & Ireland
 Albion House, Rawdon Park
 GB LS19 7XX Leeds Yeadon
 Telephone : +44 (0) 113 3879 200
 Telefax : +44 (0) 113 3879 280
 E-mail address : msds@brenntag.co.uk

1.4. Emergency telephone number

Emergency telephone number : Emergency only telephone number (open 24 hours):
 +44 (0) 1865 407333 (N.C.E.C. Culham)

SECTION 2: Hazards identification

2.1. Classification of the substance or mixture

Classification according to Regulation (EC) No 1272/2008

| REGULATION (EC) No 1272/2008 | | | |
|------------------------------|-----------------|---------------|-------------------|
| Hazard class | Hazard category | Target Organs | Hazard statements |
| Skin corrosion | Category 1B | --- | H314 |
| Acute aquatic toxicity | Category 1 | --- | H400 |

sodium hypochlorite, solution 10 - 15%

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

Classification according to EU Directives 67/548/EEC or 1999/45/EC


| Directive 67/548/EEC or 1999/45/EC | |
|--|--------------|
| Hazard symbol / Category of danger | Risk phrases |
| Corrosive (C)Corrosive (C) | R34 |
| Dangerous for the environment (N)Dangerous for the environment (N) | R50 |
| | R31 |

For the full text of the R-phrases mentioned in this Section, see Section 16.

Most important adverse effects

- Human Health : See section 11 for toxicological information.
- Physical and chemical hazards : See section 9 for physicochemical information.
- Potential environmental effects : See section 12 for environmental information.

2.2. Label elements**Labelling according to Regulation (EC) No 1272/2008**

- Hazard symbols : 
- Signal word : Danger
- Hazard statements : H314 Causes severe skin burns and eye damage.
H400 Very toxic to aquatic life.
- 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.
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.

sodium hypochlorite, solution 10 - 15%

P303 + P361 + P353 IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower.

Additional Labelling:

EUH031 Contact with acids liberates toxic gas.

Hazardous components which must be listed on the label:

- sodium hypochlorite, solution

2.3. Other hazards

For Results of PBT and vPvB assessment see section 12.5.

SECTION 3: Composition/information on ingredients

3.1. Substances

Chemical nature : sodium hypochlorite
Aqueous solution

| Hazardous components | Amount [%] | Classification (REGULATION (EC) No 1272/2008) | | Classification (67/548/EEC) |
|--------------------------------------|---------------|---|-------------------|-----------------------------------|
| | | Hazard class / Hazard category | Hazard statements | |
| sodium hypochlorite, solution | | | | |
| Index-No. : 017-011-00-1 | | Met. Corr.1 | H290 | R31 |
| CAS-No. : 7681-52-9 | | Skin Corr.1B | H314 | Corrosive; C; R34 |
| EC-No. : 231-668-3 | | STOT SE3 | H335 | Irritant; Xi; R37 |
| Registration : 01-2119488154-34-xxxx | >= 10 - <= 15 | Aquatic Acute1 | H400 | Dangerous for the environment; N; |
| | | Aquatic Chronic1 | H410 | R50 |
| sodium hydroxide | | | | |
| Index-No. : 011-002-00-6 | | Met. Corr.1 | H290 | Corrosive; C; R35 |
| CAS-No. : 1310-73-2 | | Skin Corr.1A | H314 | |
| EC-No. : 215-185-5 | >= 0 - < 5 | | | |
| Registration : 01-2119457892-27-xxxx | | | | |

For the full text of the R-phrases mentioned in this Section, see Section 16.

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

SECTION 4: First aid measures

4.1. Description of first aid measures

General advice : Take off all contaminated clothing immediately.

sodium hypochlorite, solution 10 - 15%

| | |
|-------------------------|--|
| If inhaled | : In case of accident by inhalation: remove casualty to fresh air and keep at rest. If breathing is irregular or stopped, administer artificial respiration. Call a physician immediately. |
| In case of skin contact | : Wash off immediately with soap and plenty of water. If irritation appears or if the contamination is important, seek medical advice. |
| In case of eye contact | : Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Consult an eye specialist immediately. Go to an ophthalmic hospital if possible. |
| If swallowed | : Clean mouth with water and drink afterwards plenty of water. Never give anything by mouth to an unconscious person. If swallowed, do not induce vomiting - seek medical advice. If a person vomits when lying on his back, place him in the recovery position. |

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

| | |
|----------|---|
| Symptoms | : Inhalation may provoke the following symptoms: Cough, Headache, Lung oedema |
| Effects | : Risk of serious damage to the lungs (by aspiration). |

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

| | |
|-----------|---|
| Treatment | : Treat symptomatically. Later control for pneumonia and lung oedema. |
|-----------|---|

SECTION 5: Firefighting measures

5.1. Extinguishing media

| | |
|--------------------------------|---|
| Suitable extinguishing media | : Use extinguishing measures that are appropriate to local circumstances and the surrounding environment. The product itself does not burn. |
| Unsuitable extinguishing media | : Exempt |

5.2. Special hazards arising from the substance or mixture

| | |
|--------------------------------------|---|
| Specific hazards during firefighting | : Fire may cause evolution of: Chlorine, Hydrogen chloride gas, chlorine oxides |
|--------------------------------------|---|

5.3. Advice for firefighters

| | |
|---|---|
| Special protective equipment for firefighters | : In the event of fire, wear self-contained breathing apparatus. Wear appropriate body protection (full protective suit) |
| Further information | : Cool closed containers exposed to fire with water spray. Heating will cause a pressure rise - with risk of bursting. Collect contaminated fire extinguishing water separately. This must not be discharged into drains. |

sodium hypochlorite, solution 10 - 15%**SECTION 6: Accidental release measures****6.1. Personal precautions, protective equipment and emergency procedures**

Personal precautions : Use personal protective equipment. Wear respiratory protection. Keep people away from and upwind of spill/leak. Provide adequate ventilation. Danger of slipping if spilled. Avoid contact with skin and eyes. Do not breathe vapour.

6.2. Environmental precautions

Environmental precautions : Do not flush into surface water or sanitary sewer system. Avoid subsoil penetration. If the product contaminates rivers and lakes or drains inform respective authorities. If material reaches soil inform authorities responsible for such cases.

6.3. Methods and materials for containment and cleaning up

Methods and materials for containment and cleaning up : Absorb with liquid-binding material (sand, diatomite, acid binders, universal binders). Keep in suitable, closed containers for disposal. Do not keep the container sealed.

Further information : Treat recovered material as described in the section "Disposal considerations".

6.4. Reference to other sections

For personal protection see section 8.

SECTION 7: Handling and storage**7.1. Precautions for safe handling**

Advice on safe handling : Do not keep the container sealed. Handle and open container with care. Ensure adequate ventilation. Use personal protective equipment. Avoid contact with the skin and the eyes. Do not breathe vapours or spray mist. Use respirator with appropriate filter if vapours or aerosol are released. Emergency eye wash fountains and emergency showers should be available in the immediate vicinity.

Hygiene measures : Keep away from food, drink and animal feedingstuffs. Smoking, eating and drinking should be prohibited in the application area. Wash hands before breaks and at the end of workday. Take off all contaminated clothing immediately.

7.2. Conditions for safe storage, including any incompatibilities

Requirements for storage areas and containers : Keep in a cool, well-ventilated place. Keep in an area equipped with alkali resistant flooring. Keep only in the original container. Store in a receptacle equipped with a vent. Protect against light.

Advice on protection against fire and explosion : The product is not flammable. Normal measures for preventive fire protection.

sodium hypochlorite, solution 10 - 15%

Further information on storage conditions : Keep in a well-ventilated place. Protect against light. Store in cool place. Do not keep the container sealed.

Advice on common storage : Keep away from food, drink and animal feedingstuffs. Do not store together with acids and ammonium salts.

German storage class : 8B: Non-combustible substances, corrosive

Storage temperature : -10 - 20 °C

7.3. Specific end use(s)

Specific use(s) : No information available.

