



SAFETY DATA SHEET-Extended

Prepared in accordance with Commission Regulation (EU) 830/2015 amending Regulation 1907/2006, REACH

SODIUM HYPOCHLORITE

Revision: 7 Last up date: 02.03.2017 Issued date: February, 2011 page 1/ 85

1. IDENTIFICATION OF THE SUBSTANCE/PREPARATION AND OF THE COMPANY/UNDERTAKING

1.1. Identification of the substance/preparation:

Trade name	SODIUM HYPOCHLORITE SOLUTION
IUPAC name	SODIUM HYPOCHLORITE
Synonym	Clorox, hypochlorite , hypochlorite solution, hypochlorous acid-sodium salt
EC name	SODIUM HYPOCHLORITE
EC (EINECS no.)	231-668-3
CAS no.	7681-52-9
Molecular Formula	NaOCl
Molecular weight	75,45
REACH registration number	01-2119488154-34-0039
Biocide Notice number issued by Romanian Authority	01925BIO/02-05/12.24

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

- Bleaching agent in textile, pulp and paper industries
- disinfectant for potable water, swimming pool, cooling water
- treatment of waste waters
- oxidizing agent in chemical industry
- household bleaches solution

Use in industrial settings:

Industrial use [SU 10]; Formulation [PROC1, PROC2, PROC3, PROC4, PROC5, PROC8a, PROC8b, PROC 9, PROC14]

Technical function of the substance during formulation: Bleaching agents, Intermediates, Oxidising agents, cleaning/washing agent

Industrial use [SU 8, 9]; Industrial use as intermediate [PROC1, PROC2, PROC3, PROC4, PROC8a, PROC8b, PROC 9]

Industrial use [SU 5]; Industrial use in textile industry [PROC1, PROC2, PROC3, PROC4, PROC5, PROC8a, PROC8b, PROC 9, PROC13]; PC [34]- Textile dyes, finishing and impregnating products; including bleaches and other processing aids.

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Industrial use [SU 23]; Industrial use in sewage and cooling or heating water treatment [PROC1, PROC2, PROC3, PROC4, PROC5, PROC8a, PROC8b, PROC 9] [P20, P37]

Industrial use [SU4] ; Industrial cleaning use [PROC5, PROC 7, PROC8a, PROC 9, PROC10, PROC13], [PC 13]

Industrial use [SU 6b]; Industrial use in pulp and paper [PROC1, PROC2, PROC3, PROC4, PROC5, PROC8a, PROC8b, PROC 9]; [PC26]

1.3. Details of the supplier of the safety data sheet

Name	S.C. OLTCHIM S.A
Address	1 Uzinei Street, 240050 Ramnicu Valcea, Romania
Phone N°	+40 250 701 200
FAX N°	+40 250 735 030
E-mail of competent person responsible for SDS in the MS or in the EU:	tehnic@oltchim.com

1.4. Emergency telephone

European Emergency N°:	112
Emergency telephone at the company:	+40/250/738141- available 24h/day/365days
For Romania- The institution responsible with providing information in case of a health emergency is The National Institute for Public Health, Department for the International Sanitary Regulation and Toxicological Information.	Telephone: 021.318.36.06, Working hours: Monday - Friday from 8 a.m. to 3 p

2. HAZARDS IDENTIFICATION

2.1. Classification of the substance

2.1.1. Classification according to Regulation (EC) 1272/2008

Skin corrosive; category 1B, H314

Aquatic Acute 1, H400

EUH031 Contact with acids liberates toxic gas. (Specific concentration limit \geq 5%)



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2.2. Label elements according to Regulation (EC) 1272/2008 (CLP/GHS)**2.2.1. Labelling according to Regulation (EC) 1272/2008, CLP**

Signal word :	Danger
GHS05: Corrosion	
GHS09 : Environment	
Hazard statements:	H314: Causes severe skin burns and eye damage. H400: Very toxic to aquatic life. M FACTOR =10
Precautionary statements : Prevention	P260: Do not breathe dust/fume/gas/mist/vapours/spray. P273: Avoid release to the environment. P280: Wear protective gloves/protective clothing/eye protection/face protection.
Precautionary statements : Intervention	P303+P361+P353: IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower P305+P351+P338: IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing P310: Immediately call a POISON CENTER or doctor/physician P390: Absorb spillage to prevent material damage. P 391: Collect spillage.
Additional labelling requirements	EUH031 Contact with acids liberates toxic gas. (Specific concentration limit $\geq 5\%$)

2.3. Other effects: The substance does not fulfil the PBT criteria (not PBT) and not the vPvB criteria (not vPvB).



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3. COMPOSITION/INFORMATION ON INGREDIENTS

Identification name	CAS no	EC No	Index no.	Concentration (%)
Sodium Hypochlorite,	7681-52-9	231-668-3	017-011-00-1	Min. 12.5 free available chlorine
Sodium hydroxide	1310-73-2	215-185-5	011-002-00-6	0,7-2

Impurities: No impurities relevant for classification and labelling.

4. FIRST - AID MEASURES

4.1 Description of first aid measures

General Advice: IF exposed or if you feel unwell: Call a Poison Center or doctor/physician. Show this safety data sheet to the doctor in attendance

Following inhalation: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen.

Following skin contact: Remove contaminated clothes and shoes. Rinse skin with plenty of water for at least 15 minutes until slippery feeling disappears. Seek medical attention immediately. Wash clothing before reuse.

Following eye contact: Immediately flush eyes with high amounts of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Seek medical attention immediately.

Following ingestion: Call a physician immediately. Do not induce vomiting. If conscious, give large amounts of water. *Never give anything by mouth to an unconscious person.*

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

Chlorine gas released from sodium hypochlorite causes irritation of respiratory system, consisting in coughing, difficult breathing, stomatitis, nausea and pulmonary edema.

The product contact with skin can cause skin irritation, followed by blisters and eczema (especially at 12% concentration). The eye contact causes serious damages of eyes.

Ingestion of tens of grams of sodium hypochlorite solution (12% concentration) can cause mucous membrane burns, perforation of the esophagus and stomach, and laryngeal edema.



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4.3 Indication of immediate medical attention and special treatment needed

In caz of eyes and face splashing , treat eayes firstly. Treat symptomatically and supportively

5. FIRE - FIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media: Water. Use water spray to cool fire-exposed containers, to dilute liquid, and control vapour.

Unsuitable extinguishing media: None

5.2 Exposure hazards: Not considered to be a fire hazard. Sodium hypochlorite itself does not burn, but poisonous gases are produced in fire. The sodium hypochlorite anhydrous is very explosive. The product contact with combustibile materials can cause fire.

5.3. Protection of fire-fighters: Firefighters should wear proper protective equipment and self contained breathing apparatus with full face-piece operated in positive pressure mode.

6. ACCIDENTAL RELEASE MEASURES

6.1. Personal precautions, protective equipment and emergency procedures

Personal precautions: Keep unnecessary and unprotected personnel away from entering. Ventilate area of leak or spill. Remove all sources of ignition. Wear appropriate personal equipment. Persons performing clean-up work should wear adequate personal protective equipment and a self-contained breathing apparatus with full face-piece operated in the pressure demand or other positive pressure mode. Do not touch or walk through spill material.

6.2. Environmental precautions

Environmental precautions: Prevent from contamination the ground and surface water by isolating the hazard area. The spills can be neutralized using light reducing agents as sodium sulphite, sodium bisulphite or sodium thiosulphate. Do not use sulphates or bi-sulphate! After neutralization cover the spills with earth, clay or sand. Contain and recover when is possible. Dispose according to all applicable federal state or local environment regulations.

6.3. Methods and materials for containment and cleaning up



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Methods of cleaning up: Contain and recover liquid when possible. Small spills will be absorbed by covering with incombustible absorbers (earth, clay, sand). Large spills will be removing with vacuum trucks pump to storage vessels. Soak up residues with an absorbent such as clay, sand or other suitable material; place in a chemical waste containers for proper disposal.

Neutralize with sodium sulphite, bisulfite or thiosulfate, and then flush with plenty of water. For small spills, take up with an absorbent material and place in a chemical waste containers; seal tightly for proper disposal.

Special precautions: Do not use combustible materials, such as saw dust! **Do not use sulphates or bisulphates for spill neutralizing!**

6.4 Reference to other sections

Additional advice: Refer to section 8, 13.

7. HANDLING AND STORAGE

7.1. Precautions for safe handling

Protective measures: Protect against physical damage. The personnel which handling the product must wear protective equipment, consisting in protective breathing apparatus in order to avoid any contact with hand, skin or eyes. In order to keep the concentration under the limit, area will be well ventilated.

Advice on general occupational hygiene: Avoid inhalation or ingestion and contact with skin and eyes. General occupational hygiene measures are required to ensure safe handling of the substance.

7.2. Conditions for safe storage, including any incompatibilities

Storage: Keep in tightly closed containers, store in a cool, dry, well ventilated area. Isolate from incompatible substances. The aqueous solutions are sensitive to storage due the oxygen action. Avoid the storage for long period because the product degrades over time. Containers of this material may be warnings and precautions listed for the product. The recommended storing temperature is 15-25⁰C. The storage at 15⁰C reduces the rate of decomposition. The electrical equipment has to be corrosion-preventing.

Incompatible materials: reducing agents, combustible materials (wood, cellulose), organic materials, metals, acids.

Materials to avoid: carbon steel, stainless steel, copper and its alloys, aluminium, zinc, unprotected metals.



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Materials used for storage tanks:

- polyethylene; 5-7 years life time. The outdoor tanks will be UV proof.
- glass fibre reinforced plastics – designed accordingly
- steel rubber-lined (thickness of lining - ¾")
- steel Halar lined (Halar is a copolymer 1:1 ethylene- chlorotrifluoroethylene) ; 3-6 years life time function of quality of lining application.
- titanium – the best material used for tank construction but because the high price is used only for specific applications.

7.3. Specific end use(s)

Please check the identified uses from Section 1.2.

For more information please see the relevant exposure scenario, available via your supplier/given in the Annex I.

Recommendation(s) for intended use

Use as biocidal product in accordance with regulation EU 528/2012 and national biocides regulation.

Registered uses: Disinfectants and algacides not intended for direct application to humans or animals (PT2).

Disinfection of bathing and drinking water (PT5).

[Reference to the EuroChlor website www.EuroChlor.org]

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

8.1 Control parameters

8.1.1 Components with workplace control parameters

Exposure limits:

- limit exposure value , 8h -
- limit exposure value, 15 min 1,5 mg/cm

DN(M)ELs for workers

Exposure pattern	Route	DNEL/DMEL (appropriate unit)	Most sensitive endpoint
Acute - systemic effects	dermal (mg/kgbw /day)	NA	NA
	Inhalation (mg/m ³)	3.1	Repeated dose toxicity
Acute - local effects	Dermal (mg/cm ²)	NA	NA
	Inhalation (mg/m ³)	3.1	Repeated dose toxicity
Long-term systemic effects	Dermal (mg/kg bw /day)	NA	NA



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	Inhalation (mg/m ³)	1.55	Repeated dose toxicity
Long-term – local effects	Dermal (% in mixture (weight basis))	0.5	Repeated dose toxicity
	Inhalation (mg/m ³)	1.55	Repeated dose toxicity

DN(M)ELs for the general population

Exposure pattern	Route	DNEL/DMEL (appropriate unit)	Most sensitive endpoint
Acute - systemic effects	Dermal (mg/kg bw /day)	NA	NA
	Inhalation (mg/m ³)	3.1	Repeated dose toxicity
	Oral (mg/kg bw /day)	NA	NA
Acute - local effects	Dermal (mg/cm ²)	NA	NA
	Inhalation (mg/m ³)	3.1	Repeated dose toxicity
Long-term - systemic effects	dermal(mg/kg bw /day)	NA	NA
	Inhalation (mg/m ³)	1.55	Repeated dose toxicity
	oral(mg/kg bw /day)	0.26	Repeated dose toxicity
Long-term – local effects	Dermal (% in mixture (weight basis))	0.5	Repeated dose toxicity
	Inhalation (mg/m ³)	1.55	Repeated dose toxicity

PNEC values

PNEC fresh water = Minimum long-term aquatic toxicity/10 = 0.21 µg/L

PNEC marine water = Minimum long-term aquatic toxicity /50 = 0.042 µg/L

PNEC=0 fresh water sediment / marine water sediment.

8.2. Exposure control

Occupational exposure control: A system of local and / or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emission of the contaminant at its source, preventing dispersion of it into the general work area.

8.2.2. Personal Protection Equipment

Eye protection: Chemical splash goggles and/or face shield must be worn when possibility exist for eye contact due to splashing or spraying liquid or vapor. Equipment for eye protection should be tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection: Wear impervious protective clothing including boots, lab coat, apron or coveralls as appropriate, to prevent skin contact.



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Hand protection: Handle with gloves which were inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. The selected protective gloves have to satisfy the specifications of the standard EN 374 derived from it.

Recommended material for full contact (Permeation time \geq 8hours):

Natural rubber/natural latex –NR (0,5 mm)

Polychloroprene- CR (0,5 mm)

Nitrile rubber –NBR (0,35 mm)

Butyl rubber (0,5 mm)

Fluoro carbon rubber –FKM (0,4 mm)

Polyvinyl chloride – PVC (0,5 mm)

Do not use leather gloves.

Above recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Respiratory protection: Where risk assessment shows that the exposure limit is exceeded a full face-piece respirator with a chemical cartridge respirator with chlorine cartridge is recommended, approved according to EN 14 387 standard.

For emergencies or instances where exposure levels are not known, use a full face piece positive pressure, air supplied respirator. *Warning! Air -purifying respirators do not protect workers in oxygen deficient atmospheres.*

Other precautions: In case of concomitant splashing on eyes and face, treat eyes before face. Maintain shower, eye wash fountain and quick-drench facilities in work area.

Environmental exposure control: It is recommended to draw-up a monitoring plan both for personnel and environment. Will be monitored the sodium hypochlorite concentration in fixed points, where is considered as being possible the exceeding of the exposure limits above the national standard requirements. The sampling points and test frequency will be settled in a manner that the results to be relevant for the working place air and for areas susceptible to take place possible accidental product releases.

9. PHYSICAL AND CHEMICAL PROPERTIES

General information

Appearance	Clear, yellowish liquid
Odor	like chlorine



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Important health, safety and environmental information

pH	alkaline
Boiling point	NA*
Flash point	NA
Flammability	non flammable
Explosive properties	NA
Oxidizing properties	oxidizer
Vapor pressure, 20 °C	2500 Pa
Specific density (water=1)	1.09 for 5.25% 1.15 for 8.0% 1.21for 12.0%
Solubility in water	completely miscible with water
Partition coefficient (log K _{ow})	-3.42 (calculated value).
Viscosity, 20°C	2.6 mPas

Other information

Melting point	-6°C
Self ignition temperature	NA

* Sodium hypochlorite solution is an aqueous mix of inorganic salts; therefore by heating of solution, water evaporates. At temperatures above 60°C, begin the water evaporation with depositing of white crystals on the bottom of tank. For this reason the boiling point can not be determined.

10. STABILITY AND REACTIVITY

10.1. Reactivity: Reacts violently with acids with chlorine releasing.

10.2. Chemical stability: Unstable. Stability decreases with concentration, heat, light exposure, decrease in pH and contamination with heavy metals, such as nickel, cobalt, copper and iron. After 3 months storage, at 15°C, the product concentration (12.5%) decreases with 2%. At pH<11, sodium hypochlorite is unstable, decomposes with chlorine releasing.

10.3. Possibility of hazardous reactions: Sodium hypochlorite is extremely corrosive for aluminium, brass. Reacts with metals (nickel, copper, tin) with oxygen release, with ammonia, urea, oxidisable substances, ammonium nitrate, ammonium oxalate, ammonium phosphate, ammonium acetate, ammonium carbonate, cellulose and methanol.

10.4. Conditions to avoid: Light, heat and incompatibles.



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10.5. Incompatible materials: aluminum, brass, cellulose, steel, stainless steel, bronzes. Strong acids, strong oxidizers, heavy metals (which act as catalysts), reducing agents, ammonia and ammonium salts, ether, and many organic and inorganic chemicals such as paint, kerosene, paint thinners, shellac.