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

| | | |
|-------------------|-------------------------|------------------------------------|
| Component: | sodium hydroxide | CAS-No. 1310-73-2 |
|-------------------|-------------------------|------------------------------------|

Other Occupational Exposure Limit Values

EH40 WEL, Short Term Exposure Limit (STEL):
2 mg/m³

ELV (IE), Short Term Exposure Limit (STEL):
2 mg/m³

| | | |
|-------------------|-----------------|------------------------------------|
| Component: | chlorine | CAS-No. 7782-50-5 |
|-------------------|-----------------|------------------------------------|

Other Occupational Exposure Limit Values

EU ELV, Short Term Exposure Limit (STEL):
0.5 ppm, 1.5 mg/m³
Indicative

EH40 WEL, Short Term Exposure Limit (STEL):
0.5 ppm, 1.5 mg/m³

ELV (IE), Short Term Exposure Limit (STEL):
0.5 ppm, 1.5 mg/m³
Indicative OELV

8.2. Exposure controls

Appropriate engineering controls

sodium hypochlorite, solution 10 - 15%

Refer to protective measures listed in sections 7 and 8.

Personal protective equipment*Respiratory protection*

Advice : Use respirator with appropriate filter if vapours or aerosol are released.
Recommended Filter type:
Combination filter: B-P2
Combination filter: B-P3
For low vapor concentrations: EN 136. For higher concentrations:
EN 137

Hand protection

Advice : Protective gloves complying with EN 374.
The glove material has to be impermeable and resistant to the product / the substance / the preparation.
Take note of the information given by the producer concerning permeability and break through times, and of special workplace conditions (mechanical strain, duration of contact).
Protective gloves should be replaced at first signs of wear.

Material : butyl-rubber
Break through time : 8 h
Glove thickness : 0.5 mm

Material : Polyvinylchloride
Break through time : 8 h
Glove thickness : 0.5 mm

Material : polychloroprene
Break through time : 8 h
Glove thickness : 0.5 mm

Eye protection

Advice : Safety glasses with side-shields conforming to EN166
Tightly fitting safety goggles

Skin and body protection

Advice : alkali resistant protective clothing
(EN 340)

Environmental exposure controls

General advice : Do not flush into surface water or sanitary sewer system.
Avoid subsoil penetration.
If the product contaminates rivers and lakes or drains inform respective authorities.
If material reaches soil inform authorities responsible for such cases.

sodium hypochlorite, solution 10 - 15%**SECTION 9: Physical and chemical properties****9.1. Information on basic physical and chemical properties**

| | | |
|--|---|--|
| Form | : | liquid |
| Colour | : | yellowish green |
| Odour | : | slight chlorine |
| Odour Threshold | : | Currently we do not have any information from our supplier about this. |
| pH | : | > 11 |
| Melting point/range | : | -17 °C |
| Boiling point/boiling range | : | 110 °C |
| Flash point | : | Not applicable |
| Evaporation rate | : | Currently we do not have any information from our supplier about this. |
| Flammability (solid, gas) | : | does not ignite |
| Upper explosion limit | : | Not applicable |
| Lower explosion limit | : | Not applicable |
| Vapour pressure | : | Currently we do not have any information from our supplier about this. |
| Relative vapour density | : | > 1.0 (Air = 1.0) |
| Density | : | 1.2 - 1.3 g/cm ³ |
| Water solubility | : | completely soluble |
| Partition coefficient: n-octanol/water | : | Currently we do not have any information from our supplier about this. |
| Auto-ignition temperature | : | Not applicable |
| Thermal decomposition | : | To avoid thermal decomposition, do not overheat. |
| Viscosity, dynamic | : | 3.45 mPa.s (20 °C) (Aqueous, solution, 15 %) |
| Explosive properties | : | EU legislation: Not explosive |

sodium hypochlorite, solution 10 - 15%

Oxidizing properties : Currently we do not have any information from our supplier about this.

9.2. Other information

No further information available.

SECTION 10: Stability and reactivity

10.1. Reactivity

Advice : This product is a very reactive substance that can react with many inorganic and organic compounds.

10.2. Chemical stability

Advice : Decomposes on heating.
Decomposes on exposure to light.

10.3. Possibility of hazardous reactions

Hazardous reactions : May develop chlorine if mixed with acidic solutions.

10.4. Conditions to avoid

Conditions to avoid : Heat.
Thermal decomposition : To avoid thermal decomposition, do not overheat.

10.5. Incompatible materials

Materials to avoid : Acids, ammonium compounds, Acetic anhydride, Organic materials, Hydrogen peroxide, metal salts, Copper, Nickel, Iron

10.6. Hazardous decomposition products

Hazardous decomposition products : Hydrogen chloride gas, Chlorine, chlorine oxides

SECTION 11: Toxicological information

11.1. Information on toxicological effects

Acute toxicity

Oral

LD50 : 2900 - 3400 mg/kg (Mouse)
Cause serious burns with severe pains, vomiting, pains in the stomach, possibly chock and damaged kidneys. The burn may occur even if only small amounts have been swallowed.

Dermal

sodium hypochlorite, solution 10 - 15%

LD50 : > 2000 mg/kg (Rabbit)

Irritation**Skin**

Result : Severe skin irritation (Rabbit) (OECD Test Guideline 404)
corrosive effects (human)

Eyes

Result : corrosive effects (Rabbit)
Risk of serious damage to eyes.

Sensitisation

Result : not sensitizing (Guinea pig)

Further information

Other relevant toxicity information : If ingested, severe burns of the mouth and throat, as well as a danger of perforation of the oesophagus and the stomach.

SECTION 12: Ecological information**12.1. Toxicity****12.2. Persistence and degradability****Persistence and degradability****Persistence**

Result : no data available

Biodegradability

Result : The methods for determining the biological degradability are not applicable to inorganic substances.

12.3. Bioaccumulative potential**Bioaccumulation**

Result : Bioaccumulation is not expected.

sodium hypochlorite, solution 10 - 15%**12.4. Mobility in soil****Mobility**

Result : The product is mobile in water environment.

12.5. Results of PBT and vPvB assessment**Results of PBT and vPvB assessment**

Result : no data available

12.6. Other adverse effects**Additional ecological information**

Result : Do not flush into surface water or sanitary sewer system.
Very toxic to aquatic organisms.

SECTION 13: Disposal considerations**13.1. Waste treatment methods**

- Product : Disposal together with normal waste is not allowed. Special disposal required according to local regulations. Do not let product enter drains. Contact waste disposal services.
- Contaminated packaging : Empty contaminated packagings thoroughly. They can be recycled after thorough and proper cleaning. Packagings that cannot be cleaned are to be disposed of in the same manner as the product.
- European Waste Catalogue Number : No waste code according to the European Waste Catalogue can be assigned for this product, as the intended use dictates the assignment. The waste code is established in consultation with the regional waste disposer.

SECTION 14: Transport information**14.1. UN number**

1791

14.2. UN proper shipping name

ADR : HYPOCHLORITE SOLUTION
RID : HYPOCHLORITE SOLUTION
IMDG : HYPOCHLORITE SOLUTION

sodium hypochlorite, solution 10 - 15%**14.3. Transport hazard class(es)**

| | |
|--|-----------------------|
| ADR-Class (Labels; Classification Code; Hazard identification No; Tunnel restriction code) | : 8 8; C9; 80; (E) |
| RID-Class (Labels; Classification Code; Hazard identification No) | : 8 8; C9; 80 |
| IMDG-Class (Labels; EmS) | : 8 8; F-A, S-B |

14.4. Packaging group

| | |
|------|-------|
| ADR | : III |
| RID | : III |
| IMDG | : III |

14.5. Environmental hazards

| | |
|--|-----------------|
| Labeling according to 5.2.1.8 ADR | : Fish and tree |
| Labeling according to 5.2.1.8 RID | : Fish and tree |
| Labeling according to 5.2.1.6.3 IMDG | : Fish and tree |
| Classification as environmentally hazardous according to 2.9.3 IMDG | : yes |

14.6. Special precautions for user

| | |
|------|------------------|
| Note | : Not applicable |
|------|------------------|

14.7. Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code

| | |
|------|-------------------|
| IMDG | : Not applicable. |
|------|-------------------|

SECTION 15: Regulatory information**15.1. Safety, health and environmental regulations/legislation specific for the substance or mixture**

| | |
|-------------------|---|
| Other regulations | : Occupational restrictions: Take note of Dir 92/85/EEC on the safety and health of pregnant workers at work and of Dir 94/33/EC on the protection of young people at work. |
| | : |

15.2. Chemical Safety Assessment

A Chemical Safety Assessment has been carried out for this substance.