10.6. Hazardous decomposition products: Emits toxic fumes of chlorine (hypochlorous acid and sodium chlorate) when heated to decomposition. The decomposition is an exothermal process.

11. TOXICOLOGICAL INFORMATION

	Conclusions
Skin irritation/corrosion	Light irritant at low concentrations. Moderate irritant at medium concentrations (>5%). Corrosive at concentration higher than 10%. -it is classified : Skin corrosive category 1B
Eye irritation	Irritant. Causes eye damage. Is classified as: Eye damage, category 1. Eye contact causes: - serious burns and discomfort - after several hours after exposure is observed a superficial irritation of Korean epithelium - at two days after exposure : complete recovery
Respiratory system irritation	Irritant. Inhalation of sprayed solution and vapors can cause respiratory system irritation, caught, difficulty of breathing, stomatitis, nausea and pulmonary edema. .
Sensitization	NaOCl is not classified as skin sensitiser
Acute toxicity	<u>Oral:</u> Rat male LD50 = 1100 mg/kg bw (for sodium hypochlorite sol.. 12% free chlorine) Mouse male LD50, = 880 mg/kg bw (for sodium hypochlorite sol.. 12% free chlorine) <u>Inhalation:</u> Rat LD 50, (1h) > 10,7 mg/L air, causes abundant tearing <u>Dermal:</u> Rabbit male/female LD 50, >20 g/kg bw. Causes serious skin irritation. <u>Other routes : intra-peritoneal</u> Mouse LD= 240-250mg/kg bw Guinea pig LD: 63 mg/kg bw
Repeated dose toxicity	Oral: NOAEL: 50 mg/kg bw/day
Toxi-kinetic	Sodium hypochlorite solution is a mixing of different chlorine species, with variant concentration depending on pH values. In biological system with pH ranged 6-8, the most abundant species are HOCl and ClO ⁻ ions at balance. ClO ⁻ ion is present at alkaline pH, while Cl ₂ is present at pH <4. Sodium hypochlorite reacts rapidly with the organic molecules and cellular components, forming organic chlorinated compounds which have their own toxicity (BIBRA 1990). There are not available data about the dermal or oral exposure. However, due to its polarity is estimated a very limited adsorption by skin, without causing of



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	lesions. . Due to the low vale of vapor pressure, the inhalation exposure is very limited. Hypochlorous ions are physiological present in the human body, being formed by the white cells during anti-inflammatory process (they have anti –microbial action).
Mutagenity	No genetic toxicity effects
Toxicity for reproduction	NaOCl has no geno toxic potential, therefore no classification is required according to 67/548/EEC and 1272/2008/EC (CLP) requirements.
Carcinogenicity	No carcinogenic potential.

12. ECOLOGICAL INFORMATIONS

12.1. Aquatic Toxicity

Tests demonstrate NOEC (7 days)= 0,0021mg/L. Factor M=10.

Acute (short-term) toxicity

fish

- Fresh water *LC 50 =0,06 mg/l*
- Marine water *LC 50= 0.032 mg/l*

Aquatic invertebrates (molluscs, *Daphnia magna*, *Ceriodaphnia dubia*)

- *Fresh water: EC50/LC50 =0,141 mg/L*
- *Marine water: EC50/LC50 =0.026 mg/L*

Algae and aquatic plants: Not applicable , sodium hypochlorite decomposes rapidly .

Chronic (long-term) toxicity

fish

- Marine water: NOEC= 0,04 mg CPO/L

Invertebrates

- Marine water: *LC100 (36days) 0,005mg/L*
- NOEC for aquatic invertebrates = 0.007 mg/L

Algae and aquatic plants

- *Fresh water EC50/LC50=0,1 mg/l*
- Marine water *EC10/LC10 or NOEC =0,02 mg/L*

Toxicity to sediment micro-organisms

There are not predicted exposures due the fact that sodium hypochlorite is destroyed quickly by oxy-reduction. Sodium hypochlorite can not exist in presence of organic carbon.

PNEC=0 fresh water sediment / marine water sediment.



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Terrestrial toxicity

Short/long -term toxicity to terrestrial invertebrates

Substance is not absorbed in soil and is not persistent in soil. TD50<1 min, PEC/PNEC soil<1. In accordance with column 2 of REACH Annexes IX and X, there is no need to further investigate the effects of the substance on terrestrial invertebrates.

Toxicity to soil micro-organisms

In accordance with column 2 of REACH Annexes IX and X, there is no need to further investigate the effects of the substance on soil micro-organisms.

Short/long term toxicity to plants

Due the fact that PEC/PNEC for terrestrial toxicity is <1 and at contact with soil hypochlorite dissipates quickly (TD50 <1 min) there is not estimated short/long toxicity to plants. In accordance with column 2 of REACH Annexes IX and X, there is no need to further investigate the effects of the substance on plants.

12.2. Persistence and degradability:

Biotic

The inorganic water can not be tested for biodegradability.

Abiotic

Hypochlorite degrades quickly during the transport through sewage system.

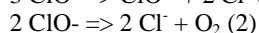
Photo-transforming (Photolysis)

Atmospheric degradation

At medium pH (6, 5-8, 5) value, half of sodium hypochlorite is present as hypochlorous acid and the other half is dissociate as hypochlorite ions. In atmosphere, hypochlorous acid degrades generating atomic chlorine, which is destroyed by UV radiation. The half -life is 15 days. Do not react with ozone layer.

Photolysis in water

Half-life for sodium hypochlorite solution, active chlorine 12-15%, at 25⁰C is 220 days. In presence of light, the half-life decreases 3-4 times. The UV radiation decomposes the hypochlorite, generating chlorate, chlorite and oxygen:



In water, under photolysis, sodium hypochlorite with concentration of 13-18 mg/L, has a half-life of 12 min. at pH =8. This increases up to 60 min. with pH decreasing.

12.3. Bioaccumulative potential: Hypochlorite reacts instantaneously with organic and oxidant materials. Has not potential for bioaccumulation.



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12.4. Mobility in soil

Adsorption

At medium pH (6, 5-8, 5) value, half of sodium hypochlorite is present as hypochlorous acid and the other half is dissociate as hypochlorite ions. The absorption of hypochlorous acid particles, the air volatilization and soil absorption are very low. Thus, hypochlorite remains in aqueous phase and degrades to chlorine.

Results of PBT and vPvB assessment: Hypochlorite does not fulfil the PBT criteria (not PBT) and not the vPvB criteria (not vPvB).

13. DISPOSAL CONSIDERATIONS

Waste Code (European Waste Catalogue): 09 01 05* bleach solutions and bleach fixer solutions

Note: Also please refer to your specific industry and take into account the waste composition for establish the correct waste code.

13.1 Waste treatment methods

13.1.1 Product

Methods of disposal: The generation of waste should be avoided or minimised wherever possible. Empty containers or liners may retain some product residues. This material and its container must be disposed of in a safe way. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Avoid dispersal of spill material and runoff and contact with soil, waterways, drains and sewers.

Hazardous waste: The classification of the product may meet the criteria for a hazardous waste.

13.1.2. Packaging

Methods of disposal: The generation of waste should be avoided or minimised wherever possible. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible.

Relevant European legislation regarding waste:

Directive 2008/98/EC on waste (Waste framework Directive)

Directive 2008/532/EC replacing Decision 94/3/EC establishing a list of wastes pursuant to Article 1(a) of Council Directive 75/442/EEC on waste and Council Decision 94/904/EC establishing a list of hazardous waste pursuant to Article 1(4) of Council Directive 91/689/EEC on hazardous waste



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Regulation (Ec) No 1013/2006 of the European Parliament and of the Council on shipments of waste, with subsequent modifications and additions

14. TRANSPORT INFORMATION

Sodium hypochlorite solution can be shipped according to transport regulations for dangerous goods, hazard class 8, Corrosive substance.

Transport Labeling

**Label no.8- Corrosive
 substances**

RID/ADR

UN No.	1791
Proper shipping name	Sodium Hypochlorite Solution
Hazard class	8
UN Packing Group	II
Label	Corrosive, 8
Classification code	C9

<i>Danger panel</i>	<i>80/1791</i>	(Hazard Identification No. 80)
		(UN Identification No 1791)

IMDG/IMO

UN No.	1791
Hazard class	8
UN Packing Group	II
Proper shipping name	Sodium Hypochlorite Solution
EmS No.	F-A, S-B
Marine pollutant	No

IATA/IT-ICAO

Proper shipping name	Sodium Hydroxide Solution
UN No.	1791
Hazard class	8
UN Packing Group	II
IATA Label	Corrosive



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Packaging Note Passenger	819
Packaging Note Cargo	821
Max. Quantity Passenger	1 1
Max. Quantity Cargo	60 1
Special requirement	A3
ERG Code	81

15. REGULATORY INFORMATION

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

Relevant information regarding the European legislation

EU Regulation (EC) No. 1907/2006 (REACH) Regulation (EC) no.1907/2006 of the European Parliament and of the Council regarding the Registration, Evaluation, Authorization and Restriction of Chemicals (REACH) Regulation

Regulation (EC) no.1272/2008 of the European Parliament and of the Council on the Classification, Labeling and Packaging of substances and mixtures.

Directive 2012/18/EU (SEVESO III) of the European Parliament and of the Council on the control of major-accident hazards involving dangerous substances, amending and subsequently repealing Council Directive 96/82/EC

Regulation (EC) No 1005/2009 of the European Parliament and of the Council on substances that deplete the ozone layer

European Agreement concerning the International Carriage of Dangerous Goods by Road (ADR)

Regulation referring to the International Carriage of Dangerous Goods by Rail (RID)

International Maritime Dangerous Goods (IMDG)

EU Regulation (EC) No. 1907/2006 (REACH):

Annex XIV of REACH -Authorization: Sodium hypochlorite is not subject to authorization.

Annex XVII of REACH - Restrictions on the manufacture, placing on the market and use of certain dangerous substances, mixtures and articles

Restrictions on use: no restriction

Directive 2012/18/EU -SEVESO III Directive- sodium hypochlorite is a Seveso substance, categorie E1 (Anex I Part2 Number: 41)

Other EU regulations: Sodium hypochlorite is not subject to:

Regulation (EC) No 1005/2009 on substances that deplete the ozone layer

Regulation (EC) No 850/2004 on persistent organic pollutants

Regulation (EC) No 649/2012 concerning the export and import of dangerous chemicals



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WGK (Germany): WGK 2

Biocide regulation

Regulation EU 528/2012 concerning making available on the market and use of biocidal products, and its amendments.

15.2 Chemical safety Assessment

A chemical safety assessment (CSA) has been carried out for this substance and a CSR was issued.

16. OTHER INFORMATION

16.1. 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.

H400: Very toxic to aquatic life

H410: Very toxic to aquatic life with long lasting effects.

16. 2. Abbreviation and acronyms (NOT ALL ARE USED IN THIS SDS)

ADR European agreement concerning the international carriage of dangerous goods by road

BSAF Bio soil accumulation factor

BCF Bio concentration factor

CAS Chemical Abstracts Service

CLP Classification, labelling and packaging

CMR Carcinogenic, mutagenic or toxic for reproduction

CSA/CSR Chemical safety assessment / Chemical safety report

DNEL Derived no effect level

EC10 Concentration of a substance where 10% of the population is affected

EC50 Concentration of a substance where 50% of the population is affected

ECHA European chemicals agency

EINECS EU list of existing chemical substances

EmS Emergency schedule

ERC Environmental release category

ES Exposure scenario

eSDS Extended safety data sheet

GHS Globally harmonised system

IATA-DGR International air transport association - dangerous goods regulations

ICAO Technical Instructions for the Safe Transport of Dangerous Goods by Air

IU Identified use



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IUPAC International Union of Pure and Applied Chemistry
IBC code International code for the construction and equipment of ships carrying dangerous chemicals in bulk
IMDG International maritime dangerous goods
KP Partition coefficient
LC10 Lethal concentration of a substance that can be expected to cause death in 10% of the population
LC50 Lethal concentration of a substance that can be expected to cause death in 50% of the population
LD50 Lethal dose of a substance that can be expected to cause death in 50% of the population
NO(A)EC No observed (adverse) effect concentration
NO(A)EL No observed (adverse) effect level
OECD Organisation for economic co-operation and development
OEL Occupational exposure limit
PBT Persistent, bioaccumulative, and toxic
PC Product category
PNEC Predicted no-effect concentration
PROC Process category
REACH Registration, evaluation, authorisation and restriction of chemicals (i.e. Regulation (EC) No. 1907/2006)
RID International rule for transport of dangerous substances by railway
SDS Safety data sheet
STOT Specific target organ toxicant
STP Sewage treatment plant
SU Sector of end use
TWA Time weighted average
vPvB Very persistent, very bioaccumulative

16.3. Key literature references

The information provided in this eSDS is consistent with the information provided in the REACH CSR. The CSR contains a complete reference list for all data used. Non confidential data from the REACH registration dossier are published by the ECHA, see <https://echa.europa.eu/information-on-chemicals/registered-substances> ; http://echa.europa.eu/clp/c_1_inventory_en.asp
<http://chelist.jrc.ec.europa.eu>
<http://www.dguv.de/ifa/gestis/gestis-stoffdatenbank/index-2.jsp>

16.4. Revision: Revision 7 replaces revision 6 dated April 26, 2016.

Chapters 1,3, 8,11,12,13,15,16 of this safety data sheet have been revised according to the provision of Regulation (EC) No. 1907/2006, as amended by Regulation 830/2015, and Regulation (EC) No. 1272/2008 -consolidated. The information provided in this SDS is consistent with the information provided in the REACH CSR for sodium hypochlorite.



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See below Annex I-Exposure Scenario

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Oltchim provides the information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy. This document is intended only as a guide to the appropriate precautionary handling of the material by a properly trained person using this product. Individuals receiving the information must exercise their independent judgment in determining its appropriateness for a particular purpose. Furthermore, this safety data sheet is made up based on the legal requirements as set by EC 1907/2006 (REACH) and EC Regulation 830/2015



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Annex I to SDS- Exposure Scenario

List of Exposure Scenario
Formulation
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: Formulation

Number of the ES	2
Title of exposure scenario	Formulation
List of all use descriptors related to the life cycle stage	SU: 3, 10 PROC: 1, 2, 3, 4, 5, 8a, 8b, 9, 14, 15 ERC: 2
Name of contributing environmental scenario and corresponding ERC	Formulation of preparations (ERC2).
Name(s) of contributing worker scenarios and corresponding PROCs	<p>PROC 1: Use in closed process, no likelihood of exposure</p> <p>PROC 2: Use in closed, continuous process with occasional controlled exposure</p> <p>PROC 3: Use in closed batch process (synthesis or formulation)</p> <p>PROC 4: Use in batch and other process (synthesis) where opportunity for exposure arises</p> <p>PROC 5: Mixing or blending in batch processes (multistage and/or significant contact)</p> <p>PROC 8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities</p> <p>PROC 8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities</p> <p>PROC 9: 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, pelleti-sation</p> <p>PROC15: Use as laboratory reagent</p>



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Contributing exposure scenario controlling worker exposure for PROC 1, 2, 3, 4, 5, 8a, 8b, 9, 14		
Control of workers exposure for PROC 1		
Title information related to contributing scenario		
Use descriptor covered	PROC 1	
Processes, tasks, activities covered	Use in closed process, no likelihood of exposure	
Exposure Assessment Method	Tool used: Advanced Reach Tool (ART)	
Product characteristic		
Physical state	liquid	Operation conditions: ambient temperature
Concentration of substance	<25	%
Fugacity	medium	
Vapour pressure of the substance	2.5 kPa (20 °C)	
Amounts used		
Not relevant in ART		
Frequency and duration of use/exposure		
Duration of exposure	8	hours/day
Frequency of exposure	≤ 240	days/year
Other given operational conditions affecting workers exposure		
Location	Indoors	
Domain	Industrial	
Technical conditions and measures at process level (source) to prevent release		
Handle substance within a closed system [E47].		
Technical conditions and measures to control dispersion from source towards the worker		
Local exhaust ventilation required	Not relevant (closed system)	
Organisational measures to prevent /limit releases, dispersion and exposure		
Not relevant		
Conditions and measures related to personal protection, hygiene and health evaluation		
Not relevant		
Control of workers exposure for PROC 2		
Title information related to contributing scenario		
Use descriptor covered	PROC 2	
Processes, tasks, activities covered	Use in closed, continuous process with occasional controlled	