SECTION 16: Other information

sodium hypochlorite, solution 10 - 15%**Full text of R-phrases referred to under sections 2 and 3.**

| | |
|-----|---|
| R31 | Contact with acids liberates toxic gas. |
| R34 | Causes burns. |
| R35 | Causes severe burns. |
| R37 | Irritating to respiratory system. |
| R50 | Very toxic to aquatic organisms. |

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. |
| H335 | May cause respiratory irritation. |
| H400 | Very toxic to aquatic life. |
| H410 | Very toxic to aquatic life with long lasting effects. |

Further information

Key literature references : Supplier information and data from the "Database of registered substances" of the European Chemicals Agency (ECHA) were used to create this safety data sheet.

Other information : Restricted to professional users. Attention - Avoid exposure - obtain special instructions before use. The information provided in this Safety Data Sheet is correct to our knowledge at the date of its revision. The information given only describes the products with regard to safety arrangements and is not to be considered as a warranty or quality specification and does not constitute a legal relationship.
The information contained in this Safety Data Sheet relates only to the specific material designated and may not be valid for such material used in combination with any other material or in any process, unless specified in the text

|| Indicates updated section.

sodium hypochlorite, solution 10 - 15%

| No. | Short title | Main User Group (SU) | Sector of Use (SU) | Product Category (PC) | Process Category (PROC) | Environmental Release Category (ERC) | Article Category (AC) | Specified |
|-----|--|----------------------|--------------------|-----------------------|----------------------------------|--------------------------------------|-----------------------|-----------|
| 1 | Manufacture of substance | 3 | 8 | NA | 1, 2, 3, 4, 8a, 8b, 9 | 1 | NA | ES447 |
| 2 | Use as an intermediate | 3 | 8, 9 | 19 | 1, 2, 3, 4, 8a, 8b, 9 | 6a | NA | ES9182 |
| 3 | Formulation & (re)packing of substances and mixtures | 3 | 10 | NA | 1, 2, 3, 4, 5, 8a, 8b, 9, 14, 15 | 2 | NA | ES9179 |
| 4 | Use in Cleaning Agents | 3 | 4 | 35 | 5, 7, 8a, 9, 10, 13 | 6b | NA | ES9191 |
| 5 | Use in Cleaning Agents | 22 | NA | 35 | 5, 9, 10, 11, 13, 15 | 8a, 8b, 8d, 8e | NA | ES538 |
| 6 | Use in sewage water treatment | 3 | 23 | 20, 37 | 1, 2, 3, 4, 5, 8a, 8b, 9 | 6b | NA | ES9187 |
| 7 | Use in paper industry | 3 | 6b | 26 | 1, 2, 3, 4, 5, 8a, 8b, 9 | 6b | NA | ES9189 |
| 8 | Use in textile industry | 3 | 5 | 34 | 1, 2, 3, 4, 5, 8a, 8b, 9, 13 | 6b | NA | ES9185 |
| 9 | Consumer use | 21 | NA | 34, 35, 37 | NA | 8a, 8b, 8d, 8e | NA | ES653 |

sodium hypochlorite, solution 10 - 15%

1. Short title of Exposure Scenario 1: Manufacture of substance

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

2.1 Contributing scenario controlling environmental exposure for: ERC1

Substance is a unique structure, Non-hydrophobic, Low potential to bioaccumulate

| | | |
|--|---|---|
| Product characteristics | Concentration of the Substance in Mixture/Article | Covers percentage substance in the product up to 25 %. |
| Amount used | Amounts used in the EU (tonnes/year) | 999.999 ton(s)/year |
| Frequency and duration of use | Continuous exposure | 360 days/year |
| Environment factors not influenced by risk management | Flow rate of receiving surface water | 18,000 m3/d |
| | Dilution Factor (River) | 10 |
| | Dilution Factor (Coastal Areas) | 100 |
| Technical conditions and measures at process level (source) to prevent release Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil Organizational measures to prevent/limit release from the site | Air | Substance release to air can be excluded |
| | Water | Risk from environmental exposure is driven by the freshwater., Do not release wastewater directly into environment., Onsite wastewater treatment required, No discharge of substance into waste water |
| | Soil | Substance release to soil can be excluded |
| Conditions and measures related to sewage treatment plant | Type of Sewage Treatment Plant | Municipal sewage treatment plant |
| | Flow rate of sewage treatment plant effluent | 2,000 m3/d |
| 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, PROC2, PROC3, PROC4, PROC8a, PROC8b, PROC9

| | | |
|-------------------------|---|--|
| Product characteristics | Concentration of the Substance in Mixture/Article | Covers percentage substance in the product up to 25 %. |
| | Physical Form (at time of | Liquid, moderate fugacity |

sodium hypochlorite, solution 10 - 15%

| | | |
|--|---|------------------------|
| | use) | |
| | Vapour pressure | 25 hPa |
| | Process Temperature | 90 °C |
| Frequency and duration of use | Exposure duration per day | 8 h |
| | Frequency of use | 5 days/week |
| Human factors not influenced by risk management | Body weight | 70 kg |
| | Respiration volume under conditions of use | 10 m ³ /day |
| | Light activity | |
| Other operational conditions affecting workers exposure | Indoor/Outdoor use. | |
| | Assumes activities are at ambient temperature. | |
| Technical conditions and measures to control dispersion from source towards the worker | Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). Drain down system prior to equipment opening or maintenance. | |
| Organisational measures to prevent /limit releases, dispersion and exposure | Ensure that no inhalable aerosols are generated Regular inspection and maintenance of equipment and machines. Ensure that the task is not carried out overhead. Ensure containment of the emission source | |
| Conditions and measures related to personal protection, hygiene and health evaluation | Wear protective gloves/ protective clothing/ eye protection/ face protection. In case of odour, gas alarm or insufficient ventilation wear suitable respiratory protection In the case of hazardous fumes, wear self contained breathing apparatus. | |
| Risk Management Measures are based on qualitative risk characterisation. | | |

3. Exposure estimation and reference to its source

Environment

Qualitative approach used to conclude safe use.

Workers

EU RAR

| Contributing Scenario | Specific conditions | Exposure routes | Level of Exposure | RCR |
|----------------------------|-----------------------|--|------------------------|--------|
| Relevant for all PROCs | --- | Worker - inhalative, long-term - local and systemic. | 0.705mg/m ³ | 0.4548 |
| PROC1, PROC2, PROC3, PROC4 | General exposures | Worker - inhalative, short-term - local and systemic | 0.540mg/m ³ | 0.1742 |
| PROC1, PROC2, PROC3, PROC4 | Laboratory activities | Worker - inhalative, short-term - local and systemic | 0.252mg/m ³ | 0.081 |
| PROC1, PROC2, PROC3, PROC4 | Equipment maintenance | Worker - inhalative, short-term - local and systemic | 0.480mg/m ³ | 0.155 |
| PROC8a, PROC8b, PROC9 | --- | Worker - inhalative, short-term - local and systemic | 0.498mg/m ³ | 0.161 |

Qualitative assessment dermal. Contact is only accidental. The exposure estimate represents the 90th percentile of the exposure distribution.

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

sodium hypochlorite, solution 10 - 15%

Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures.

Exposure values based on the EU Risk Assessment Report on chlorine (2007)

Additional good practice advice beyond the REACH Chemical Safety Assessment

Assumes a good basic standard of occupational hygiene is implemented.