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	exposure		
Exposure Assessment Method	Tool used: Advanced Reach Tool (ART)		
Product characteristic			
Physical state	liquid	Operation conditions: ambient temperature	
Concentration of substance	<25	%	
Fugacity	medium		
Vapour pressure of the substance	2.5 kPa (20 °C)		
Amounts used			
Not relevant in ART			
Frequency and duration of use/exposure			
Duration of exposure	8	hours per day	
Frequency of exposure	≤ 240	days/year	
Other given operational conditions affecting workers exposure			
Location	Indoors		
Domain	Industrial		
Technical conditions and measures at process level (source) to prevent release			
Process under low containment			
Technical conditions and measures to control dispersion from source towards the worker			
Appropriate local exhaust ventilation	Provide extract ventilation to points where emissions occur		
Organisational measures to prevent /limit releases, dispersion and exposure			
Avoiding frequent and direct contact with substance. Minimisation of manual phases. Regular cleaning of equipment and work area. Supervision in place to check that the RMMs in place are being used correctly and OCs followed.			
Conditions and measures related to personal protection, hygiene and health evaluation			
Use of suitable respiratory protection	Cross reference to General Risk Management Measures and Qualitative Exposure Assessment (see beginning of chap.9)		
Use of suitable chemical resistant gloves			
Use of suitable eye protection			
Control of workers exposure for PROC 3			
Title information related to contributing scenario			
Processes, tasks, activities covered	Use in closed batch process (synthesis or formulation)		
Use descriptor covered	PROC 3		
Exposure Assessment Method	Tool used: Advanced Reach Tool (ART)		
Product characteristic			
Physical state	liquid	Operation conditions:	



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		ambient temperature
Concentration of substance	<25	%
Fugacity	medium	
Vapour pressure of the substance	2.5 kPa (20 °C)	
Amounts used		
Not relevant in ART		
Frequency and duration of use/exposure		
Duration of exposure	8	hours per day
Frequency of exposure	≤ 240	days/year
Other given operational conditions affecting workers exposure		
Location	Indoors	
Domain	Industrial	
Technical conditions and measures at process level (source) to prevent release		
Process under low containment		
Technical conditions and measures to control dispersion from source towards the worker		
Appropriate local exhaust ventilation	Provide extract ventilation to points where emissions occur	
Organisational measures to prevent /limit releases, dispersion and exposure		
Avoiding frequent and direct contact with substance. Minimisation of manual phases. Regular cleaning of equipment and work area. Supervision in place to check that the RMMs in place are being used correctly and OCs followed.		
Conditions and measures related to personal protection, hygiene and health evaluation		
Use of suitable respiratory protection	Cross reference to General Risk Management Measures and Qualitative Exposure Assessment (see beginning of chap.9)	
Use of suitable chemical resistant gloves		
Use of suitable eye protection		
Control of workers exposure for PROC 4		
Title information related to contributing scenario		
Processes, tasks, activities covered	Use in batch and other process (synthesis) where opportunity for exposure arises	
Use descriptor covered	PROC 4	
Exposure Assessment Method	Tool used: Advanced Reach Tool (ART)	
Product characteristic		
Physical state	liquid	Operation conditions: ambient temperature
Concentration of substance	<25	%
Fugacity	medium	



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Vapour pressure of the substance	2.5 kPa (20 °C)		
Amounts used			
Not relevant in ART			
Frequency and duration of use/exposure			
Duration of exposure	8	hours per day	
Frequency of exposure	≤ 240	days/year	
Other given operational conditions affecting workers exposure			
Location	Indoors		
Domain	Industrial		
Technical conditions and measures at process level (source) to prevent release			
Process under low containment			
Technical conditions and measures to control dispersion from source towards the worker			
Appropriate local exhaust ventilation	Provide extract ventilation to points where emissions occur		
Organisational measures to prevent /limit releases, dispersion and exposure			
Avoiding frequent and direct contact with substance. Minimisation of manual phases. Regular cleaning of equipment and work area. Supervision in place to check that the RMMs in place are being used correctly and OCs followed.			
Conditions and measures related to personal protection, hygiene and health evaluation			
Use of suitable respiratory protection	Cross reference to General Risk Management Measures and Qualitative Exposure Assessment (see beginning of chap.9)		
Use of suitable chemical resistant gloves			
Use of suitable eye protection			
Control of workers exposure for PROC 5			
Title information related to contributing scenario			
Processes, tasks, activities covered	Mixing or blending in batch processes (multistage and/or significant contact)		
Use descriptor covered	PROC 5		
Exposure Assessment Method	Tool used: Advanced Reach Tool (ART)		
Product characteristic			
Physical state	liquid	Operation conditions: ambient temperature	
Concentration of substance	<25	%	
Fugacity	medium		
Vapour pressure of the substance	2.5 kPa (20 °C)		
Amounts used			
Not relevant in ART			



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Frequency and duration of use/exposure			
Duration of exposure	8	hours per day	
Frequency of exposure	≤ 240	days/year	
Other given operational conditions affecting workers exposure			
Location	Indoors		
Domain	Industrial		
Technical conditions and measures at process level (source) to prevent release			
Process under low containment			
Technical conditions and measures to control dispersion from source towards the worker			
Appropriate local exhaust ventilation	Provide extract ventilation to points where emissions occur		
Organisational measures to prevent /limit releases, dispersion and exposure			
Avoiding frequent and direct contact with substance. Minimisation of manual phases. Regular cleaning of equipment and work area. Supervision in place to check that the RMMs in place are being used correctly and OCs followed.			
Conditions and measures related to personal protection, hygiene and health evaluation			
Use of suitable respiratory protection	Cross reference to General Risk Management Measures and Qualitative Exposure Assessment (see beginning of chap.9)		
Use of suitable chemical resistant gloves			
Use of suitable eye protection			
Control of workers exposure for PROC 8a			
Title information related to contributing scenario			
Processes, tasks, activities covered	Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities		
Use descriptor covered	PROC 8a		
Exposure Assessment Method	Tool used: Advanced Reach Tool (ART)		
Product characteristic			
Physical state	liquid	Operation conditions: ambient temperature	
Concentration of substance	<25	%	
Fugacity	medium		
Vapour pressure of the substance	2.5 kPa (20 °C)		
Amounts used			
Not relevant in ART			
Frequency and duration of use/exposure			
Duration of exposure	6	hours per day	
Frequency of exposure	≤ 240	days/year	



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Other given operational conditions affecting workers exposure		
Location	Indoors	
Domain	Industrial	
Technical conditions and measures at process level (source) to prevent release		
Process under low containment		
Technical conditions and measures to control dispersion from source towards the worker		
Appropriate local exhaust ventilation	Provide extract ventilation to points where emissions occur	
Organisational measures to prevent /limit releases, dispersion and exposure		
Avoiding frequent and direct contact with substance. Minimisation of manual phases. Regular cleaning of equipment and work area. Supervision in place to check that the RMMs in place are being used correctly and OCs followed.		
Conditions and measures related to personal protection, hygiene and health evaluation		
Use of suitable respiratory protection	Cross reference to General Risk Management Measures and Qualitative Exposure Assessment (see beginning of chap.9)	
Use of suitable chemical resistant gloves		
Use of suitable eye protection		
Control of workers exposure for PROC 8b		
Title information related to contributing scenario		
Processes, tasks, activities covered	Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities	
Use descriptor covered	PROC 8b	
Exposure Assessment Method	Tool used: Advanced Reach Tool (ART)	
Product characteristic		
Physical state	liquid	Operation conditions: ambient temperature
Concentration of substance	<25	%
Fugacity	medium	
Vapour pressure of the substance	2.5 kPa (20 °C)	
Amounts used		
Not relevant in ART		
Frequency and duration of use/exposure		
Duration of exposure	6	hours per day
Frequency of exposure	≤ 240	days/year
Other given operational conditions affecting workers exposure		
Location	Indoors	
Domain	Industrial	



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Technical conditions and measures at process level (source) to prevent release		
Process under low containment		
Technical conditions and measures to control dispersion from source towards the worker		
Appropriate local exhaust ventilation	Provide extract ventilation to points where emissions occur	
Organisational measures to prevent /limit releases, dispersion and exposure		
Avoiding frequent and direct contact with substance. Minimisation of manual phases. Regular cleaning of equipment and work area. Supervision in place to check that the RMMs in place are being used correctly and OCs followed.		
Conditions and measures related to personal protection, hygiene and health evaluation		
Use of suitable respiratory protection	Cross reference to General Risk Management Measures and Qualitative Exposure Assessment (see beginning of chap.9)	
Use of suitable chemical resistant gloves		
Use of suitable eye protection		
Control of workers exposure for PROC 9		
Title information related to contributing scenario		
Processes, tasks, activities covered	Transfer of substance or preparation into small containers (dedicated filling line, including weighing)	
Use descriptor covered	PROC 9	
Exposure Assessment Method	Tool used: Advanced Reach Tool (ART)	
Product characteristic		
Physical state	liquid	Operation conditions: ambient temperature
Concentration of substance	<25	%
Fugacity	medium	
Vapour pressure of the substance	2.5 kPa (20 °C)	
Amounts used		
Not relevant in ART		
Frequency and duration of use/exposure		
Duration of exposure	8	hours per day
Frequency of exposure	≤ 240	days/year
Other given operational conditions affecting workers exposure		
Location	Indoors	
Domain	Industrial	
Technical conditions and measures at process level (source) to prevent release		
Process under low containment		
Technical conditions and measures to control dispersion from source towards the worker		



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Appropriate local exhaust ventilation	Provide extract ventilation to points where emissions occur		
Organisational measures to prevent /limit releases, dispersion and exposure			
Avoiding frequent and direct contact with substance. Minimisation of manual phases. Regular cleaning of equipment and work area. Supervision in place to check that the RMMs in place are being used correctly and OCs followed.			
Conditions and measures related to personal protection, hygiene and health evaluation			
Use of suitable respiratory protection	Cross reference to General Risk Management Measures and Qualitative Exposure Assessment (see beginning of chap.9)		
Use of suitable chemical resistant gloves			
Use of suitable eye protection			
Control of workers exposure for PROC 14			
Title information related to contributing scenario			
Processes, tasks, activities covered	Production of preparations or articles by tableting, compression, extrusion, pelleti-sation		
Use descriptor covered	PROC 14		
Exposure Assessment Method	Tool used: Advanced Reach Tool (ART)		
Product characteristic			
Physical state	liquid	Operation conditions: ambient temperature	
Concentration of substance	<25	%	
Fugacity	medium		
Vapour pressure of the substance	2.5 kPa (20 °C)		
Amounts used			
Not relevant in ART			
Frequency and duration of use/exposure			
Duration of exposure	8	hours per day	
Frequency of exposure	≤ 240	days/year	
Other given operational conditions affecting workers exposure			
Location	Indoors		
Domain	Industrial		
Technical conditions and measures at process level (source) to prevent release			
Process under medium containment			
Technical conditions and measures to control dispersion from source towards the worker			
Appropriate local exhaust ventilation	Provide extract ventilation to points where emissions occur		
Organisational measures to prevent /limit releases, dispersion and exposure			
Avoiding frequent and direct contact with substance. Minimisation of manual phases. Regular cleaning of			



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equipment and work area. Supervision in place to check that the RMMs in place are being used correctly and OCs followed.		
Conditions and measures related to personal protection, hygiene and health evaluation		
Use of suitable respiratory protection	Cross reference to General Risk Management Measures and Qualitative Exposure Assessment (see beginning of chap.9)	
Use of suitable chemical resistant gloves		
Use of suitable eye protection		
Control of workers exposure for PROC 15		
Title information related to contributing scenario		
Processes, tasks, activities covered	Use as laboratory reagent	
Use descriptor covered	PROC 15	
Processes, tasks, activities covered	Use of substances at small scale laboratory (< 1 l or 1 kg present at workplace). Larger laboratories and R+D installations should be treated as industrial processes.	
Exposure Assessment Method	Tool used: Advanced Reach Tool (ART)	
Product characteristic		
Physical state	liquid	Operation conditions: ambient temperature
Concentration of substance	<25	%
Fugacity	medium	
Vapour pressure of the substance	2.5 kPa (20 °C)	
Amounts used		
Not relevant in ART		
Frequency and duration of use/exposure		
Duration of exposure	8	hours per day
Frequency of exposure	≤ 240	days/year
Other given operational conditions affecting workers exposure		
Location	Indoors	
Domain	Professional	
Technical conditions and measures at process level (source) to prevent release		
Not relevant		
Technical conditions and measures to control dispersion from source towards the worker		
Appropriate local exhaust ventilation	Provide extract ventilation to points where emissions occur	
Organisational measures to prevent /limit releases, dispersion and exposure		
Avoiding frequent and direct contact with substance. Minimisation of manual phases. Regular cleaning of equipment and work area. Supervision in place to check that the RMMs in place are being used correctly and OCs followed.		



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Conditions and measures related to personal protection, hygiene and health evaluation	
Use of suitable respiratory protection	Cross reference to General Risk Management Measures and Qualitative Exposure Assessment (see beginning of chap.9)
Use of suitable chemical resistant gloves	
Use of suitable eye protection	
Control of environmental exposure for ERC 2	
Product characteristics	Substance is a unique structure. Non-hydrophobic. Readily degradable. Concentration: < 25 % (typically 12 – 14 %)
European tonnage	1195.23 kt/y 24% active chlorine (286.85 kt/year Cl ₂ equivalent) Number of european production and formulation sites > 63
Maximum regional tonnage	342.58 kt/y 24% active chlorine (82.22) kt/year Cl ₂ equivalent)
Frequency and duration of use	Continuous release. Emission Days: 360 days/year
Environmental factors not influenced by risk management	Local freshwater dilution factor 10 Local marine water dilution factor 100
Other Operational Conditions of use affecting environmental exposure	Indoor/Outdoor use. Product applied in aqueous process solution with negligible volatilization. Free available chlorine in effluent is measured as total residual chlorine (TRC) and should be below 1.0E-13 mg/L No release in air from process expected because hypochlorite solution is non volatile. No release in soil from process expected.
Technical conditions and measures at process level (source) to prevent release	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).
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	Risk from environmental exposure is driven by freshwater. Onsite wastewater treatment required. Prevent discharge of undissolved substance to or recover from onsite wastewater.
Organisation measures to prevent/limit release from site	Prevent environmental discharge consistent with regulatory requirement
Conditions and measures related to industrial or municipal sewage treatment plant	The waste water treatment is required.
Conditions and measures related to external treatment of waste for disposal	External treatment and disposal of waste should comply with applicable local and/or national regulations.
Exposure Estimation	
Workers: Used Advanced Reach Tool (ART) Environment: Qualitative approach used to conclude safe use.	
Guidance to check compliance with the Exposure Scenario	
Guidance is based on assumed operating conditions which may not be applicable to all sites. Thus, scaling is	



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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.



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2: Industrial use as intermediate

Number of the ES	3	
Title of exposure scenario	Industrial use as intermediate	
List of all use descriptors related to the life cycle stage	SU: 3, 8, 9 PC : 19 PROCs: 1, 2, 3, 4, 8a, 8b, 9, ERC: 6 a	
Name of contributing environmental scenario and corresponding ERC	Industrial use resulting in manufacture of another substance (use of interme-diates)	
Name(s) of contributing worker scenarios and corresponding PROCs	<p>PROC 1: Use in closed process, no likelihood of exposure</p> <p>PROC 2: Use in closed, continuous process with occasional controlled exposure</p> <p>PROC 3: Use in closed batch process (synthesis or formulation)</p> <p>PROC 4: Use in batch and other process (synthesis) where opportunity for exposure arises</p> <p>PROC 8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities</p> <p>PROC 8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities</p> <p>PROC 9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing)</p>	
Contributing exposure scenario controlling worker exposure for PROC 1, 2, 3, 4,, 8a, 8b, 9		
Control of workers exposure for PROC 1		
Title information related to contributing scenario		
Processes, tasks, activities covered	Use in closed process, no likelihood of exposure	
Use descriptor covered	PROC 1	
Exposure Assessment Method	Tool used: Advanced Reach Tool (ART)	
Product characteristic		
Physical state	liquid	Operation conditions: ambient temperature
Concentration of substance	<25	%



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Fugacity	medium	
Vapour pressure of the substance	2.5 kPa (20 °C)	
Amounts used		
Not relevant in ART		
Frequency and duration of use/exposure		
Duration of exposure	8	hours/day
Frequency of exposure	≤ 240	days/year
Other given operational conditions affecting workers exposure		
Location	Indoors	
Domain	Industrial	
Technical conditions and measures at process level (source) to prevent release		
Handle substance within a closed system [E47].		
Technical conditions and measures to control dispersion from source towards the worker		
Local exhaust ventilation required	Not relevant (closed system)	
Organisational measures to prevent /limit releases, dispersion and exposure		
Not relevant		
Conditions and measures related to personal protection, hygiene and health evaluation		
Not relevant		
Control of workers exposure for PROC 2		
Title information related to contributing scenario		
Processes, tasks, activities covered	Use in closed, continuous process with occasional controlled exposure	
Use descriptor covered	PROC 2	
Exposure Assessment Method	Tool used: Advanced Reach Tool (ART)	
Product characteristic		
Physical state	liquid	Operation conditions: ambient temperature
Concentration of substance	<25	%
Fugacity	medium	
Vapour pressure of the substance	2.5 kPa (20 °C)	
Amounts used		
Not relevant in ART		
Frequency and duration of use/exposure		



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Duration of exposure	8	hours per day	
Frequency of exposure	≤ 240	days/year	
Other given operational conditions affecting workers exposure			
Location	Indoors		
Domain	Industrial		
Technical conditions and measures at process level (source) to prevent release			
Process under low containment			
Technical conditions and measures to control dispersion from source towards the worker			
Appropriate local exhaust ventilation	Provide extract ventilation to points where emissions occur		
Organisational measures to prevent /limit releases, dispersion and exposure			
Avoiding frequent and direct contact with substance. Minimisation of manual phases. Regular cleaning of equipment and work area. Supervision in place to check that the RMMs in place are being used correctly and OCs followed.			
Conditions and measures related to personal protection, hygiene and health evaluation			
Use of suitable respiratory protection	Cross reference to General Risk Management Measures and Qualitative Exposure Assessment (see beginning of chap.9)		
Use of suitable chemical resistant gloves			
Use of suitable eye protection			
Control of workers exposure for PROC 3			
Title information related to contributing scenario			
Processes, tasks, activities covered	Use in closed batch process (synthesis or formulation)		
Use descriptor covered	PROC 3		
Exposure Assessment Method	Tool used: Advanced Reach Tool (ART)		
Product characteristic			
Physical state	liquid	Operation conditions: ambient temperature	
Concentration of substance	<25	%	
Fugacity	medium		
Vapour pressure of the substance	2.5 kPa (20 °C)		
Amounts used			
Not relevant in ART			
Frequency and duration of use/exposure			
Duration of exposure	8	hours per day	
Frequency of exposure	≤ 240	days/year	
Other given operational conditions affecting workers exposure			
Location	Indoors		



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Domain	Industrial	
Technical conditions and measures at process level (source) to prevent release		
Process under low containment		
Technical conditions and measures to control dispersion from source towards the worker		
Appropriate local exhaust ventilation	Provide extract ventilation to points where emissions occur	
Organisational measures to prevent /limit releases, dispersion and exposure		
Avoiding frequent and direct contact with substance. Minimisation of manual phases. Regular cleaning of equipment and work area. Supervision in place to check that the RMMs in place are being used correctly and OCs followed.		
Conditions and measures related to personal protection, hygiene and health evaluation		
Use of suitable respiratory protection	Cross reference to General Risk Management Mesures and Qualitative Exposure Assessment (see beginning of chap.9)	
Use of suitable chemical resistant gloves		
Use of suitable eye protection		
Control of workers exposure for PROC 4		
Title information related to contributing scenario		
Processes, tasks, activities covered	Use in batch and other process (synthesis) where opportunity for exposure arises	
Use descriptor covered	PROC 4	
Exposure Assessment Method	Tool used: Advanced Reach Tool (ART)	
Product characteristic		
Physical state	liquid	Operation conditions: ambient temperature
Concentration of substance	<25	%
Fugacity	medium	
Vapour pressure of the substance	2.5 kPa (20 °C)	
Amounts used		
Not relevant in ART		
Frequency and duration of use/exposure		
Duration of exposure	8	hours per day
Frequency of exposure	≤ 240	days/year
Other given operational conditions affecting workers exposure		
Location	Indoors	
Domain	Industrial	
Technical conditions and measures at process level (source) to prevent release		
Process under low containment		



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Technical conditions and measures to control dispersion from source towards the worker		
Appropriate local exhaust ventilation	Provide extract ventilation to points where emissions occur	
Organisational measures to prevent /limit releases, dispersion and exposure		
Avoiding frequent and direct contact with substance. Minimisation of manual phases. Regular cleaning of equipment and work area. Supervision in place to check that the RMMs in place are being used correctly and OCs followed.		
Conditions and measures related to personal protection, hygiene and health evaluation		
Use of suitable respiratory protection	Cross reference to General Risk Management Measures and Qualitative Exposure Assessment (see beginning of chap.9)	
Use of suitable chemical resistant gloves		
Use of suitable eye protection		
Control of workers exposure for PROC 8a		
Title information related to contributing scenario		
Processes, tasks, activities covered	Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities	
Use descriptor covered	PROC 8a	
Exposure Assessment Method	Tool used: Advanced Reach Tool (ART)	
Product characteristic		
Physical state	liquid	Operation conditions: ambient temperature
Concentration of substance	<25	%
Fugacity	medium	
Vapour pressure of the substance	2.5 kPa (20 °C)	
Amounts used		
Not relevant in ART		
Frequency and duration of use/exposure		
Duration of exposure	6	hours per day
Frequency of exposure	≤ 240	days/year
Other given operational conditions affecting workers exposure		
Location	Indoors	
Domain	Industrial	
Technical conditions and measures at process level (source) to prevent release		
Process under low containment		
Technical conditions and measures to control dispersion from source towards the worker		
Appropriate local exhaust ventilation	Provide extract ventilation to points where emissions occur	
Organisational measures to prevent /limit releases, dispersion and exposure		



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Avoiding frequent and direct contact with substance. Minimisation of manual phases. Regular cleaning of equipment and work area. Supervision in place to check that the RMMs in place are being used correctly and OCs followed.		
Conditions and measures related to personal protection, hygiene and health evaluation		
Use of suitable respiratory protection	Cross reference to General Risk Management Measures and Qualitative Exposure Assessment (see beginning of chap.9)	
Use of suitable chemical resistant gloves		
Use of suitable eye protection		
Control of workers exposure for PROC 8b		
Title information related to contributing scenario		
Processes, tasks, activities covered	Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities	
Use descriptor covered	PROC 8b	
Exposure Assessment Method	Tool used: Advanced Reach Tool (ART)	
Product characteristic		
Physical state	liquid	Operation conditions: ambient temperature
Concentration of substance	<25	%
Fugacity	medium	
Vapour pressure of the substance	2.5 kPa (20 °C)	
Amounts used		
Not relevant in ART		
Frequency and duration of use/exposure		
Duration of exposure	6	hours per day
Frequency of exposure	≤ 240	days/year
Other given operational conditions affecting workers exposure		
Location	Indoors	
Domain	Industrial	
Technical conditions and measures at process level (source) to prevent release		
Process under low containment		
Technical conditions and measures to control dispersion from source towards the worker		
Appropriate local exhaust ventilation	Provide extract ventilation to points where emissions occur	
Organisational measures to prevent /limit releases, dispersion and exposure		
Avoiding frequent and direct contact with substance. Minimisation of manual phases. Regular cleaning of equipment and work area. Supervision in place to check that the RMMs in place are being used correctly and OCs followed.		
Conditions and measures related to personal protection, hygiene and health evaluation		



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Use of suitable respiratory protection	Cross reference to General Risk Management Measures and Qualitative Exposure Assessment (see beginning of chap.9)		
Use of suitable chemical resistant gloves			
Use of suitable eye protection			
Control of workers exposure for PROC 9			
Title information related to contributing scenario			
Processes, tasks, activities covered	Transfer of substance or preparation into small containers (dedicated filling line, including weighing)		
Use descriptor covered	PROC 9		
Exposure Assessment Method	Tool used: Advanced Reach Tool (ART)		
Product characteristic			
Physical state	liquid	Operation conditions: ambient temperature	
Concentration of substance	<25	%	
Fugacity	medium		
Vapour pressure of the substance	2.5 kPa (20 °C)		
Amounts used			
Not relevant in ART			
Frequency and duration of use/exposure			
Duration of exposure	8	hours per day	
Frequency of exposure	≤ 240	days/year	
Other given operational conditions affecting workers exposure			
Location	Indoors		
Domain	Industrial		
Technical conditions and measures at process level (source) to prevent release			
Process under low containment			
Technical conditions and measures to control dispersion from source towards the worker			
Appropriate local exhaust ventilation	Provide extract ventilation to points where emissions occur		
Organisational measures to prevent /limit releases, dispersion and exposure			
Avoiding frequent and direct contact with substance. Minimisation of manual phases. Regular cleaning of equipment and work area. Supervision in place to check that the RMMs in place are being used correctly and OCs followed.			
Conditions and measures related to personal protection, hygiene and health evaluation			
Use of suitable respiratory protection	Cross reference to General Risk Management Measures and		
Use of suitable chemical resistant gloves			



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Use of suitable eye protection	Qualitative Exposure Assessment (see beginning of chap.9)
Control of environmental exposure for ERC 6 a	
Product characteristics	Substance is a unique structure. Non-hydrophobic. Readily biodegradable. Concentration: < 25 %
European tonnage	26 % of the total consumption was estimated to be used as a chemical intermediate (75.96 kt/year chlorine equivalent).
Frequency and duration of use	Continuous release. Emission Days: 360 days/year
Environmental factors not influenced by risk management	Local freshwater dilution factor 10 Local marine water dilution factor 100
Other Operational Conditions of use affecting environmental exposure	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 at process level (source) to prevent release	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.
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	NaClO must be reduced completely to sodium chloride during the process avoiding critical releases in environment. Chlorine formation should be avoided by maintaining high alkalinity.
Organisation measures to prevent/limit release from site	Prevent environmental discharge consistent with regulatory requirement
Conditions and measures related to industrial or municipal sewage treatment plant	Waste water treatment is required to remove any residual organic compounds and at the same time remaining available chlorine.
Conditions and measures related to external treatment of waste for disposal	External treatment and disposal of waste should comply with applicable local and/or national regulations.
Exposure Estimation	
Workers: Used Advanced Reach Tool (ART) Environment: No releases in environment are expected but in worst case the qualitative approach is used to conclude safe use.	
Guidance to check compliance with 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.	

3: Industrial use in textile industrie

Number of the ES	4
Title of exposure scenario	Industrial use in textile industrie



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List of all use descriptors related to the life cycle stage	SU: 3, 5 PC : 34 PROCs: 1, 2, 3, 4, 5, 8a, 8b, 9, 13 ERC: 6 b	
Name of contributing environmental scenario and corresponding ERC	ERC 6 b Industrial use of reactive processing aids	
Name(s) of contributing worker scenarios and corresponding PROCs	<p>PROC 1: Use in closed process, no likelihood of exposure</p> <p>PROC 2: Use in closed, continuous process with occasional controlled exposure</p> <p>PROC 3: Use in closed batch process (synthesis or formulation)</p> <p>PROC 4: Use in batch and other process (synthesis) where opportunity for exposure arises</p> <p>PROC 5: Mixing or blending in batch processes (multistage and/or significant contact)</p> <p>PROC 8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities</p> <p>PROC 8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities</p> <p>PROC 9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing)</p> <p>PROC 13: Treatment of articles by dipping and pouring</p>	
Contributing exposure scenario controlling worker exposure for PROC 1, 2, 3, 4, 5, 8a, 8b, 9, 13		
Control of workers exposure for PROC 1		
Title information related to contributing scenario		
Processes, tasks, activities covered	Use in closed process, no likelihood of exposure	
Use descriptor covered	PROC 1	
Exposure Assessment Method	Tool used: Advanced Reach Tool (ART)	
Product characteristic		
Physical state	liquid	Operation conditions: ambient temperature
Concentration of substance	<25	%
Fugacity	medium	
Vapour pressure of the substance	2.5 kPa (20 °C)	
Amounts used		



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Not relevant in ART			
Frequency and duration of use/exposure			
Duration of exposure	8	hours/day	
Frequency of exposure	≤ 240	days/year	
Other given operational conditions affecting workers exposure			
Location	Indoors		
Domain	Industrial		
Technical conditions and measures at process level (source) to prevent release			
Handle substance within a closed system [E47].			
Technical conditions and measures to control dispersion from source towards the worker			
Local exhaust ventilation required	Not relevant (closed system)		
Organisational measures to prevent /limit releases, dispersion and exposure			
Not relevant			
Conditions and measures related to personal protection, hygiene and health evaluation			
Not relevant			
Control of workers exposure for PROC 2			
Title information related to contributing scenario			
Processes, tasks, activities covered	Use in closed, continuous process with occasional controlled exposure		
Use descriptor covered	PROC 2		
Exposure Assessment Method	Tool used: Advanced Reach Tool (ART)		
Product characteristic			
Physical state	liquid	Operation conditions: ambient temperature	
Concentration of substance	<25	%	
Fugacity	medium		
Vapour pressure of the substance	2.5 kPa (20 °C)		
Amounts used			
Not relevant in ART			
Frequency and duration of use/exposure			
Duration of exposure	8	hours per day	
Frequency of exposure	≤ 240	days/year	
Other given operational conditions affecting workers exposure			
Location	Indoors		



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Domain	Industrial	
Technical conditions and measures at process level (source) to prevent release		
Process under low containment		
Technical conditions and measures to control dispersion from source towards the worker		
Appropriate local exhaust ventilation	Provide extract ventilation to points where emissions occur	
Organisational measures to prevent /limit releases, dispersion and exposure		
Avoiding frequent and direct contact with substance. Minimisation of manual phases. Regular cleaning of equipment and work area. Supervision in place to check that the RMMs in place are being used correctly and OCs followed.		
Conditions and measures related to personal protection, hygiene and health evaluation		
Use of suitable respiratory protection	Cross reference to General Risk Management Mesures and Qualitative Exposure Assessment (see beginning of chap.9)	
Use of suitable chemical resistant gloves		
Use of suitable eye protection		
Control of workers exposure for PROC 3		
Title information related to contributing scenario		
Processes, tasks, activities covered	Use in closed batch process (synthesis or formulation)	
Use descriptor covered	PROC 3	
Exposure Assessment Method	Tool used: Advanced Reach Tool (ART)	
Product characteristic		
Physical state	liquid	Operation conditions: ambient temperature
Concentration of substance	<25	%
Fugacity	medium	
Vapour pressure of the substance	2.5 kPa (20 °C)	
Amounts used		
Not relevant in ART		
Frequency and duration of use/exposure		
Duration of exposure	8	hours per day
Frequency of exposure	≤ 240	days/year
Other given operational conditions affecting workers exposure		
Location	Indoors	
Domain	Industrial	
Technical conditions and measures at process level (source) to prevent release		
Process under low containment		
Technical conditions and measures to control dispersion from source towards the worker		



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Appropriate local exhaust ventilation	Provide extract ventilation to points where emissions occur		
Organisational measures to prevent /limit releases, dispersion and exposure			
Avoiding frequent and direct contact with substance. Minimisation of manual phases. Regular cleaning of equipment and work area. Supervision in place to check that the RMMs in place are being used correctly and OCs followed.			
Conditions and measures related to personal protection, hygiene and health evaluation			
Use of suitable respiratory protection	Cross reference to General Risk Management Measures and Qualitative Exposure Assessment (see beginning of chap.9)		
Use of suitable chemical resistant gloves			
Use of suitable eye protection			
Control of workers exposure for PROC 4			
Title information related to contributing scenario			
Processes, tasks, activities covered	Use in batch and other process (synthesis) where opportunity for exposure arises		
Use descriptor covered	PROC 4		
Exposure Assessment Method	Tool used: Advanced Reach Tool (ART)		
Product characteristic			
Physical state	liquid	Operation conditions: ambient temperature	
Concentration of substance	<25	%	
Fugacity	medium		
Vapour pressure of the substance	2.5 kPa (20 °C)		
Amounts used			
Not relevant in ART			
Frequency and duration of use/exposure			
Duration of exposure	8	hours per day	
Frequency of exposure	≤ 240	days/year	
Other given operational conditions affecting workers exposure			
Location	Indoors		
Domain	Industrial		
Technical conditions and measures at process level (source) to prevent release			
Process under low containment			
Technical conditions and measures to control dispersion from source towards the worker			
Appropriate local exhaust ventilation	Provide extract ventilation to points where emissions occur		
Organisational measures to prevent /limit releases, dispersion and exposure			
Avoiding frequent and direct contact with substance. Minimisation of manual phases. Regular cleaning of			