Ensure that gas alarms are installed

Change gloves, if duration of activity exceeds breakthrough time

sodium hypochlorite, solution 10 - 15%

1. Short title of Exposure Scenario 2: Use as an intermediate

| | |
|----------------------------------|---|
| Main User Groups | SU 3: Industrial uses: Uses of substances as such or in preparations at industrial sites |
| Sectors of end-use | SU8: Manufacture of bulk, large scale chemicals (including petroleum products) SU9: Manufacture of fine chemicals |
| 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) |
| Environmental Release Categories | ERC6a: Industrial use resulting in manufacture of another substance (use of intermediates) |

2.1 Contributing scenario controlling environmental exposure for: ERC6a

Substance is a unique structure, Non-hydrophobic, Low potential to bioaccumulate

| | | |
|--|---|---|
| Product characteristics | Concentration of the Substance in Mixture/Article | Covers percentage substance in the product up to 25 %. |
| Amount used | Amounts used in the EU (tonnes/year) | 999.999 ton(s)/year |
| Frequency and duration of use | Continuous exposure | 360 days/year |
| Environment factors not influenced by risk management | Flow rate of receiving surface water | 18,000 m3/d |
| | Dilution Factor (River) | 10 |
| | Dilution Factor (Coastal Areas) | 100 |
| Technical conditions and measures at process level (source) to prevent release Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil Organizational measures to prevent/limit release from the site | Air | Substance release to air can be excluded |
| | Water | Risk from environmental exposure is driven by the freshwater., Do not release wastewater directly into environment., Onsite wastewater treatment required, No discharge of substance into waste water |
| | Soil | Substance release to soil can be excluded |
| Conditions and measures related to sewage treatment plant | Type of Sewage Treatment Plant | Municipal sewage treatment plant |
| | Flow rate of sewage treatment plant effluent | 2,000 m3/d |
| 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, PROC2, PROC3, PROC4, PROC8a, PROC8b, PROC9

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

sodium hypochlorite, solution 10 - 15%

| | | |
|--|---|---------------------------|
| | Mixture/Article | |
| | Physical Form (at time of use) | Liquid, moderate fugacity |
| | Vapour pressure | 25 hPa |
| | Process Temperature | 90 °C |
| Frequency and duration of use | Exposure duration per day | 8 h |
| | Frequency of use | 5 days/week |
| Human factors not influenced by risk management | Body weight | 70 kg |
| | Respiration volume under conditions of use | 10 m ³ /day |
| | Light activity | |
| Other operational conditions affecting workers exposure | Indoor use. | |
| | Assumes activities are at ambient temperature., Outdoor location is covered by the worst case inside location | |
| Technical conditions and measures to control dispersion from source towards the worker | Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). Drain down system prior to equipment opening or maintenance. | |
| Organisational measures to prevent /limit releases, dispersion and exposure | Ensure that no inhalable aerosols are generated Regular inspection and maintenance of equipment and machines. Ensure that the task is not carried out overhead. Ensure containment of the emission source | |
| Conditions and measures related to personal protection, hygiene and health evaluation | Wear protective gloves/ protective clothing/ eye protection/ face protection. In case of odour, gas alarm or insufficient ventilation wear suitable respiratory protection In the case of hazardous fumes, wear self contained breathing apparatus. | |

Risk Management Measures are based on qualitative risk characterisation.

3. Exposure estimation and reference to its source

Environment

Qualitative approach used to conclude safe use.

Workers

Advanced REACH Tool (ART model)

| Contributing Scenario | Specific conditions | Exposure routes | Level of Exposure | RCR |
|-----------------------|---------------------|--|-----------------------|------|
| PROC1 | --- | Worker - inhalative, long-term - local | 0.02mg/m ³ | 0.01 |
| PROC2, PROC3 | --- | Worker - inhalative, long-term - local | 1.10mg/m ³ | 0.71 |
| PROC4 | --- | Worker - inhalative, long-term - local | 1.20mg/m ³ | 0.77 |
| PROC8a, PROC8b | --- | Worker - inhalative, long-term - local | 1.25mg/m ³ | 0.81 |
| PROC9 | --- | Worker - inhalative, long-term - local | 0.91mg/m ³ | 0.59 |

The short-term exposure is covered by the assessment of long-term exposure. Qualitative assessment dermal.
Qualitative approach used to conclude safe use.

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

sodium hypochlorite, solution 10 - 15%

Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Assumes a good basic standard of occupational hygiene is implemented.

Ensure that gas alarms are installed

Change gloves, if duration of activity exceeds breakthrough time

sodium hypochlorite, solution 10 - 15%

1. Short title of Exposure Scenario 3: Formulation & (re)packing of substances and mixtures

| | |
|----------------------------------|--|
| Main User Groups | SU 3: Industrial uses: Uses of substances as such or in preparations at industrial sites |
| Sectors of end-use | SU 10: Formulation |
| Process categories | <p>PROC1: Use in closed process, no likelihood of exposure</p> <p>PROC2: Use in closed, continuous process with occasional controlled exposure</p> <p>PROC3: Use in closed batch process (synthesis or formulation)</p> <p>PROC4: Use in batch and other process (synthesis) where opportunity for exposure arises</p> <p>PROC5: Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact)</p> <p>PROC8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities</p> <p>PROC8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities</p> <p>PROC9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing)</p> <p>PROC14: Production of preparations or articles by tableting, compression, extrusion, pelletisation</p> <p>PROC15: Use as laboratory reagent</p> |
| Environmental Release Categories | ERC2: Formulation of preparations |

2.1 Contributing scenario controlling environmental exposure for: ERC2

Substance is a unique structure, Non-hydrophobic, Low potential to bioaccumulate

| | | |
|--|---|---|
| Product characteristics | Concentration of the Substance in Mixture/Article | Covers percentage substance in the product up to 25 %. |
| Amount used | Amounts used in the EU (tonnes/year) | 999.999 ton(s)/year |
| Frequency and duration of use | Continuous exposure | 360 days/year |
| Environment factors not influenced by risk management | Flow rate of receiving surface water | 18,000 m ³ /d |
| | Dilution Factor (River) | 10 |
| | Dilution Factor (Coastal Areas) | 100 |
| Technical conditions and measures at process level (source) to prevent release Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil Organizational measures to prevent/limit release from the site | Air | Substance release to air can be excluded |
| | Water | Risk from environmental exposure is driven by the freshwater., Do not release wastewater directly into environment., Onsite wastewater treatment required, No discharge of substance into waste water |
| | Soil | Substance release to soil can be excluded |
| Conditions and measures related to sewage treatment plant | Type of Sewage Treatment Plant | Municipal sewage treatment plant |
| | Flow rate of sewage treatment plant effluent | 2,000 m ³ /d |
| 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, PROC2, PROC3, PROC4, PROC5, PROC8a, PROC8b, PROC9, PROC14, PROC15

sodium hypochlorite, solution 10 - 15%

| | | |
|--|---|--|
| Product characteristics | Concentration of the Substance in Mixture/Article | Covers percentage substance in the product up to 25 %. |
| | Physical Form (at time of use) | Liquid, moderate fugacity |
| | Vapour pressure | 25 hPa |
| | Process Temperature | 90 °C |
| Frequency and duration of use | Exposure duration per day | 8 h |
| | Frequency of use | 5 days/week |
| Human factors not influenced by risk management | Body weight | 70 kg |
| | Respiration volume under conditions of use | 10 m ³ /day |
| | Light activity | |
| Other operational conditions affecting workers exposure | Indoor/Outdoor use. | |
| | Assumes activities are at ambient temperature. | |
| Technical conditions and measures to control dispersion from source towards the worker | Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). Drain down system prior to equipment opening or maintenance. Ensure samples are obtained under containment or extract ventilation. | |
| Organisational measures to prevent /limit releases, dispersion and exposure | Ensure that no inhalable aerosols are generated Regular inspection and maintenance of equipment and machines. Ensure that the task is not carried out overhead. Ensure containment of the emission source | |
| Conditions and measures related to personal protection, hygiene and health evaluation | Wear protective gloves/ protective clothing/ eye protection/ face protection. In case of odour, gas alarm or insufficient ventilation wear suitable respiratory protection In the case of hazardous fumes, wear self contained breathing apparatus. | |
| Risk Management Measures are based on qualitative risk characterisation. | | |

3. Exposure estimation and reference to its source

Environment

Qualitative approach used to conclude safe use.

Workers

EU RAR

| Contributing Scenario | Specific conditions | Exposure routes | Level of Exposure | RCR |
|--|-----------------------|--|------------------------|--------|
| PROC1, PROC2, PROC3, PROC4, PROC5, PROC8a, PROC8b, PROC9, PROC15 | --- | Worker - inhalative, long-term - local and systemic. | 0.705mg/m ³ | 0.4548 |
| PROC1, PROC2, PROC3, PROC4, PROC5 | General exposures | Worker - inhalative, short-term - local and systemic | 0.540mg/m ³ | 0.1742 |
| PROC1, PROC2, PROC3, PROC4, PROC5 | Laboratory activities | Worker - inhalative, short-term - local and systemic | 0.252mg/m ³ | 0.081 |
| PROC1, PROC2, PROC3, PROC4, | Equipment maintenance | Worker - inhalative, short-term - local and | 0.480mg/m ³ | 0.155 |

sodium hypochlorite, solution 10 - 15%

| | | | | |
|-----------------------------|-----|--|------------------------|-------|
| PROC5 | | systemic | | |
| PROC8a, PROC8b, PROC9 | --- | Worker - inhalative, short-term - local and systemic | 0.498mg/m ³ | 0.161 |
| PROC14 | --- | Worker - inhalative, long- term | 0.23mg/m ³ | 0.15 |

Qualitative assessment dermal. Contact is only accidental. The exposure estimate represents the 90th percentile of the exposure distribution.

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 may be necessary to define appropriate site-specific risk management measures.
Exposure values based on the EU Risk Assessment Report on chlorine (2007)

Additional good practice advice beyond the REACH Chemical Safety Assessment

Assumes a good basic standard of occupational hygiene is implemented.
Ensure that gas alarms are installed
Change gloves, if duration of activity exceeds breakthrough time

sodium hypochlorite, solution 10 - 15%

1. Short title of Exposure Scenario 4: Use in Cleaning Agents

| | |
|----------------------------------|---|
| 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 |
| Chemical product category | PC35: Washing and cleaning products (including solvent based 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 |
| Environmental Release Categories | ERC6b: Industrial use of reactive processing aids |
| Activity | Note: this Exposure Scenario is only relevant for an appropriated use according to the quality grade of the substance delivered |

2.1 Contributing scenario controlling environmental exposure for: ERC6b

Substance is a unique structure, Non-hydrophobic, Low potential to bioaccumulate

| | | |
|--|---|---|
| Product characteristics | Concentration of the Substance in Mixture/Article | Covers percentage substance in the product up to 25 %. |
| Amount used | Amounts used in the EU (tonnes/year) | 999.999 ton(s)/year |
| Frequency and duration of use | Continuous exposure | 360 days/year |
| Environment factors not influenced by risk management | Flow rate of receiving surface water | 18,000 m3/d |
| | Dilution Factor (River) | 10 |
| | Dilution Factor (Coastal Areas) | 100 |
| Technical conditions and measures at process level (source) to prevent release Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil Organizational measures to prevent/limit release from the site | Air | Substance release to air can be excluded |
| | Water | Risk from environmental exposure is driven by the freshwater., Do not release wastewater directly into environment., Onsite wastewater treatment required, No discharge of substance into waste water |
| | Soil | Substance release to soil can be excluded |
| Conditions and measures related to sewage treatment plant | Type of Sewage Treatment Plant | Municipal sewage treatment plant |
| | Flow rate of sewage treatment plant effluent | 2,000 m3/d |
| 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, PROC7, PROC8a, PROC9, PROC10, PROC13

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

sodium hypochlorite, solution 10 - 15%

| | | |
|--|---|---------------------------|
| | Physical Form (at time of use) | Liquid, moderate fugacity |
| | Vapour pressure | 25 hPa |
| | Process Temperature | 90 °C |
| Frequency and duration of use | Exposure duration per day | 8 h |
| | Frequency of use | 5 days/week |
| Human factors not influenced by risk management | Body weight | 70 kg |
| | Respiration volume under conditions of use | 10 m ³ /day |
| | Light activity | |
| Other operational conditions affecting workers exposure | Indoor use. | |
| | Assumes activities are at ambient temperature., Outdoor location is covered by the worst case inside location | |
| Technical conditions and measures to control dispersion from source towards the worker | Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). Drain down system prior to equipment opening or maintenance. | |
| Organisational measures to prevent /limit releases, dispersion and exposure | Ensure that no inhalable aerosols are generated Regular inspection and maintenance of equipment and machines. Ensure that the task is not carried out overhead. Ensure containment of the emission source | |
| Conditions and measures related to personal protection, hygiene and health evaluation | Wear protective gloves/ protective clothing/ eye protection/ face protection. In case of odour, gas alarm or insufficient ventilation wear suitable respiratory protection In the case of hazardous fumes, wear self contained breathing apparatus. | |

Risk Management Measures are based on qualitative risk characterisation.

3. Exposure estimation and reference to its source

Environment

Qualitative approach used to conclude safe use.

Workers

Advanced REACH Tool (ART model)

| Contributing Scenario | Specific conditions | Exposure routes | Level of Exposure | RCR |
|-----------------------|---------------------|--|-----------------------|------|
| PROC5, PROC8a | --- | Worker - inhalative, long-term - local | 1.25mg/m ³ | 0.81 |
| PROC7 | --- | Worker - inhalative, long-term - local | 1.20mg/m ³ | 0.77 |
| PROC9 | --- | Worker - inhalative, long-term - local | 0.91mg/m ³ | 0.59 |
| PROC10 | --- | Worker - inhalative, long-term - local | 1.00mg/m ³ | 0.65 |
| PROC13 | --- | Worker - inhalative, long-term - local | 0.70mg/m ³ | 0.45 |

The short-term exposure is covered by the assessment of long-term exposure. Qualitative assessment dermal. Qualitative approach used to conclude safe use.

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 may

sodium hypochlorite, solution 10 - 15%

be necessary to define appropriate site-specific risk management measures.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Assumes a good basic standard of occupational hygiene is implemented.

Ensure that gas alarms are installed

Change gloves, if duration of activity exceeds breakthrough time

sodium hypochlorite, solution 10 - 15%

1. Short title of Exposure Scenario 5: Use in Cleaning Agents

| | |
|----------------------------------|---|
| Main User Groups | SU 22: Professional uses: Public domain (administration, education, entertainment, services, craftsmen) |
| Chemical product category | PC35: Washing and cleaning products (including solvent based 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 |
| Environmental Release Categories | ERC8a: Wide dispersive indoor use of processing aids in open systems ERC8b: Wide dispersive indoor use of reactive substances in open systems ERC8d: Wide dispersive outdoor use of processing aids in open systems ERC8e: Wide dispersive outdoor use of reactive substances in open systems |