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equipment and work area. Supervision in place to check that the RMMs in place are being used correctly and OCs followed.		
Conditions and measures related to personal protection, hygiene and health evaluation		
Use of suitable respiratory protection	Cross reference to General Risk Management Measures and Qualitative Exposure Assessment (see beginning of chap.9)	
Use of suitable chemical resistant gloves		
Use of suitable eye protection		
Control of workers exposure for PROC 5		
Title information related to contributing scenario		
Processes, tasks, activities covered	Mixing or blending in batch processes (multistage and/or significant contact)	
Use descriptor covered	PROC 5	
Exposure Assessment Method	Tool used: Advanced Reach Tool (ART)	
Product characteristic		
Physical state	liquid	Operation conditions: ambient temperature
Concentration of substance	<25	%
Fugacity	medium	
Vapour pressure of the substance	2.5 kPa (20 °C)	
Amounts used		
Not relevant in ART		
Frequency and duration of use/exposure		
Duration of exposure	8	hours per day
Frequency of exposure	≤ 240	days/year
Other given operational conditions affecting workers exposure		
Location	Indoors	
Domain	Industrial	
Technical conditions and measures at process level (source) to prevent release		
Process under low containment		
Technical conditions and measures to control dispersion from source towards the worker		
Appropriate local exhaust ventilation	Provide extract ventilation to points where emissions occur	
Organisational measures to prevent /limit releases, dispersion and exposure		
Avoiding frequent and direct contact with substance. Minimisation of manual phases. Regular cleaning of equipment and work area. Supervision in place to check that the RMMs in place are being used correctly and OCs followed.		
Conditions and measures related to personal protection, hygiene and health evaluation		



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Use of suitable respiratory protection	Cross reference to General Risk Management Measures and Qualitative Exposure Assessment (see beginning of chap.9)		
Use of suitable chemical resistant gloves			
Use of suitable eye protection			
Control of workers exposure for PROC 8a			
Title information related to contributing scenario			
Processes, tasks, activities covered	Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities		
Use descriptor covered	PROC 8a		
Exposure Assessment Method	Tool used: Advanced Reach Tool (ART)		
Product characteristic			
Physical state	liquid	Operation conditions: ambient temperature	
Concentration of substance	<25	%	
Fugacity	medium		
Vapour pressure of the substance	2.5 kPa (20 °C)		
Amounts used			
Not relevant in ART			
Frequency and duration of use/exposure			
Duration of exposure	6	hours per day	
Frequency of exposure	≤ 240	days/year	
Other given operational conditions affecting workers exposure			
Location	Indoors		
Domain	Industrial		
Technical conditions and measures at process level (source) to prevent release			
Process under low containment			
Technical conditions and measures to control dispersion from source towards the worker			
Appropriate local exhaust ventilation	Provide extract ventilation to points where emissions occur		
Organisational measures to prevent /limit releases, dispersion and exposure			
Avoiding frequent and direct contact with substance. Minimisation of manual phases. Regular cleaning of equipment and work area. Supervision in place to check that the RMMs in place are being used correctly and OCs followed.			
Conditions and measures related to personal protection, hygiene and health evaluation			
Use of suitable respiratory protection	Cross reference to General Risk Management Measures and Qualitative Exposure Assessment (see beginning of chap.9)		
Use of suitable chemical resistant gloves			
Use of suitable eye protection			



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Control of workers exposure for PROC 8b		
Title information related to contributing scenario		
Processes, tasks, activities covered	Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities	
Use descriptor covered	PROC 8b	
Exposure Assessment Method	Tool used: Advanced Reach Tool (ART)	
Product characteristic		
Physical state	liquid	Operation conditions: ambient temperature
Concentration of substance	<25	%
Fugacity	medium	
Vapour pressure of the substance	2.5 kPa (20 °C)	
Amounts used		
Not relevant in ART		
Frequency and duration of use/exposure		
Duration of exposure	6	hours per day
Frequency of exposure	≤ 240	days/year
Other given operational conditions affecting workers exposure		
Location	Indoors	
Domain	Industrial	
Technical conditions and measures at process level (source) to prevent release		
Process under low containment		
Technical conditions and measures to control dispersion from source towards the worker		
Appropriate local exhaust ventilation	Provide extract ventilation to points where emissions occur	
Organisational measures to prevent /limit releases, dispersion and exposure		
Avoiding frequent and direct contact with substance. Minimisation of manual phases. Regular cleaning of equipment and work area. Supervision in place to check that the RMMs in place are being used correctly and OCs followed.		
Conditions and measures related to personal protection, hygiene and health evaluation		
Use of suitable respiratory protection	Cross reference to General Risk Management Measures and Qualitative Exposure Assessment (see beginning of chap.9)	
Use of suitable chemical resistant gloves		
Use of suitable eye protection		
Control of workers exposure for PROC 9		
Title information related to contributing scenario		
Processes, tasks, activities covered	Transfer of substance or preparation into small containers	



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	(dedicated filling line, including weighing)		
Use descriptor covered	PROC 9		
Exposure Assessment Method	Tool used: Advanced Reach Tool (ART)		
Product characteristic			
Physical state	liquid	Operation conditions: ambient temperature	
Concentration of substance	<25	%	
Fugacity	medium		
Vapour pressure of the substance	2.5 kPa (20 °C)		
Amounts used			
Not relevant in ART			
Frequency and duration of use/exposure			
Duration of exposure	8	hours per day	
Frequency of exposure	≤ 240	days/year	
Other given operational conditions affecting workers exposure			
Location	Indoors		
Domain	Industrial		
Technical conditions and measures at process level (source) to prevent release			
Process under low containment			
Technical conditions and measures to control dispersion from source towards the worker			
Appropriate local exhaust ventilation	Provide extract ventilation to points where emissions occur		
Organisational measures to prevent /limit releases, dispersion and exposure			
Avoiding frequent and direct contact with substance. Minimisation of manual phases. Regular cleaning of equipment and work area. Supervision in place to check that the RMMs in place are being used correctly and OCs followed.			
Conditions and measures related to personal protection, hygiene and health evaluation			
Use of suitable respiratory protection	Cross reference to General Risk Management Measures and Qualitative Exposure Assessment (see beginning of chap.9)		
Use of suitable chemical resistant gloves			
Use of suitable eye protection			
Control of workers exposure for PROC 13			
Title information related to contributing scenario			
Processes, tasks, activities covered	Treatment of articles by dipping and pouring		
Use descriptor covered	PROC 13		
Exposure Assessment Method	Tool used: Advanced Reach Tool (ART)		
Product characteristic			



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Physical state	liquid	Operation conditions: ambient temperature
Concentration of substance	<25	%
Fugacity	medium	
Vapour pressure of the substance	2.5 kPa (20 °C)	
Amounts used		
Not relevant in ART		
Frequency and duration of use/exposure		
Duration of exposure	8	hours per day
Frequency of exposure	≤ 240	days/year
Other given operational conditions affecting workers exposure		
Location	Indoors	
Domain	Industrial	
Technical conditions and measures at process level (source) to prevent release		
Process under medium containment; Minimise exposure by ventilated partial enclosure of the operator or equipment.		
Technical conditions and measures to control dispersion from source towards the worker		
Appropriate local exhaust ventilation	Provide extract ventilation to points where emissions occur	
Organisational measures to prevent /limit releases, dispersion and exposure		
Avoiding frequent and direct contact with substance. Minimisation of manual phases. Regular cleaning of equipment and work area. Supervision in place to check that the RMMs in place are being used correctly and OCs followed.		
Conditions and measures related to personal protection, hygiene and health evaluation		
Use of suitable respiratory protection	Cross reference to General Risk Management Measures and Qualitative Exposure Assessment (see beginning of chap.9)	
Use of suitable chemical resistant gloves		
Use of suitable eye protection		
Control of environmental exposure for ERC 6 b		
Product characteristics	Substance is a unique structure. Non-hydrophobic. Readily degradable. Concentration: < 25 %	
European tonnage	12.05 kt of Cl ₂ equivalent have been used in Europe in 1994 (300 t as chlorine gas and 11.75 kt as bleach).	
Frequency and duration of use	Continuous release. Emission Days: 360 days/year	
Environmental factors not influenced by risk management	Local freshwater dilution factor 10 Local marine water dilution factor 100	



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Other Operational Conditions of use affecting environmental exposure	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
Technical conditions and measures at process level (source) to prevent release	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.
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	Wool chlorination performed in an acid 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
Organisation measures to prevent/limit release from site	Prevent environmental discharge consistent with regulatory requirement
Conditions and measures related to industrial or municipal sewage treatment plant	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	External treatment and disposal of waste should comply with applicable local and/or national regulations.
Exposure Estimation	
Workers: Used Advanced Reach Tool (ART) Environment: No releases in environment are expected but in worst case the qualitative approach is used to conclude safe use.	
Guidance to check compliance with 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.	



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4: Industrial use in sewage and cooling or heating water treatment

Number of the ES	5	
Title of exposure scenario	Industrial use in sewage and cooling or heating water treatment	
List of all use descriptors related to the life cycle stage	SU: 3, 23 PC : 20, 37 PROCs: 1, 2, 3, 4, 5, 8a, 8b, 9, ERC: 6 b	
Name of contributing environmental scenario and corresponding ERC	ERC 6 b Industrial use of reactive processing aids	
Name(s) of contributing worker scenarios and corresponding PROCs	PROC 1: Use in closed process, no likelihood of exposure PROC 2: Use in closed, continuous process with occasional controlled exposure PROC 3: Use in closed batch process (synthesis or formulation) PROC 4: Use in batch and other process (synthesis) where opportunity for exposure arises PROC 5: Mixing or blending in batch processes (multistage and/or significant contact) PROC 8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities PROC 8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities PROC 9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing)	
Contributing exposure scenario controlling worker exposure for PROC 1, 2, 3, 4, 5, 8a, 8b, 9		
Control of workers exposure for PROC 1		
Title information related to contributing scenario		
Processes, tasks, activities covered	Use in closed process, no likelihood of exposure	
Use descriptor covered	PROC 1	
Exposure Assessment Method	Tool used: Advanced Reach Tool (ART)	
Product characteristic		
Physical state	liquid	Operation conditions: ambient temperature
Concentration of substance	<25	%
Fugacity	medium	



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Vapour pressure of the substance	2.5 kPa (20 °C)		
Amounts used			
Not relevant in ART			
Frequency and duration of use/exposure			
Duration of exposure	8	hours/day	
Frequency of exposure	≤ 240	days/year	
Other given operational conditions affecting workers exposure			
Location	Indoors		
Domain	Industrial		
Technical conditions and measures at process level (source) to prevent release			
Handle substance within a closed system [E47].			
Technical conditions and measures to control dispersion from source towards the worker			
Local exhaust ventilation required	Not relevant (closed system)		
Organisational measures to prevent /limit releases, dispersion and exposure			
Not relevant			
Conditions and measures related to personal protection, hygiene and health evaluation			
Not relevant			
Control of workers exposure for PROC 2			
Title information related to contributing scenario			
Processes, tasks, activities covered	Use in closed, continuous process with occasional controlled exposure		
Use descriptor covered	PROC 2		
Exposure Assessment Method	Tool used: Advanced Reach Tool (ART)		
Product characteristic			
Physical state	liquid	Operation conditions: ambient temperature	
Concentration of substance	<25	%	
Fugacity	medium		
Vapour pressure of the substance	2.5 kPa (20 °C)		
Amounts used			
Not relevant in ART			
Frequency and duration of use/exposure			
Duration of exposure	8	hours per day	



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Frequency of exposure	≤ 240	days/year	
Other given operational conditions affecting workers exposure			
Location	Indoors		
Domain	Industrial		
Technical conditions and measures at process level (source) to prevent release			
Process under low containment			
Technical conditions and measures to control dispersion from source towards the worker			
Appropriate local exhaust ventilation	Provide extract ventilation to points where emissions occur		
Organisational measures to prevent /limit releases, dispersion and exposure			
Avoiding frequent and direct contact with substance. Minimisation of manual phases. Regular cleaning of equipment and work area. Supervision in place to check that the RMMs in place are being used correctly and OCs followed.			
Conditions and measures related to personal protection, hygiene and health evaluation			
Use of suitable respiratory protection	Cross reference to General Risk Management Measures and Qualitative Exposure Assessment (see beginning of chap.9)		
Use of suitable chemical resistant gloves			
Use of suitable eye protection			
Control of workers exposure for PROC 3			
Title information related to contributing scenario			
Processes, tasks, activities covered	Use in closed batch process (synthesis or formulation)		
Use descriptor covered	PROC 3		
Exposure Assessment Method	Tool used: Advanced Reach Tool (ART)		
Product characteristic			
Physical state	liquid	Operation conditions: ambient temperature	
Concentration of substance	<25	%	
Fugacity	medium		
Vapour pressure of the substance	2.5 kPa (20 °C)		
Amounts used			
Not relevant in ART			
Frequency and duration of use/exposure			
Duration of exposure	8	hours per day	
Frequency of exposure	≤ 240	days/year	
Other given operational conditions affecting workers exposure			
Location	Indoors		
Domain	Industrial		



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Technical conditions and measures at process level (source) to prevent release		
Process under low containment		
Technical conditions and measures to control dispersion from source towards the worker		
Appropriate local exhaust ventilation	Provide extract ventilation to points where emissions occur	
Organisational measures to prevent /limit releases, dispersion and exposure		
Avoiding frequent and direct contact with substance. Minimisation of manual phases. Regular cleaning of equipment and work area. Supervision in place to check that the RMMs in place are being used correctly and OCs followed.		
Conditions and measures related to personal protection, hygiene and health evaluation		
Use of suitable respiratory protection	Cross reference to General Risk Management Measures and Qualitative Exposure Assessment (see beginning of chap.9)	
Use of suitable chemical resistant gloves		
Use of suitable eye protection		
Control of workers exposure for PROC 4		
Title information related to contributing scenario		
Processes, tasks, activities covered	Use in batch and other process (synthesis) where opportunity for exposure arises	
Use descriptor covered	PROC 4	
Exposure Assessment Method	Tool used: Advanced Reach Tool (ART)	
Product characteristic		
Physical state	liquid	Operation conditions: ambient temperature
Concentration of substance	<25	%
Fugacity	medium	
Vapour pressure of the substance	2.5 kPa (20 °C)	
Amounts used		
Not relevant in ART		
Frequency and duration of use/exposure		
Duration of exposure	8	hours per day
Frequency of exposure	≤ 240	days/year
Other given operational conditions affecting workers exposure		
Location	Indoors	
Domain	Industrial	
Technical conditions and measures at process level (source) to prevent release		
Process under low containment		
Technical conditions and measures to control dispersion from source towards the worker		



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Appropriate local exhaust ventilation	Provide extract ventilation to points where emissions occur		
Organisational measures to prevent /limit releases, dispersion and exposure			
Avoiding frequent and direct contact with substance. Minimisation of manual phases. Regular cleaning of equipment and work area. Supervision in place to check that the RMMs in place are being used correctly and OCs followed.			
Conditions and measures related to personal protection, hygiene and health evaluation			
Use of suitable respiratory protection	Cross reference to General Risk Management Measures and Qualitative Exposure Assessment (see beginning of chap.9)		
Use of suitable chemical resistant gloves			
Use of suitable eye protection			
Control of workers exposure for PROC 5			
Title information related to contributing scenario			
Processes, tasks, activities covered	Mixing or blending in batch processes (multistage and/or significant contact)		
Use descriptor covered	PROC 5		
Exposure Assessment Method	Tool used: Advanced Reach Tool (ART)		
Product characteristic			
Physical state	liquid	Operation conditions: ambient temperature	
Concentration of substance	<25	%	
Fugacity	medium		
Vapour pressure of the substance	2.5 kPa (20 °C)		
Amounts used			
Not relevant in ART			
Frequency and duration of use/exposure			
Duration of exposure	8	hours per day	
Frequency of exposure	≤ 240	days/year	
Other given operational conditions affecting workers exposure			
Location	Indoors		
Domain	Industrial		
Technical conditions and measures at process level (source) to prevent release			
Process under low containment			
Technical conditions and measures to control dispersion from source towards the worker			
Appropriate local exhaust ventilation	Provide extract ventilation to points where emissions occur		
Organisational measures to prevent /limit releases, dispersion and exposure			
Avoiding frequent and direct contact with substance. Minimisation of manual phases. Regular cleaning of			