2.1 Contributing scenario controlling environmental exposure for: ERC8a, ERC8b, ERC8d, ERC8e

Substance is a unique structure, Non-hydrophobic, Low potential to bioaccumulate

| | | |
|--|---|---|
| Product characteristics | Concentration of the Substance in Mixture/Article | Concentration of substance in product : 0% - 10% |
| Amount used | Amounts used in the EU (tonnes/year) | 999999 ton(s)/year |
| Frequency and duration of use | Continuous exposure | 360 days/year |
| Environment factors not influenced by risk management | Flow rate of receiving surface water | 18,000 m3/d |
| | Dilution Factor (River) | 10 |
| | Dilution Factor (Coastal Areas) | 100 |
| Technical conditions and measures at process level (source) to prevent release Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil Organizational measures to prevent/limit release from the site | Air | Substance release to air can be excluded |
| | Water | Risk from environmental exposure is driven by the freshwater., Do not release wastewater directly into environment., Do not let product enter drains., Onsite wastewater treatment required |
| | Soil | Substance release to soil can be excluded |
| Conditions and measures related to sewage treatment plant | Type of Sewage Treatment Plant | Municipal sewage treatment plant |
| | Flow rate of sewage treatment plant effluent | 2,000 m3/d |
| 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, PROC9, PROC10, PROC11, PROC13, PROC15

| | | |
|-------------------------|---|--|
| Product characteristics | Concentration of the Substance in Mixture/Article | Concentration of substance in product : 0% - 10% |
| | Physical Form (at time of use) | Liquid, moderate fugacity |

sodium hypochlorite, solution 10 - 15%

| | | |
|--|--|-------------|
| | Vapour pressure | 25 hPa |
| | Process Temperature | 90 °C |
| Frequency and duration of use | Exposure duration per day | 8 h |
| | Frequency of use | 5 days/week |
| Other operational conditions affecting workers exposure | Indoor/Outdoor use. | |
| | Assumes activities are at ambient temperature. | |
| Technical conditions and measures to control dispersion from source towards the worker | 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. | |
| Organisational measures to prevent /limit releases, dispersion and exposure | Ensure that no inhalable aerosols are generated Regular inspection and maintenance of equipment and machines. Ensure that the task is not carried out overhead. Avoid direct contact with the chemical/the product/the preparation by establishing organisational measures. | |
| Conditions and measures related to personal protection, hygiene and health evaluation | Wear protective gloves/ protective clothing/ eye protection/ face protection. In case of odour, gas alarm or insufficient ventilation wear suitable respiratory protection Personal measures have to be applied in case of potential exposure only. | |

Risk Management Measures are based on qualitative risk characterisation.

2.3 Contributing scenario controlling worker exposure for: PROC11

| | | |
|--|---|---|
| Product characteristics | Concentration of the Substance in Mixture/Article | Concentration of substance in product: 0% - 0.05% |
| | Physical Form (at time of use) | Liquid, moderate fugacity |
| | Vapour pressure | 25 hPa |
| | Process Temperature | 90 °C |
| Amount used | | 0.005 kg |
| Frequency and duration of use | Exposure duration | 120 min |
| | Frequency of use | 4 Times per day |
| Other operational conditions affecting workers exposure | Indoor/Outdoor use. | |
| | Assumes activities are at ambient temperature. | |
| Technical conditions and measures to control dispersion from source towards the worker | 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. | |
| Organisational measures to prevent /limit releases, dispersion and exposure | Regular inspection and maintenance of equipment and machines. Ensure that the task is not carried out overhead. Avoid direct contact with the chemical/the product/the preparation by establishing organisational measures. | |
| Conditions and measures related to personal protection, hygiene and health evaluation | Wear protective gloves/ protective clothing/ eye protection/ face protection. In case of odour, gas alarm or insufficient ventilation wear suitable respiratory protection | |

Risk Management Measures are based on qualitative risk characterisation.

3. Exposure estimation and reference to its source

Environment

Qualitative approach used to conclude safe use.

Workers

EASE v2.0

sodium hypochlorite, solution 10 - 15%

| Contributing Scenario | Specific conditions | Exposure routes | Level of Exposure | RCR |
|-----------------------|---------------------|---|-------------------------|--------|
| PROC11 | --- | Worker - inhalative, long-term - systemic | 0.0017mg/m ³ | 0.0011 |

Qualitative assessment dermal. Contact is only accidental. Exposure is considered negligible.

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 may be necessary to define appropriate site-specific risk management measures.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Assumes a good basic standard of occupational hygiene is implemented.
 Ensure that gas alarms are installed
 Change gloves, if duration of activity exceeds breakthrough time

sodium hypochlorite, solution 10 - 15%

1. Short title of Exposure Scenario 6: Use in sewage 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 |
| Chemical product category | PC20: Products 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) |
| Environmental Release Categories | ERC6b: Industrial use of reactive processing aids |

2.1 Contributing scenario controlling environmental exposure for: ERC6b

| | | |
|--|---|---|
| Product characteristics | Concentration of the Substance in Mixture/Article | Covers percentage substance in the product up to 25 %. |
| Amount used | Amounts used in the EU (tonnes/year) | 999.999 ton(s)/year |
| Frequency and duration of use | Continuous exposure | 360 days/year |
| Environment factors not influenced by risk management | Flow rate of receiving surface water | 18,000 m3/d |
| | Dilution Factor (River) | 10 |
| | Dilution Factor (Coastal Areas) | 100 |
| Technical conditions and measures at process level (source) to prevent release Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil Organizational measures to prevent/limit release from the site | Air | Substance release to air can be excluded |
| | Water | Risk from environmental exposure is driven by the freshwater., Do not release wastewater directly into environment., Onsite wastewater treatment required, No discharge of substance into waste water |
| | Soil | Substance release to soil can be excluded |
| Conditions and measures related to sewage treatment plant | Type of Sewage Treatment Plant | Municipal sewage treatment plant |
| | Flow rate of sewage treatment plant effluent | 2,000 m3/d |
| 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, PROC2, PROC3, PROC4, PROC5, PROC8a, PROC8b, PROC9

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

sodium hypochlorite, solution 10 - 15%

| | | |
|--|---|---------------------------|
| | Mixture/Article | |
| | Physical Form (at time of use) | Liquid, moderate fugacity |
| | Vapour pressure | 25 hPa |
| | Process Temperature | 90 °C |
| Frequency and duration of use | Exposure duration per day | 8 h |
| | Frequency of use | 5 days/week |
| Human factors not influenced by risk management | Body weight | 70 kg |
| | Respiration volume under conditions of use | 10 m ³ /day |
| | Light activity | |
| Other operational conditions affecting workers exposure | Indoor use. | |
| | Assumes activities are at ambient temperature., Outdoor location is covered by the worst case inside location | |
| Technical conditions and measures to control dispersion from source towards the worker | Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). Drain down system prior to equipment opening or maintenance. | |
| Organisational measures to prevent /limit releases, dispersion and exposure | Ensure that no inhalable aerosols are generated Regular inspection and maintenance of equipment and machines. Ensure that the task is not carried out overhead. Ensure containment of the emission source | |
| Conditions and measures related to personal protection, hygiene and health evaluation | Wear protective gloves/ protective clothing/ eye protection/ face protection. In case of odour, gas alarm or insufficient ventilation wear suitable respiratory protection In the case of hazardous fumes, wear self contained breathing apparatus. | |

Risk Management Measures are based on qualitative risk characterisation.

3. Exposure estimation and reference to its source

Environment

Qualitative approach used to conclude safe use.

Workers

Advanced REACH Tool (ART model)

| Contributing Scenario | Specific conditions | Exposure routes | Level of Exposure | RCR |
|-----------------------|---------------------|--|-----------------------|------|
| PROC1 | --- | Worker - inhalative, long-term - local | 0.02mg/m ³ | 0.01 |
| PROC2, PROC3 | --- | Worker - inhalative, long-term - local | 1.10mg/m ³ | 0.71 |
| PROC4 | --- | Worker - inhalative, long-term - local | 1.20mg/m ³ | 0.77 |
| PROC5, PROC8a, PROC8b | --- | Worker - inhalative, long-term - local | 1.25mg/m ³ | 0.81 |
| PROC9 | --- | Worker - inhalative, long-term - local | 0.91mg/m ³ | 0.59 |

The short-term exposure is covered by the assessment of long-term exposure. Qualitative assessment dermal.
Qualitative approach used to conclude safe use.

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

sodium hypochlorite, solution 10 - 15%

Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Assumes a good basic standard of occupational hygiene is implemented.