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equipment and work area. Supervision in place to check that the RMMs in place are being used correctly and OCs followed.		
Conditions and measures related to personal protection, hygiene and health evaluation		
Use of suitable respiratory protection	Cross reference to General Risk Management Measures and Qualitative Exposure Assessment (see beginning of chap.9)	
Use of suitable chemical resistant gloves		
Use of suitable eye protection		
Control of workers exposure for PROC 8a		
Title information related to contributing scenario		
Processes, tasks, activities covered	Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities	
Use descriptor covered	PROC 8a	
Exposure Assessment Method	Tool used: Advanced Reach Tool (ART)	
Product characteristic		
Physical state	liquid	Operation conditions: ambient temperature
Concentration of substance	<25	%
Fugacity	medium	
Vapour pressure of the substance	2.5 kPa (20 °C)	
Amounts used		
Not relevant in ART		
Frequency and duration of use/exposure		
Duration of exposure	6	hours per day
Frequency of exposure	≤ 240	days/year
Other given operational conditions affecting workers exposure		
Location	Indoors	
Domain	Industrial	
Technical conditions and measures at process level (source) to prevent release		
Process under low containment		
Technical conditions and measures to control dispersion from source towards the worker		
Appropriate local exhaust ventilation	Provide extract ventilation to points where emissions occur	
Organisational measures to prevent /limit releases, dispersion and exposure		
Avoiding frequent and direct contact with substance. Minimisation of manual phases. Regular cleaning of equipment and work area. Supervision in place to check that the RMMs in place are being used correctly and OCs followed.		
Conditions and measures related to personal protection, hygiene and health evaluation		



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Use of suitable respiratory protection	Cross reference to General Risk Management Measures and Qualitative Exposure Assessment (see beginning of chap.9)	
Use of suitable chemical resistant gloves		
Use of suitable eye protection		
Control of workers exposure for PROC 8b		
Title information related to contributing scenario		
Processes, tasks, activities covered	Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities	
Use descriptor covered	PROC 8b	
Exposure Assessment Method	Tool used: Advanced Reach Tool (ART)	
Product characteristic		
Physical state	liquid	Operation conditions: ambient temperature
Concentration of substance	<25	%
Fugacity	medium	
Vapour pressure of the substance	2.5 kPa (20 °C)	
Amounts used		
Not relevant in ART		
Frequency and duration of use/exposure		
Duration of exposure	6	hours per day
Frequency of exposure	≤ 240	days/year
Other given operational conditions affecting workers exposure		
Location	Indoors	
Domain	Industrial	
Technical conditions and measures at process level (source) to prevent release		
Process under low containment		
Technical conditions and measures to control dispersion from source towards the worker		
Appropriate local exhaust ventilation	Provide extract ventilation to points where emissions occur	
Organisational measures to prevent /limit releases, dispersion and exposure		
Avoiding frequent and direct contact with substance. Minimisation of manual phases. Regular cleaning of equipment and work area. Supervision in place to check that the RMMs in place are being used correctly and OCs followed.		
Conditions and measures related to personal protection, hygiene and health evaluation		
Use of suitable respiratory protection	Cross reference to General Risk Management Measures and Qualitative Exposure Assessment (see beginning of chap.9)	
Use of suitable chemical resistant gloves		
Use of suitable eye protection		



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Control of workers exposure for PROC 9		
Title information related to contributing scenario		
Processes, tasks, activities covered	Transfer of substance or preparation into small containers (dedicated filling line, including weighing)	
Use descriptor covered	PROC 9	
Exposure Assessment Method	Tool used: Advanced Reach Tool (ART)	
Product characteristic		
Physical state	liquid	Operation conditions: ambient temperature
Concentration of substance	<25	%
Fugacity	medium	
Vapour pressure of the substance	2.5 kPa (20 °C)	
Amounts used		
Not relevant in ART		
Frequency and duration of use/exposure		
Duration of exposure	8	hours per day
Frequency of exposure	≤ 240	days/year
Other given operational conditions affecting workers exposure		
Location	Indoors	
Domain	Industrial	
Technical conditions and measures at process level (source) to prevent release		
Process under low containment		
Technical conditions and measures to control dispersion from source towards the worker		
Appropriate local exhaust ventilation	Provide extract ventilation to points where emissions occur	
Organisational measures to prevent /limit releases, dispersion and exposure		
Avoiding frequent and direct contact with substance. Minimisation of manual phases. Regular cleaning of equipment and work area. Supervision in place to check that the RMMs in place are being used correctly and OCs followed.		
Conditions and measures related to personal protection, hygiene and health evaluation		
Use of suitable respiratory protection	Cross reference to General Risk Management Measures and Qualitative Exposure Assessment (see beginning of chap.9)	
Use of suitable chemical resistant gloves		
Use of suitable eye protection		
Control of environmental exposure for ERC 6 b		
Product characteristics	Substance is a unique structure. Non-hydrophobic. Readily degradable.	



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	Concentration: < 25%
European tonnage	Sewage treatment: 15.18 kt/year and 9.55 kt/year chlorine equivalent have been used in Europe in 1994 Cooling water: The consumption of hypochlorite produced by the chemical industry for cooling water applications is estimated at 5.58 kt/year chlorine equivalent. The use of gaseous chlorine is rather similar with 4.80 kt/year chlorine equivalent for the year 1994
Frequency and duration of use	Continuous release. Emission Days: 360 days/year
Environmental factors not influenced by risk management	Local freshwater dilution factor 10 Local marine water dilution factor 100
Other Operational Conditions of use affecting environmental exposure	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 Cl ₂ /L. The chlorine dosages are designed in order to minimise the chlorine discharges to the environment.
Technical conditions and measures at process level (source) to prevent release	Common practices vary across sites but no releases are expected.
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	NaClO must be reduced completely to sodium chloride during the process avoiding critical releases in environment.
Organisation measures to prevent/limit release from site	Prevent environmental discharge consistent with regulatory requirement
Conditions and measures related to industrial or municipal sewage treatment plant	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	External treatment and disposal of waste should comply with applicable local and/or national regulations.
Exposure Estimation	
Workers: Used Advanced Reach Tool (ART) Environment: No releases in environment are expected but in worst case the qualitative approach is used to conclude safe use.	
Guidance to check compliance with 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. Any biocidal use of sodium hypochlorite is covered by a dossier submitted under the Biocide Directive No 98/8/EC and also included in the EU Risk Assessment Report on sodium hypochlorite. Exposures were included to reflect the worst case.	



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5: Industrial use in pulp and paper

Number of the ES	6	
Title of exposure scenario	Industrial use in pulp and paper	
List of all use descriptors related to the life cycle stage	SU: 3, 6b PC : 26 PROC: 1, 2, 3, 4, 5, 8a, 8b, 9 ERC: 6 b	
Name of contributing environmental scenario and corresponding ERC	ERC 6 b Industrial use of reactive processing aids	
Name(s) of contributing worker scenarios and corresponding PROCs	PROC 1: Use in closed process, no likelihood of exposure PROC 2: Use in closed, continuous process with occasional controlled exposure PROC 3: Use in closed batch process (synthesis or formulation) PROC 4: Use in batch and other process (synthesis) where opportunity for exposure arises PROC 5: Mixing or blending in batch processes (multistage and/or significant contact) PROC 8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities PROC 8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities PROC 9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing)	
Contributing exposure scenario controlling worker exposure for PROC 1, 2, 3, 4, 5, 8a, 8b, 9		
Control of workers exposure for PROC 1		
Title information related to contributing scenario		
Processes, tasks, activities covered	Use in closed process, no likelihood of exposure	
Use descriptor covered	PROC 1	
Exposure Assessment Method	Tool used: Advanced Reach Tool (ART)	
Product characteristic		
Physical state	liquid	Operation conditions: ambient temperature
Concentration of substance	<25	%
Fugacity	medium	
Vapour pressure of the substance	2.5 kPa (20 °C)	



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Amounts used		
Not relevant in ART		
Frequency and duration of use/exposure		
Duration of exposure	8	hours/day
Frequency of exposure	≤ 240	days/year
Other given operational conditions affecting workers exposure		
Location	Indoors	
Domain	Industrial	
Technical conditions and measures at process level (source) to prevent release		
Handle substance within a closed system [E47].		
Technical conditions and measures to control dispersion from source towards the worker		
Local exhaust ventilation required	Not relevant (closed system)	
Organisational measures to prevent /limit releases, dispersion and exposure		
Not relevant		
Conditions and measures related to personal protection, hygiene and health evaluation		
Not relevant		
Control of workers exposure for PROC 2		
Title information related to contributing scenario		
Processes, tasks, activities covered	Use in closed, continuous process with occasional controlled exposure	
Use descriptor covered	PROC 2	
Exposure Assessment Method	Tool used: Advanced Reach Tool (ART)	
Product characteristic		
Physical state	liquid	Operation conditions: ambient temperature
Concentration of substance	<25	%
Fugacity	medium	
Vapour pressure of the substance	2.5 kPa (20 °C)	
Amounts used		
Not relevant in ART		
Frequency and duration of use/exposure		
Duration of exposure	8	hours per day
Frequency of exposure	≤ 240	days/year



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Other given operational conditions affecting workers exposure		
Location	Indoors	
Domain	Industrial	
Technical conditions and measures at process level (source) to prevent release		
Process under low containment		
Technical conditions and measures to control dispersion from source towards the worker		
Appropriate local exhaust ventilation	Provide extract ventilation to points where emissions occur	
Organisational measures to prevent /limit releases, dispersion and exposure		
Avoiding frequent and direct contact with substance. Minimisation of manual phases. Regular cleaning of equipment and work area. Supervision in place to check that the RMMs in place are being used correctly and OCs followed.		
Conditions and measures related to personal protection, hygiene and health evaluation		
Use of suitable respiratory protection	Cross reference to General Risk Management Measures and Qualitative Exposure Assessment (see beginning of chap.9)	
Use of suitable chemical resistant gloves		
Use of suitable eye protection		
Control of workers exposure for PROC 3		
Title information related to contributing scenario		
Processes, tasks, activities covered	Use in closed batch process (synthesis or formulation)	
Use descriptor covered	PROC 3	
Exposure Assessment Method	Tool used: Advanced Reach Tool (ART)	
Product characteristic		
Physical state	liquid	Operation conditions: ambient temperature
Concentration of substance	<25	%
Fugacity	medium	
Vapour pressure of the substance	2.5 kPa (20 °C)	
Amounts used		
Not relevant in ART		
Frequency and duration of use/exposure		
Duration of exposure	8	hours per day
Frequency of exposure	≤ 240	days/year
Other given operational conditions affecting workers exposure		
Location	Indoors	
Domain	Industrial	
Technical conditions and measures at process level (source) to prevent release		



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Process under low containment		
Technical conditions and measures to control dispersion from source towards the worker		
Appropriate local exhaust ventilation	Provide extract ventilation to points where emissions occur	
Organisational measures to prevent /limit releases, dispersion and exposure		
Avoiding frequent and direct contact with substance. Minimisation of manual phases. Regular cleaning of equipment and work area. Supervision in place to check that the RMMs in place are being used correctly and OCs followed.		
Conditions and measures related to personal protection, hygiene and health evaluation		
Use of suitable respiratory protection	Cross reference to General Risk Management Measures and Qualitative Exposure Assessment (see beginning of chap.9)	
Use of suitable chemical resistant gloves		
Use of suitable eye protection		
Control of workers exposure for PROC 4		
Title information related to contributing scenario		
Processes, tasks, activities covered	Use in batch and other process (synthesis) where opportunity for exposure arises	
Use descriptor covered	PROC 4	
Exposure Assessment Method	Tool used: Advanced Reach Tool (ART)	
Product characteristic		
Physical state	liquid	Operation conditions: ambient temperature
Concentration of substance	<25	%
Fugacity	medium	
Vapour pressure of the substance	2.5 kPa (20 °C)	
Amounts used		
Not relevant in ART		
Frequency and duration of use/exposure		
Duration of exposure	8	hours per day
Frequency of exposure	≤ 240	days/year
Other given operational conditions affecting workers exposure		
Location	Indoors	
Domain	Industrial	
Technical conditions and measures at process level (source) to prevent release		
Process under low containment		
Technical conditions and measures to control dispersion from source towards the worker		
Appropriate local exhaust ventilation	Provide extract ventilation to points where emissions occur	



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Organisational measures to prevent /limit releases, dispersion and exposure		
Avoiding frequent and direct contact with substance. Minimisation of manual phases. Regular cleaning of equipment and work area. Supervision in place to check that the RMMs in place are being used correctly and OCs followed.		
Conditions and measures related to personal protection, hygiene and health evaluation		
Use of suitable respiratory protection	Cross reference to General Risk Management Measures and Qualitative Exposure Assessment (see beginning of chap.9)	
Use of suitable chemical resistant gloves		
Use of suitable eye protection		
Control of workers exposure for PROC 5		
Title information related to contributing scenario		
Processes, tasks, activities covered	Mixing or blending in batch processes (multistage and/or significant contact)	
Use descriptor covered	PROC 5	
Exposure Assessment Method	Tool used: Advanced Reach Tool (ART)	
Product characteristic		
Physical state	liquid	Operation conditions: ambient temperature
Concentration of substance	<25	%
Fugacity	medium	
Vapour pressure of the substance	2.5 kPa (20 °C)	
Amounts used		
Not relevant in ART		
Frequency and duration of use/exposure		
Duration of exposure	8	hours per day
Frequency of exposure	≤ 240	days/year
Other given operational conditions affecting workers exposure		
Location	Indoors	
Domain	Industrial	
Technical conditions and measures at process level (source) to prevent release		
Process under low containment		
Technical conditions and measures to control dispersion from source towards the worker		
Appropriate local exhaust ventilation	Provide extract ventilation to points where emissions occur	
Organisational measures to prevent /limit releases, dispersion and exposure		
Avoiding frequent and direct contact with substance. Minimisation of manual phases. Regular cleaning of equipment and work area. Supervision in place to check that the RMMs in place are being used correctly and OCs followed.		



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Conditions and measures related to personal protection, hygiene and health evaluation			
Use of suitable respiratory protection	Cross reference to General Risk Management Measures and Qualitative Exposure Assessment (see beginning of chap.9)		
Use of suitable chemical resistant gloves			
Use of suitable eye protection			
Control of workers exposure for PROC 8a			
Title information related to contributing scenario			
Processes, tasks, activities covered	Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities		
Use descriptor covered	PROC 8a		
Exposure Assessment Method	Tool used: Advanced Reach Tool (ART)		
Product characteristic			
Physical state	liquid	Operation conditions: ambient temperature	
Concentration of substance	<25	%	
Fugacity	medium		
Vapour pressure of the substance	2.5 kPa (20 °C)		
Amounts used			
Not relevant in ART			
Frequency and duration of use/exposure			
Duration of exposure	6	hours per day	
Frequency of exposure	≤ 240	days/year	
Other given operational conditions affecting workers exposure			
Location	Indoors		
Domain	Industrial		
Technical conditions and measures at process level (source) to prevent release			
Process under low containment			
Technical conditions and measures to control dispersion from source towards the worker			
Appropriate local exhaust ventilation	Provide extract ventilation to points where emissions occur		
Organisational measures to prevent /limit releases, dispersion and exposure			
Avoiding frequent and direct contact with substance. Minimisation of manual phases. Regular cleaning of equipment and work area. Supervision in place to check that the RMMs in place are being used correctly and OCs followed.			
Conditions and measures related to personal protection, hygiene and health evaluation			
Use of suitable respiratory protection	Cross reference to General Risk Management Measures and		
Use of suitable chemical resistant gloves			



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Use of suitable eye protection	Qualitative Exposure Assessment (see beginning of chap.9)		
Control of workers exposure for PROC 8b			
Title information related to contributing scenario			
Processes, tasks, activities covered	Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities		
Use descriptor covered	PROC 8b		
Exposure Assessment Method	Tool used: Advanced Reach Tool (ART)		
Product characteristic			
Physical state	liquid	Operation conditions: ambient temperature	
Concentration of substance	<25	%	
Fugacity	medium		
Vapour pressure of the substance	2.5 kPa (20 °C)		
Amounts used			
Not relevant in ART			
Frequency and duration of use/exposure			
Duration of exposure	6	hours per day	
Frequency of exposure	≤ 240	days/year	
Other given operational conditions affecting workers exposure			
Location	Indoors		
Domain	Industrial		
Technical conditions and measures at process level (source) to prevent release			
Process under low containment			
Technical conditions and measures to control dispersion from source towards the worker			
Appropriate local exhaust ventilation	Provide extract ventilation to points where emissions occur		
Organisational measures to prevent /limit releases, dispersion and exposure			
Avoiding frequent and direct contact with substance. Minimisation of manual phases. Regular cleaning of equipment and work area. Supervision in place to check that the RMMs in place are being used correctly and OCs followed.			
Conditions and measures related to personal protection, hygiene and health evaluation			
Use of suitable respiratory protection	Cross reference to General Risk Management Mesures and Qualitative Exposure Assessment (see beginning of chap.9)		
Use of suitable chemical resistant gloves			
Use of suitable eye protection			
Control of workers exposure for PROC 9			
Title information related to contributing scenario			



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Processes, tasks, activities covered	Transfer of substance or preparation into small containers (dedicated filling line, including weighing)		
Use descriptor covered	PROC 9		
Exposure Assessment Method	Tool used: Advanced Reach Tool (ART)		
Product characteristic			
Physical state	liquid	Operation conditions: ambient temperature	
Concentration of substance	<25	%	
Fugacity	medium		
Vapour pressure of the substance	2.5 kPa (20 °C)		
Amounts used			
Not relevant in ART			
Frequency and duration of use/exposure			
Duration of exposure	8	hours per day	
Frequency of exposure	≤ 240	days/year	
Other given operational conditions affecting workers exposure			
Location	Indoors		
Domain	Industrial		
Technical conditions and measures at process level (source) to prevent release			
Process under low containment			
Technical conditions and measures to control dispersion from source towards the worker			
Appropriate local exhaust ventilation	Provide extract ventilation to points where emissions occur		
Organisational measures to prevent /limit releases, dispersion and exposure			
Avoiding frequent and direct contact with substance. Minimisation of manual phases. Regular cleaning of equipment and work area. Supervision in place to check that the RMMs in place are being used correctly and OCs followed.			
Conditions and measures related to personal protection, hygiene and health evaluation			
Use of suitable respiratory protection	Cross reference to General Risk Management Measures and Qualitative Exposure Assessment (see beginning of chap.9)		
Use of suitable chemical resistant gloves			
Use of suitable eye protection			
Control of environmental exposure for ERC 6 b			
Product characteristics	Substance is a unique structure. Non-hydrophobic. Readily biodegradable. Concentration: < 25%		
European tonnage	Consumption for the year 1994 was 17.43 and 8.53 kt/year chlorine equivalent for chlorine and hypochlorite, respectively		



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Frequency and duration of use	Continuous release. Emission Days: 360 days/year
Environmental factors not influenced by risk management	Local freshwater dilution factor 10 Local marine water dilution factor 100
Other Operational Conditions of use affecting environmental exposure	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 at process level (source) to prevent release	Only two specific applications are considered acceptable in pulp and paper industry: - disinfection of the paper machine system - breaking down of the wet strength resins Common practices vary across sites but no releases are expected.
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	NaClO must be reduced completely to sodium chloride during the process avoiding critical releases in environment.
Organisation measures to prevent/limit release from site	Prevent environmental discharge consistent with regulatory requirement, especially Biocide Directive No 98/8/EC
Conditions and measures related to industrial or municipal sewage treatment plant	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	External treatment and disposal of waste should comply with applicable local and/or national regulations.
Exposure Estimation	
Workers: Used Advanced Reach Tool (ART) Environment: No releases in environment are expected but in worst case the qualitative approach is used to conclude safe use.	
Guidance to check compliance with 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. Any biocidal use of sodium hypochlorite is covered by a dossier submitted under the Biocide Directive No 98/8/EC and also included in the EU Risk Assessment Report on sodium hypochlorite. Exposures were included to reflect the worst case.	

6: Industrial cleaning use

Number of the ES	7
Title of exposure scenario	Industrial cleaning use
List of all use descriptors related to the life cycle stage	SU: 3, 4 PC : 35 PROCs: 5, 7, 8a, 9, 10, 13



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		ERC: 6 b	
Name of contributing environmental scenario and corresponding ERC		ERC 6 b Industrial use of reactive processing aids	
Name(s) of contributing worker scenarios and corresponding PROCs		PROC 5: Mixing or blending in batch processes (multistage and/or significant contact) PROC 7: Industrial spraying PROC 8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities PROC 9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing) PROC 10: Roller application or brushing PROC 13: Treatment of articles by dipping and pouring	
Contributing exposure scenario controlling worker exposure for PROC 5, 7, 8a, 9, 10, 13			
Control of workers exposure for PROC 5			
Title information related to contributing scenario			
Processes, tasks, activities covered		Mixing or blending in batch processes (multistage and/or significant contact)	
Use descriptor covered		PROC 5	
Processes, tasks, activities covered		Manufacture or formulation of chemical products or articles using technologies related to mixing and blending of solid or liquid materials, and where the process is in stages and provides the opportunity for significant contact at any stage.	
Exposure Assessment Method		Tool used: Advanced Reach Tool (ART)	
Product characteristic			
Physical state	liquid	Operation conditions: ambient temperature	
Concentration of substance	<25	%	
Fugacity	medium		
Vapour pressure of the substance	2.5 kPa (20 °C)		
Amounts used			
Not relevant in ART			
Frequency and duration of use/exposure			
Duration of exposure	8	hours per day	
Frequency of exposure	≤ 240	days/year	
Other given operational conditions affecting workers exposure			



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Location	Indoors		
Domain	Industrial		
Technical conditions and measures at process level (source) to prevent release			
Process under low containment			
Technical conditions and measures to control dispersion from source towards the worker			
Appropriate local exhaust ventilation	Provide extract ventilation to points where emissions occur		
Organisational measures to prevent /limit releases, dispersion and exposure			
Avoiding frequent and direct contact with substance. Minimisation of manual phases. Regular cleaning of equipment and work area. Supervision in place to check that the RMMs in place are being used correctly and OCs followed.			
Conditions and measures related to personal protection, hygiene and health evaluation			
Use of suitable respiratory protection	Cross reference to General Risk Management Measures and Qualitative Exposure Assessment (see beginning of chap.9)		
Use of suitable chemical resistant gloves			
Use of suitable eye protection			
Control of workers exposure for PROC 7			
Title information related to contributing scenario			
Processes, tasks, activities covered	Industrial spraying		
Use descriptor covered	PROC 7		
Processes, tasks, activities covered	Air dispersive techniques Spraying for surface coating, adhesives, polishes/cleaners, air care products, sandblasting; Substances can be inhaled as aerosols. The energy of the aerosol particles may require advanced exposure controls; in case of coating, overspray may lead to waste water and waste.		
Exposure Assessment Method	Tool used: Advanced Reach Tool (ART)		
Product characteristic			
Physical state	liquid	Operation conditions: ambient temperature	
Concentration of substance	<25	%	
Fugacity	medium		
Vapour pressure of the substance	2.5 kPa (20 °C)		
Amounts used			
Not relevant in ART			
Frequency and duration of use/exposure			
Duration of exposure	<4	hours per day	
Frequency of exposure	≤ 240	days/year	



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Other given operational conditions affecting workers exposure			
Location	Indoors		
Domain	Industrial		
Technical conditions and measures at process level (source) to prevent release			
Process under medium containment; Minimise exposure by ventilated complete enclosure of the operator or equipment.			
Technical conditions and measures to control dispersion from source towards the worker			
Appropriate local exhaust ventilation	Provide extract ventilation to points where emissions occur		
Organisational measures to prevent /limit releases, dispersion and exposure			
Avoiding frequent and direct contact with substance. Minimisation of manual phases. Regular cleaning of equipment and work area. Supervision in place to check that the RMMs in place are being used correctly and OCs followed.			
Conditions and measures related to personal protection, hygiene and health evaluation			
Use of suitable respiratory protection	Cross reference to General Risk Management Measures and Qualitative Exposure Assessment (see beginning of chap.9)		
Use of suitable chemical resistant gloves			
Use of suitable eye protection			
Control of workers exposure for PROC 8a			
Title information related to contributing scenario			
Processes, tasks, activities covered	Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities		
Use descriptor covered	PROC 8a		
Processes, tasks, activities covered	Sampling, loading, filling, transfer, dumping, bagging in non-dedicated facilities. Exposure related to dust, vapour, aerosols or spillage, and cleaning of equipment to be expected.		
Exposure Assessment Method	Tool used: Advanced Reach Tool (ART)		
Product characteristic			
Physical state	liquid	Operation conditions: ambient temperature	
Concentration of substance	<25	%	
Fugacity	medium		
Vapour pressure of the substance	2.5 kPa (20 °C)		
Amounts used			
Not relevant in ART			
Frequency and duration of use/exposure			
Duration of exposure	6	hours per day	
Frequency of exposure	≤ 240	days/year	



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Other given operational conditions affecting workers exposure			
Location	Indoors		
Domain	Industrial		
Technical conditions and measures at process level (source) to prevent release			
Process under low containment			
Technical conditions and measures to control dispersion from source towards the worker			
Appropriate local exhaust ventilation	Provide extract ventilation to points where emissions occur		
Organisational measures to prevent /limit releases, dispersion and exposure			
Avoiding frequent and direct contact with substance. Minimisation of manual phases. Regular cleaning of equipment and work area. Supervision in place to check that the RMMs in place are being used correctly and OCs followed.			
Conditions and measures related to personal protection, hygiene and health evaluation			
Use of suitable respiratory protection	Cross reference to General Risk Management Measures and Qualitative Exposure Assessment (see beginning of chap.9)		
Use of suitable chemical resistant gloves			
Use of suitable eye protection			
Control of workers exposure for PROC 9			
Title information related to contributing scenario			
Processes, tasks, activities covered	Transfer of substance or preparation into small containers (dedicated filling line, including weighing)		
Use descriptor covered	PROC 9		
Processes, tasks, activities covered	Filling lines specifically designed to both capture vapour and aerosol emissions and minimise spillage		
Exposure Assessment Method	Tool used: Advanced Reach Tool (ART)		
Product characteristic			
Physical state	liquid	Operation conditions: ambient temperature	
Concentration of substance	<25	%	
Fugacity	medium		
Vapour pressure of the substance	2.5 kPa (20 °C)		
Amounts used			
Not relevant in ART			
Frequency and duration of use/exposure			
Duration of exposure	8	hours per day	
Frequency of exposure	≤ 240	days/year	
Other given operational conditions affecting workers exposure			



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Location	Indoors	
Domain	Industrial	
Technical conditions and measures at process level (source) to prevent release		
Process under low containment		
Technical conditions and measures to control dispersion from source towards the worker		
Appropriate local exhaust ventilation	Provide extract ventilation to points where emissions occur	
Organisational measures to prevent /limit releases, dispersion and exposure		
Avoiding frequent and direct contact with substance. Minimisation of manual phases. Regular cleaning of equipment and work area. Supervision in place to check that the RMMs in place are being used correctly and OCs followed.		
Conditions and measures related to personal protection, hygiene and health evaluation		
Use of suitable respiratory protection	Cross reference to General Risk Management Measures and Qualitative Exposure Assessment (see beginning of chap.9)	
Use of suitable chemical resistant gloves		
Use of suitable eye protection		
Control of workers exposure for PROC 10		
Title information related to contributing scenario		
Processes, tasks, activities covered	Roller application or brushing	
Use descriptor covered	PROC 10	
Processes, tasks, activities covered	Low energy spreading of e.g. coatings. Including cleaning of surfaces. Substance can be inhaled as vapours, skin contact can occur through droplets, splashes, working with wipes and handling of treated surfaces.	
Exposure Assessment Method	Tool used: Advanced Reach Tool (ART)	
Product characteristic		
Physical state	liquid	Operation conditions: ambient temperature
Concentration of substance	<25	%
Fugacity	medium	
Vapour pressure of the substance	2.5 kPa (20 °C)	
Amounts used		
Not relevant in ART		
Frequency and duration of use/exposure		
Duration of exposure	8	hours per day
Frequency of exposure	≤ 240	days/year
Other given operational conditions affecting workers exposure		



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Location	Indoors	
Domain	Industrial	
Technical conditions and measures at process level (source) to prevent release		
Process under medium containment		
Technical conditions and measures to control dispersion from source towards the worker		
Appropriate local exhaust ventilation	Provide extract ventilation to points where emissions occur	
Organisational measures to prevent /limit releases, dispersion and exposure		
Avoiding frequent and direct contact with substance. Minimisation of manual phases. Regular cleaning of equipment and work area. Supervision in place to check that the RMMs in place are being used correctly and OCs followed.		
Conditions and measures related to personal protection, hygiene and health evaluation		
Use of suitable respiratory protection	Cross reference to General Risk Management Measures and Qualitative Exposure Assessment (see beginning of chap.9)	
Use of suitable chemical resistant gloves		
Use of suitable eye protection		
Control of workers exposure for PROC 13		
Title information related to contributing scenario		
Processes, tasks, activities covered	Treatment of articles by dipping and pouring	
Use descriptor covered	PROC 13	
Processes, tasks, activities covered	Immersion operations Treatment of articles by dipping, pouring, immersing, soaking, washing out or washing in substances; including cold formation or resin type matrix. Includes handling of treated objects (e.g. after dyeing, plating,). Substance is applied to a surface by low energy techniques such as dipping the article into a bath or pouring a preparation onto a surface	
Exposure Assessment Method	Tool used: Advanced Reach Tool (ART)	
Product characteristic		
Physical state	liquid	Operation conditions: ambient temperature
Concentration of substance	<25	%
Fugacity	medium	
Vapour pressure of the substance	2.5 kPa (20 °C)	
Amounts used		
Not relevant in ART		
Frequency and duration of use/exposure		



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Duration of exposure	8	hours per day	
Frequency of exposure	≤ 240	days/year	
Other given operational conditions affecting workers exposure			
Location	Indoors		
Domain	Industrial		
Technical conditions and measures at process level (source) to prevent release			
Process under medium containment; Minimise exposure by ventilated partial enclosure of the operator or equipment.			
Technical conditions and measures to control dispersion from source towards the worker			
Appropriate local exhaust ventilation	Provide extract ventilation to points where emissions occur		
Organisational measures to prevent /limit releases, dispersion and exposure			
Avoiding frequent and direct contact with substance. Minimisation of manual phases. Regular cleaning of equipment and work area. Supervision in place to check that the RMMs in place are being used correctly and OCs followed.			
Conditions and measures related to personal protection, hygiene and health evaluation			
Use of suitable respiratory protection	Cross reference to General Risk Management Measures and Qualitative Exposure Assessment (see beginning of chap.9)		
Use of suitable chemical resistant gloves			
Use of suitable eye protection			
Control of environmental exposure for ERC 6 b			
Product characteristics	Substance is a unique structure. Non-hydrophobic. Readily degradable. Concentration: < 25 %		
European tonnage	250-450,000 tonnes per year of solution of sodium hypochlorite (5% solution).		
Frequency and duration of use	Continuous release. Emission Days: 360 days/year		
Environmental factors not influenced by risk management	Local freshwater dilution factor 10 Local marine water dilution factor 100		
Other Operational Conditions of use affecting environmental exposure	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 at process level (source) to prevent release	Common practices vary across sites and should comply with Biocide Directive No 98/8/EC.		
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	NaClO must be reduced completely to sodium chloride during the process avoiding critical releases in environment.		