Ensure that gas alarms are installed

Change gloves, if duration of activity exceeds breakthrough time

These measures involve good personal and housekeeping practices (i.e. regular cleaning), no eating and smoking at the workplace, wearing of standard working clothes and shoes.

sodium hypochlorite, solution 10 - 15%

1. Short title of Exposure Scenario 7: Use in paper industry

| | |
|----------------------------------|---|
| 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 |
| Chemical product category | PC26: Paper and board dye, finishing and impregnation products: including bleaches and other processing aids |
| Process categories | <p>PROC1: Use in closed process, no likelihood of exposure</p> <p>PROC2: Use in closed, continuous process with occasional controlled exposure</p> <p>PROC3: Use in closed batch process (synthesis or formulation)</p> <p>PROC4: Use in batch and other process (synthesis) where opportunity for exposure arises</p> <p>PROC5: Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact)</p> <p>PROC8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities</p> <p>PROC8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities</p> <p>PROC9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing)</p> |
| Environmental Release Categories | ERC6b: Industrial use of reactive processing aids |

2.1 Contributing scenario controlling environmental exposure for: ERC6b

Substance is a unique structure, Non-hydrophobic, Low potential to bioaccumulate

| | | |
|--|---|---|
| Product characteristics | Concentration of the Substance in Mixture/Article | Covers percentage substance in the product up to 25 %. |
| Amount used | Amounts used in the EU (tonnes/year) | 999.999 ton(s)/year |
| Frequency and duration of use | Continuous exposure | 360 days/year |
| Environment factors not influenced by risk management | Flow rate of receiving surface water | 18,000 m3/d |
| | Dilution Factor (River) | 10 |
| | Dilution Factor (Coastal Areas) | 100 |
| Technical conditions and measures at process level (source) to prevent release Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil Organizational measures to prevent/limit release from the site | Air | Substance release to air can be excluded |
| | Water | Risk from environmental exposure is driven by the freshwater., Do not release wastewater directly into environment., Onsite wastewater treatment required, No discharge of substance into waste water |
| | Soil | Substance release to soil can be excluded |
| Conditions and measures related to sewage treatment plant | Type of Sewage Treatment Plant | Municipal sewage treatment plant |
| | Flow rate of sewage treatment plant effluent | 2,000 m3/d |
| 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, PROC2, PROC3, PROC4, PROC5, PROC8a, PROC8b, PROC9

sodium hypochlorite, solution 10 - 15%

| | | |
|--|---|--|
| Product characteristics | Concentration of the Substance in Mixture/Article | Covers percentage substance in the product up to 25 %. |
| | Physical Form (at time of use) | Liquid, moderate fugacity |
| | Vapour pressure | 25 hPa |
| | Process Temperature | 90 °C |
| Frequency and duration of use | Exposure duration per day | 8 h |
| | Frequency of use | 5 days/week |
| Human factors not influenced by risk management | Body weight | 70 kg |
| | Respiration volume under conditions of use | 10 m ³ /day |
| | Light activity | |
| Other operational conditions affecting workers exposure | Indoor use. | |
| | Assumes activities are at ambient temperature., Outdoor location is covered by the worst case inside location | |
| Technical conditions and measures to control dispersion from source towards the worker | Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). Drain down system prior to equipment opening or maintenance. | |
| Organisational measures to prevent /limit releases, dispersion and exposure | Ensure that no inhalable aerosols are generated Regular inspection and maintenance of equipment and machines. Ensure that the task is not carried out overhead. Ensure containment of the emission source | |
| Conditions and measures related to personal protection, hygiene and health evaluation | Wear protective gloves/ protective clothing/ eye protection/ face protection. In case of odour, gas alarm or insufficient ventilation wear suitable respiratory protection In the case of hazardous fumes, wear self contained breathing apparatus. | |

Risk Management Measures are based on qualitative risk characterisation.

3. Exposure estimation and reference to its source

Environment

Qualitative approach used to conclude safe use.

Workers

Advanced REACH Tool (ART model)

| Contributing Scenario | Specific conditions | Exposure routes | Level of Exposure | RCR |
|-----------------------|---------------------|--|-----------------------|------|
| PROC1 | --- | Worker - inhalative, long-term - local | 0.02mg/m ³ | 0.01 |
| PROC2, PROC3 | --- | Worker - inhalative, long-term - local | 1.10mg/m ³ | 0.71 |
| PROC4 | --- | Worker - inhalative, long-term - local | 1.20mg/m ³ | 0.77 |
| PROC5, PROC8a, PROC8b | --- | Worker - inhalative, long-term - local | 1.25mg/m ³ | 0.81 |
| PROC9 | --- | Worker - inhalative, long-term - local | 0.91mg/m ³ | 0.59 |

The short-term exposure is covered by the assessment of long-term exposure. Qualitative assessment dermal. Qualitative approach used to conclude safe use.

sodium hypochlorite, solution 10 - 15%**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 may be necessary to define appropriate site-specific risk management measures.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Assumes a good basic standard of occupational hygiene is implemented.
Ensure that gas alarms are installed
Change gloves, if duration of activity exceeds breakthrough time
These measures involve good personal and housekeeping practices (i.e. regular cleaning), no eating and smoking at the workplace, wearing of standard working clothes and shoes.

sodium hypochlorite, solution 10 - 15%

1. Short title of Exposure Scenario 8: Use in textile industry

| | |
|----------------------------------|---|
| 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 |
| Chemical product category | PC34: Textile dyes, finishing and impregnating products |
| Process categories | <p>PROC1: Use in closed process, no likelihood of exposure</p> <p>PROC2: Use in closed, continuous process with occasional controlled exposure</p> <p>PROC3: Use in closed batch process (synthesis or formulation)</p> <p>PROC4: Use in batch and other process (synthesis) where opportunity for exposure arises</p> <p>PROC5: Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact)</p> <p>PROC8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities</p> <p>PROC8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities</p> <p>PROC9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing)</p> <p>PROC13: Treatment of articles by dipping and pouring</p> |
| Environmental Release Categories | ERC6b: Industrial use of reactive processing aids |

2.1 Contributing scenario controlling environmental exposure for: ERC6b

Substance is a unique structure, Non-hydrophobic, Low potential to bioaccumulate

| | | |
|--|---|---|
| Product characteristics | Concentration of the Substance in Mixture/Article | Covers percentage substance in the product up to 25 %. |
| Amount used | Amounts used in the EU (tonnes/year) | 999.999 ton(s)/year |
| Frequency and duration of use | Continuous exposure | 360 days/year |
| Environment factors not influenced by risk management | Flow rate of receiving surface water | 18,000 m ³ /d |
| | Dilution Factor (River) | 10 |
| | Dilution Factor (Coastal Areas) | 100 |
| Technical conditions and measures at process level (source) to prevent release Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil Organizational measures to prevent/limit release from the site | Air | Substance release to air can be excluded |
| | Water | Risk from environmental exposure is driven by the freshwater., Do not release wastewater directly into environment., Onsite wastewater treatment required, No discharge of substance into waste water |
| | Soil | Substance release to soil can be excluded |
| Conditions and measures related to sewage treatment plant | Type of Sewage Treatment Plant | Municipal sewage treatment plant |
| | Flow rate of sewage treatment plant effluent | 2,000 m ³ /d |
| 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, PROC2, PROC3, PROC4, PROC5, PROC8a, PROC8b, PROC9, PROC13

sodium hypochlorite, solution 10 - 15%

| | | |
|--|---|--|
| Product characteristics | Concentration of the Substance in Mixture/Article | Covers percentage substance in the product up to 25 %. |
| | Physical Form (at time of use) | Liquid, moderate fugacity |
| | Vapour pressure | 25 hPa |
| | Process Temperature | 90 °C |
| Frequency and duration of use | Exposure duration per day | 8 h |
| | Frequency of use | 5 days/week |
| Human factors not influenced by risk management | Body weight | 70 kg |
| | Respiration volume under conditions of use | 10 m ³ /day |
| | Light activity | |
| Other operational conditions affecting workers exposure | Indoor use. | |
| | Assumes activities are at ambient temperature., Outdoor location is covered by the worst case inside location | |
| Technical conditions and measures to control dispersion from source towards the worker | Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). Drain down system prior to equipment opening or maintenance. | |
| Organisational measures to prevent /limit releases, dispersion and exposure | Ensure that no inhalable aerosols are generated Regular inspection and maintenance of equipment and machines. Ensure that the task is not carried out overhead. Ensure containment of the emission source | |
| Conditions and measures related to personal protection, hygiene and health evaluation | Wear protective gloves/ protective clothing/ eye protection/ face protection. In case of odour, gas alarm or insufficient ventilation wear suitable respiratory protection In the case of hazardous fumes, wear self contained breathing apparatus. | |
| Risk Management Measures are based on qualitative risk characterisation. | | |

3. Exposure estimation and reference to its source

Environment

Qualitative approach used to conclude safe use.