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Organisation measures to prevent/limit release from site	Prevent environmental discharge consistent with regulatory requirement, especially Biocide Directive No 98/8/EC
Conditions and measures related to industrial or municipal sewage treatment plant	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	External treatment and disposal of waste should comply with applicable local and/or national regulations.
Exposure Estimation	
Workers: Used Advanced Reach Tool (ART) Environment: No releases in environment are expected but in worst case the qualitative approach is used to conclude safe use.	
Guidance to check compliance with 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. Any biocidal use of sodium hypochlorite is covered by a dossier submitted under the Biocide Directive No 98/8/EC and also included in the EU Risk Assessment Report on sodium hypochlorite. Exposures were included to reflect the worst case.	

7: Professional cleaning use

Number of the ES	8
Title of exposure scenario	Professional cleaning use
List of all use descriptors related to the life cycle stage	SU: 22 PC : 35 PROC: 5, 9, 10, 11, 13, 15 ERC: 8a, 8b, 8d, 8e
Name of contributing environmental scenario and corresponding ERC	ERC 8a Wide dispersive indoor use of processing aids in open systems ERC 8b Wide dispersive indoor use of reactive substances in open systems ERC 8d Wide dispersive outdoor use of processing aids in open systems ERC 8e Wide dispersive outdoor use of reactive substances in open systems
Name(s) of contributing worker scenarios and corresponding PROCs	PROC 5: Mixing or blending in batch processes (multistage and/or significant contact) PROC 9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing) PROC 10: Roller application or brushing



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	PROC 11: Professional spraying PROC 13: Treatment of articles by dipping and pouring PROC 15: Use as laboratory reagent		
Contributing exposure scenario controlling worker exposure for PROC 5, 9, 10, 11, 13, 15			
Control of workers exposure for PROC 5			
Title information related to contributing scenario			
Processes, tasks, activities covered	Mixing or blending in batch processes (multistage and/or significant contact)		
Use descriptor covered	PROC 5		
Processes, tasks, activities covered	Manufacture or formulation of chemical products or articles using technologies related to mixing and blending of solid or liquid materials, and where the process is in stages and provides the opportunity for significant contact at any stage.		
Exposure Assessment Method	Tool used: Advanced Reach Tool (ART)		
Product characteristic			
Physical state	liquid	Operation conditions: ambient temperature	
Concentration of substance	<5	%	
Fugacity	medium		
Vapour pressure of the substance	2.5 kPa (20 °C)		
Amounts used			
Not relevant in ART			
Frequency and duration of use/exposure			
Duration of exposure	8	hours per day	
Frequency of exposure	≤ 240	days/year	
Other given operational conditions affecting workers exposure			
Location	Indoors/outdoors		
Domain	Professional		
Technical conditions and measures at process level (source) to prevent release			
Process under low containment			
Technical conditions and measures to control dispersion from source towards the worker			
Appropriate local exhaust ventilation	no		
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. [E1]			
Organisational measures to prevent /limit releases, dispersion and exposure			



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Avoiding frequent and direct contact with substance. Minimisation of manual phases. Regular cleaning of equipment and work area. Supervision in place to check that the RMMs in place are being used correctly and OCs followed.		
Conditions and measures related to personal protection, hygiene and health evaluation		
Use of suitable respiratory protection	Cross reference to General Risk Management Measures and Qualitative Exposure Assessment (see beginning of chap.9)	
Use of suitable chemical resistant gloves		
Use of suitable eye protection		
Control of workers exposure for PROC 9		
Title information related to contributing scenario		
Processes, tasks, activities covered	Transfer of substance or preparation into small containers (dedicated filling line, including weighing)	
Use descriptor covered	PROC 9	
Processes, tasks, activities covered	Filling lines specifically designed to both capture vapour and aerosol emissions and minimise spillage	
Exposure Assessment Method	Tool used: Advanced Reach Tool (ART)	
Product characteristic		
Physical state	liquid	Operation conditions: ambient temperature
Concentration of substance	<5	%
Fugacity	medium	
Vapour pressure of the substance	2.5 kPa (20 °C)	
Amounts used		
Not relevant in ART		
Frequency and duration of use/exposure		
Duration of exposure	8	hours per day
Frequency of exposure	≤ 240	days/year
Other given operational conditions affecting workers exposure		
Location	Indoors/outdoors	
Domain	Professional	
Technical conditions and measures at process level (source) to prevent release		
Process under low containment		
Technical conditions and measures to control dispersion from source towards the worker		
Appropriate local exhaust ventilation	no	
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. [E1]		
Organisational measures to prevent /limit releases, dispersion and exposure		



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Avoiding frequent and direct contact with substance. Minimisation of manual phases. Regular cleaning of equipment and work area. Supervision in place to check that the RMMs in place are being used correctly and OCs followed.		
Conditions and measures related to personal protection, hygiene and health evaluation		
Use of suitable respiratory protection	Cross reference to General Risk Management Measures and Qualitative Exposure Assessment (see beginning of chap.9)	
Use of suitable chemical resistant gloves		
Use of suitable eye protection		
Control of workers exposure for PROC 10		
Title information related to contributing scenario		
Processes, tasks, activities covered	Roller application or brushing	
Use descriptor covered	PROC 10	
Processes, tasks, activities covered	Low energy spreading of e.g. coatings. Including cleaning of surfaces. Substance can be inhaled as vapours, skin contact can occur through droplets, splashes, working with wipes and handling of treated surfaces.	
Exposure Assessment Method	Tool used: Advanced Reach Tool (ART)	
Product characteristic		
Physical state	liquid	Operation conditions: ambient temperature
Concentration of substance	<5	%
Fugacity	medium	
Vapour pressure of the substance	2.5 kPa (20 °C)	
Amounts used		
Not relevant in ART		
Frequency and duration of use/exposure		
Duration of exposure	≤ 4	hours per day
Frequency of exposure	≤ 240	days/year
Other given operational conditions affecting workers exposure		
Location	Indoors/outdoors	
Domain	Professional	
Technical conditions and measures at process level (source) to prevent release		
Process under low containment		
Technical conditions and measures to control dispersion from source towards the worker		
Appropriate local exhaust ventilation	no	
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. [E1]		



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Organisational measures to prevent /limit releases, dispersion and exposure		
Avoiding frequent and direct contact with substance. Minimisation of manual phases. Regular cleaning of equipment and work area. Supervision in place to check that the RMMs in place are being used correctly and OCs followed.		
Conditions and measures related to personal protection, hygiene and health evaluation		
Use of suitable respiratory protection	Cross reference to General Risk Management Measures and Qualitative Exposure Assessment (see beginning of chap.9)	
Use of suitable chemical resistant gloves		
Use of suitable eye protection		
Control of workers exposure for PROC 11		
Title information related to contributing scenario		
Processes, tasks, activities covered	Professional spraying	
Use descriptor covered	PROC 11	
Processes, tasks, activities covered	Air dispersive techniques Spraying for surface coating, adhesives, polishes/cleaners, air care products, sandblasting Substances can be inhaled as aerosols. The energy of the aerosol particles may require advanced exposure controls;	
Exposure Assessment Method	Tool used: Advanced Reach Tool (ART)	
Product characteristic		
Physical state	liquid	Operation conditions: ambient temperature
Concentration of substance	<5	%
Fugacity	medium	
Vapour pressure of the substance	2.5 kPa (20 °C)	
Amounts used		
Not relevant in ART		
Frequency and duration of use/exposure		
Duration of exposure	< 1h	per day
Frequency of exposure	≤ 240	days/year
Other given operational conditions affecting workers exposure		
Location	Indoors/outdoors	
Domain	Professional	
Technical conditions and measures at process level (source) to prevent release		
Process under low containment		
Technical conditions and measures to control dispersion from source towards the worker		



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Appropriate local exhaust ventilation	no		
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. [E1]			
Organisational measures to prevent /limit releases, dispersion and exposure			
Avoiding frequent and direct contact with substance. Minimisation of manual phases. Regular cleaning of equipment and work area. Supervision in place to check that the RMMs in place are being used correctly and OCs followed.			
Conditions and measures related to personal protection, hygiene and health evaluation			
Use of suitable respiratory protection	Cross reference to General Risk Management Measures and Qualitative Exposure Assessment (see beginning of chap.9)		
Use of suitable chemical resistant gloves			
Use of suitable eye protection			
Control of workers exposure for PROC 13			
Title information related to contributing scenario			
Processes, tasks, activities covered	Treatment of articles by dipping and pouring		
Use descriptor covered	PROC 13		
Processes, tasks, activities covered	Immersion operations Treatment of articles by dipping, pouring, immersing, soaking, washing out or washing in substances; including cold formation or resin type matrix. Includes handling of treated objects (e.g. after dyeing, plating,). Substance is applied to a surface by low energy techniques such as dipping the article into a bath or pouring a preparation onto a surface		
Exposure Assessment Method	Tool used: Advanced Reach Tool (ART)		
Product characteristic			
Physical state	liquid	Operation conditions: ambient temperature	
Concentration of substance	<5	%	
Fugacity	medium		
Vapour pressure of the substance	2.5 kPa (20 °C)		
Amounts used			
Not relevant in ART			
Frequency and duration of use/exposure			
Duration of exposure	< 4	hours per day	
Frequency of exposure	≤ 240	days/year	
Other given operational conditions affecting workers exposure			
Location	Indoors/outdoors		



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Domain	Professional	
Technical conditions and measures at process level (source) to prevent release		
Process under low containment		
Technical conditions and measures to control dispersion from source towards the worker		
Appropriate local exhaust ventilation	no	
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. [E1]		
Organisational measures to prevent /limit releases, dispersion and exposure		
Avoiding frequent and direct contact with substance. Minimisation of manual phases. Regular cleaning of equipment and work area. Supervision in place to check that the RMMs in place are being used correctly and OCs followed.		
Conditions and measures related to personal protection, hygiene and health evaluation		
Use of suitable respiratory protection	Cross reference to General Risk Management Measures and Qualitative Exposure Assessment (see beginning of chap.9)	
Use of suitable chemical resistant gloves		
Use of suitable eye protection		
Control of workers exposure for PROC 15		
Title information related to contributing scenario		
Processes, tasks, activities covered	Use as laboratory reagent	
Use descriptor covered	PROC 15	
Processes, tasks, activities covered	Use of substances at small scale laboratory (< 1 l or 1 kg present at workplace). Larger laboratories and R+D installations should be treated as industrial processes.	
Exposure Assessment Method	Tool used: Advanced Reach Tool (ART)	
Product characteristic		
Physical state	liquid	Operation conditions: ambient temperature
Concentration of substance	<5	%
Fugacity	medium	
Vapour pressure of the substance	2.5 kPa (20 °C)	
Amounts used		
Not relevant in ART		
Frequency and duration of use/exposure		
Duration of exposure	8	hours per day
Frequency of exposure	≤ 240	days/year
Other given operational conditions affecting workers exposure		
Location	Indoors/outdoors	



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Domain	Professional	
Technical conditions and measures at process level (source) to prevent release		
Not relevant		
Technical conditions and measures to control dispersion from source towards the worker		
Appropriate local exhaust ventilation	no	
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. [E1]		
Organisational measures to prevent /limit releases, dispersion and exposure		
Avoiding frequent and direct contact with substance. Minimisation of manual phases. Regular cleaning of equipment and work area. Supervision in place to check that the RMMs in place are being used correctly and OCs followed.		
Conditions and measures related to personal protection, hygiene and health evaluation		
Use of suitable respiratory protection	Cross reference to General Risk Management Measures and Qualitative Exposure Assessment (see beginning of chap.9)	
Use of suitable chemical resistant gloves		
Use of suitable eye protection		
Control of environmental exposure for ERC: 8a, 8b, 8d, 8e		
Product characteristics	Substance is a unique structure. Non-hydrophobic. Readily degradable. Concentration: < 5 %	
European tonnage	250-450,000 tonnes per year of solution of sodium hypochlorite.	
Frequency and duration of use	Continuous release. Emission Days: 365 days/year	
Environmental factors not influenced by risk management	Local freshwater dilution factor 10 Local marine water dilution factor 100	
Other Operational Conditions of use affecting environmental exposure	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 at process level (source) to prevent release	Common practices vary across sites and should comply with Biocide Directive No 98/8/EC.	
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	NaClO must be reduced completely to sodium chloride during the process avoiding critical releases in environment.	
Organisation measures to prevent/limit release from site	Prevent environmental discharge consistent with regulatory requirement, especially Biocide Directive No 98/8/EC	
Conditions and measures related to industrial or municipal sewage treatment plant	Waste water treatment is required to remove any residual organic compounds and remaining available chlorine.	



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Cod FDS011

SAFETY DATA SHEET-Extended

Prepared in accordance with Commission Regulation (EU) 830/2015 amending
Regulation 1907/2006, REACH
SODIUM HYPOCHLORITE

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Conditions and measures related to external treatment of waste for disposal	External treatment and disposal of waste should comply with applicable local and/or national regulations.
Exposure Estimation	
Workers: Used Advanced Reach Tool (ART) Environment: No releases in environment are expected but in worst case the qualitative approach is used to conclude safe use.	
Guidance to check compliance with 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. Any biocidal use of sodium hypochlorite is covered by a dossier submitted under the Biocide Directive No 98/8/EC and also included in the EU Risk Assessment Report on sodium hypochlorite. Exposures were included to reflect the worst case.	

8: Consumer use

Number of the ES	9
Title of exposure scenario	Consumer use
List of all use descriptors related to the life cycle stage	SU: 21 PC: 34, 35, 37 ERC: 8a, 8b, 8d, 8e
Name of contributing environmental scenario and corresponding ERC	ERC 8a Wide dispersive indoor use of processing aids in open systems ERC 8b Wide dispersive indoor use of reactive substances in open systems ERC 8d Wide dispersive outdoor use of processing aids in open systems ERC 8e Wide dispersive outdoor use of reactive substances in open systems
Name(s) of contributing consumer scenarios and corresponding PC	PC 34: Textile dyes, finishing and impregnating products; including bleaches and other processing aids PC 35: Washing and cleaning products (including solvent based products) PC 37: Water treatment chemicals
Contributing exposure scenario controlling consumer exposure for PC	
Product characteristic	
Concentration: <= 12.5 % (typically 3 – 5 %) Physical state: liquid Vapour pressure: 2.5 kPa at 20 °C	



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Amounts used	
NA	
Frequency and duration of use/exposure	
Duration [for contact]: < 30 min. (cleaning and bleaching) to ca. 1 hour (swimming) Frequency [for one person cleaning]: 1 job/day, every day Frequency [for one person bleaching]: 2 jobs/week (laundry bleaching) and 4/day (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 by misuse such, poor rinsing, spilling to skin or drinking of the cleaning solution.	
Other given operational conditions affecting consumers exposure	
Indoor air volume: min. 4 m ³ , ventilation rate: min. 0.5/h	
Conditions and measures related to information and behavioural advice to consumers	
Safety and application notes on product label and/or package insert.	
Conditions and measures related to personal protection and hygiene	
None	
Control of environmental exposure for ERC: 8a, 8b, 8d, 8e	
Product characteristics	Substance is a unique structure. Non-hydrophobic. Readily biodegradable. Concentration: < 15 % (typically 3 – 5 %)
European tonnage	118.57 kt per year in Cl ₂ equivalent
Frequency and duration of use	Continuous release. Emission Days: 365 days/year
Environmental factors not influenced by risk management	Local freshwater dilution factor 10 Local marine water dilution factor 100
Other Operational Conditions of use affecting environmental exposure	Sodium hypochlorite is shown to disappear rapidly from all use scenarios presented, by either rapid reduction 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.
Conditions and measures related to municipal sewage treatment plant	Household waste water is treated in municipal sewage treatment because of the organic compounds and at the same time any left available chlorine is destroyed.
Conditions and measures related to external treatment of waste for disposal	External treatment and disposal of waste should comply with applicable local and/or national regulations.
Exposure Estimation	
Environment: No releases in environment are expected but in worst case the qualitative approach is used to conclude safe use.	



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Guidance to check compliance with 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. Any biocidal use of sodium hypochlorite is covered by a dossier submitted under the Biocide Directive No 98/8/EC and also included in the EU Risk Assessment Report on sodium hypochlorite. Exposures were included to reflect the worst case.



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