Workers

Advanced REACH Tool (ART model)

| Contributing Scenario | Specific conditions | Exposure routes | Level of Exposure | RCR |
|-----------------------|---------------------|--|-----------------------|------|
| PROC1 | --- | Worker - inhalative, long-term - local | 0.02mg/m ³ | 0.01 |
| PROC2, PROC3 | --- | Worker - inhalative, long-term - local | 1.10mg/m ³ | 0.71 |
| PROC4 | --- | Worker - inhalative, long-term - local | 1.20mg/m ³ | 0.77 |
| PROC5, PROC8a, PROC8b | --- | Worker - inhalative, long-term - local | 1.25mg/m ³ | 0.81 |
| PROC9 | --- | Worker - inhalative, long-term - local | 0.91mg/m ³ | 0.59 |
| PROC13 | --- | Worker - inhalative, long-term - local | 0.70mg/m ³ | 0.45 |

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The short-term exposure is covered by the assessment of long-term exposure. Qualitative assessment dermal. Qualitative approach used to conclude safe use.

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 may be necessary to define appropriate site-specific risk management measures.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Assumes a good basic standard of occupational hygiene is implemented.
Ensure that gas alarms are installed
Change gloves, if duration of activity exceeds breakthrough time

sodium hypochlorite, solution 10 - 15%

1. Short title of Exposure Scenario 9: Consumer use

| | |
|----------------------------------|--|
| Main User Groups | SU 21: Consumer uses: Private households (= general public = consumers) |
| Chemical product category | PC34: Textile dyes, finishing and impregnating products PC35: Washing and cleaning products (including solvent based products) PC37: Water treatment chemicals |
| Environmental Release Categories | ERC8a: Wide dispersive indoor use of processing aids in open systems ERC8b: Wide dispersive indoor use of reactive substances in open systems ERC8d: Wide dispersive outdoor use of processing aids in open systems ERC8e: Wide dispersive outdoor use of reactive substances in open systems |

2.1 Contributing scenario controlling environmental exposure for: ERC8a, ERC8b, ERC8d, ERC8e

Substance is a unique structure, Non-hydrophobic, Low potential to bioaccumulate

| | | |
|--|---|---|
| Product characteristics | Concentration of the Substance in Mixture/Article | Concentration of substance in product : 0% - 10% |
| Amount used | Amounts used in the EU (tonnes/year) | 999999 ton(s)/year |
| Frequency and duration of use | Continuous exposure | 360 days/year |
| Environment factors not influenced by risk management | Flow rate of receiving surface water | 18,000 m3/d |
| | Dilution Factor (River) | 10 |
| | Dilution Factor (Coastal Areas) | 100 |
| Technical conditions and measures at process level (source) to prevent release Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil Organizational measures to prevent/limit release from the site | Air | Substance release to air can be excluded |
| | Water | Risk from environmental exposure is driven by the freshwater., Do not release wastewater directly into environment., Onsite wastewater treatment required, No discharge of substance into waste water |
| | | |
| Conditions and measures related to sewage treatment plant | Type of Sewage Treatment Plant | Municipal sewage treatment plant |
| | Flow rate of sewage treatment plant effluent | 2,000 m3/d |
| 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: PC35: Cleaners, trigger sprays (all purpose cleaners, sanitary products, glass cleaners)

| | | |
|-------------------------------|---|--|
| Product characteristics | Concentration of the Substance in Mixture/Article | Concentration of substance in product: 0% - 3% |
| | Physical Form (at time of use) | Liquid, moderate fugacity |
| | Vapour pressure | 25 hPa |
| Amount used | Amount used per event | 0.005 kg |
| Frequency and duration of use | Exposure duration | 7.5 min |
| | Frequency of use | 4 Times per day |
| Other given operational | Indoor use. | |

sodium hypochlorite, solution 10 - 15%

| | | |
|---|---------------------------|------------------|
| conditions affecting consumers exposure | Room size | 4 m ³ |
| | Ventilation rate per hour | 0.5 |

2.3 Contributing scenario controlling consumer exposure for: PC35

| | | |
|--|---|---|
| Product characteristics | Concentration of the Substance in Mixture/Article | Concentration of substance in product: 0% - 0,5% |
| | Physical Form (at time of use) | Liquid, moderate fugacity |
| | Vapour pressure | 25 hPa |
| Frequency and duration of use | Frequency of use | 1 Times per day |
| Human factors not influenced by risk management | Exposed skin areas | Palm of one Hand 420 cm ² |
| | | |
| Other given operational conditions affecting consumers exposure | Indoor use. | |
| | Room size | 4 m ³ |
| | Ventilation rate per hour | 0.5 |
| Conditions and measures related to protection of consumer (e.g. behavioural advice, personal protection and hygiene) | Consumer Measures | Wear impervious chemical resistant protective gloves. |
| | | |

2.4 Contributing scenario controlling consumer exposure for: PC34

| | | |
|--|---|---|
| Product characteristics | Concentration of the Substance in Mixture/Article | Concentration of substance in product: 0% - 0.05% |
| | Physical Form (at time of use) | Liquid, moderate fugacity |
| | Vapour pressure | 25 hPa |
| Frequency and duration of use | Frequency of use | 2 days/week |
| Human factors not influenced by risk management | Exposed skin areas | Two hands 820 cm ² |
| | | |
| Other given operational conditions affecting consumers exposure | Indoor use. | |
| | Room size | 4 m ³ |
| | Ventilation rate per hour | 0.5 |
| Conditions and measures related to protection of consumer (e.g. behavioural advice, personal protection and hygiene) | Consumer Measures | Wear impervious chemical resistant protective gloves. |
| | | |

2.5 Contributing scenario controlling consumer exposure for: PC37

| | | |
|-------------------------------|---|--|
| Product characteristics | Concentration of the Substance in Mixture/Article | Concentration of substance in product: 0% - 0,1% |
| | Physical Form (at time of use) | Liquid, moderate fugacity |
| | Vapour pressure | 25 hPa |
| Amount used | | 2000 ml |
| Frequency and duration of use | Frequency of use | 1 Times per day |

3. Exposure estimation and reference to its source

Environment

Qualitative approach used to conclude safe use.

sodium hypochlorite, solution 10 - 15%

Consumers

EU RAR

| Contributing Scenario | Specific conditions | Exposure routes | Level of Exposure | RCR |
|-----------------------|---------------------------------|---|-----------------------|----------|
| PC34 | Laundry bleaching/pre-treatment | Consumer - inhalative, long-term - systemic | 1.68µg/m ³ | 0.000108 |
| PC35 | Hard surface cleaning | Consumer - inhalative, long-term - systemic | 1.68µg/m ³ | 0.000108 |
| PC34 | Laundry bleaching/pre-treatment | Consumer - dermal, long-term - local | 0.035mg/kg bw/day | < 1 |
| PC35 | Hard surface cleaning | Consumer - dermal, long-term - local | 0.002mg/kg bw/day | < 1 |
| --- | Drinking water, adult | Consumer oral, acute | 0.0003mg/kg bw/day | --- |
| --- | Drinking water, adult | Consumer oral, long-term | 0.003mg/kg bw/day | 0.011 |
| --- | Drinking water, children | Consumer oral, acute | 0.0007mg/kg bw/day | --- |
| --- | Drinking water, children | Consumer oral, long-term | 0.0033mg/kg bw/day | 0.011 |

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

Only properly trained persons shall make use of scaling methods while checking whether the OC and RMM are within the boundaries set by the ES