

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

1.1 Product identifier

Trade name or designation of the mixture RegenOx® Part A
Registration number(s) 01-2119457268-30-0020; 01-2119448725-31-0076

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

Identified uses Soil and Groundwater Remediation.
Uses advised against None known

1.3 Details of the supplier of the safety data sheet

Company name Regenesis Ltd.
Address Cambridge House
Henry Street
Bath, Somerset
BA1 1BT
United Kingdom
Telephone number +44 (0) 1225 618161
E-mail address CustomerService@regenesisis.com

1.4 Emergency telephone number

General in EU 112 (Available 24 hours a day. SDS/Product information may not be available for the
Emergency Service.)
CHEMTREC For Dangerous Goods Incidents ONLY (spill, leak, fire, exposure or accident), call
CHEMTREC 24/7 at:
International (+)1-703-527-3887
USA, Canada, Mexico (+)1-800-424-9300

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

The mixture has been assessed and/or tested for its physical, health and environmental hazards and the following classification applies

2.1.1 Classification according to Regulation (EC) No 1272/2008 (CLP)

Ox. Sol. 2; H272

Acute Tox. 4; H302

Eye Dam. 1; H318

2.2 Label elements

Hazard pictogram(s):



Signal Word	Danger	
Hazard Statement(s)	H272 H302 H318	May intensify fire; oxidiser Harmful if swallowed Causes serious eye damage
Precautionary Statement(s)	P210 P220 P264 P280 P305 + P351 + P338 + P310 P370 + P378	Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking Keep away from clothing and other combustible materials Wash hands thoroughly after handling Wear protective gloves, protective clothing, eye protection and face protection IF IN EYES. Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a POISON CENTRE or doctor. In case of fire: Use water spray, fog (flooding amounts) to extinguish

2.3 Other hazards

The mixture does not meet the criteria for PBT or vPvB according to Regulation (EC) No 1907/2006, Annex XIII

SECTION 3: Composition/information on ingredients

3.2 Mixtures

Substance Name	EC No.	CAS No.	% w/w	REACH Registration No.	Index No.	Classification
Sodium percarbonate	239-707-6	15630-89-4	≥95	01-2119457268-30-0020	N/A	Ox. Sol. 2; H272 Acute Tox. 4; H302 Eye Dam. 1; H318
Silicic acid, sodium salt	215-687-4	1344-09-8	<1	01-2119448725-31-0076	N/A	Not classified as hazardous

The full text for all H-statements is displayed in Section 16.

SECTION 4: First aid measures

4.1 Description of first aid measures

General notes	Take off all contaminated clothing immediately. Contact with combustible material may cause fire. Ensure that medical personnel are aware of the material(s) involved and take precautions to protect themselves. Show this safety data sheet to the doctor in attendance.
Following inhalation	Remove person to fresh air and keep at rest in a position comfortable for breathing.
Following skin contact	IF ON CLOTHING: rinse immediately contaminated clothing and skin with plenty of water before removing clothes. If skin irritation occurs: get medical advice/attention.
Following eye contact	Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a POISON CENTRE or doctor
Following ingestion	Rinse mouth. Call a POISON CENTRE or doctor if you feel unwell.

4.2 Most important symptoms and effects, both acute and delayed

Severe eye irritation. Permanent eye damage including blindness could result. Symptoms may include stinging, tearing, redness, swelling, and blurred vision. Dusts may irritate the respiratory tract, skin and eyes.

4.3 Indication of any immediate medical attention and special treatment needed

Provide general supportive measures and treat symptomatically. Keep victim warm. Keep victim under observation. Symptoms may be delayed.

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media	Water spray, fog (flooding amount)
Unsuitable extinguishing media	Dry Chemical, CO2, Halon Foam.

5.2 Special hazards arising from the substance or mixture

Greatly increases the burning rate of combustible materials. Containers may explode when heated. During fire, gases hazardous to health may be formed. Combustion products may include: carbon oxides and metal oxides.

5.3 Advice for firefighters

Special protective equipment for firefighters	Self-contained breathing apparatus and full protective clothing must be worn in case of fire.
Special fire fighting procedures	In case of fire and/or explosion do not breathe fumes. Move containers from fire area if you can do so without risk. Use water spray to cool unopened containers.
Specific methods	Cool containers exposed to flames with water until well after the fire is out.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

For non-emergency personnel	Keep unnecessary personnel away. Keep people away from and upwind of spill/leak. Keep away from clothing and other combustible materials. Wear appropriate protective equipment and clothing during clean-up. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. Ensure adequate ventilation. Local authorities should be advised if significant spillages cannot be contained.
For emergency responders	Keep unnecessary personnel away. Use personal protection recommended in Section 8 of the SDS.

6.2 Environmental precautions

Avoid discharge into drains, water courses or onto the ground.

6.3 Methods and material for containment and cleaning up

Eliminate all ignition sources (no smoking, flares, sparks, or flames in immediate area). Collect dust using a vacuum cleaner equipped with HEPA filter. Keep combustibles (wood, paper, oil etc) away from spilled material. Ventilate the contaminated area. This product is miscible in water. Stop the flow of material, if this is without risk. Absorb in vermiculite, dry sand or earth and place into containers.

Large Spills: Sweep up or vacuum up spillage and collect in suitable container for disposal. Shovel the material into waste container. Minimise dust generation and accumulation. Prevent product from entering drains. Following product recovery, flush area with water.

Small Spills: Wipe up with absorbent material (e.g. cloth, fleece). Clean surface thoroughly to remove residual contamination.

Never return spills to original containers for re-use. Place all material into loosely covered plastic containers for later disposal. Wear appropriate protective equipment and clothing during clean-up.

6.4 Reference to other sections
For personal protection, see section 8 of the SDS. For waste disposal, see section 13 of the SDS.

SECTION 7: Handling and storage

7.1 Precautions for safe handling

Minimise dust generation and accumulation. Routine housekeeping should be instituted to ensure that dusts do not accumulate on surfaces. Keep away from heat. Provide appropriate exhaust ventilation at places where dust is formed. Keep away from clothing and other combustible materials. Take any precaution to avoid mixing with combustibles. Do not get this material in contact with eyes. Do not eat, drink or smoke when using this product. Wear appropriate personal protective equipment. Wash hands thoroughly after handling. Observe good industrial hygiene practices.

7.2 Conditions for safe storage, including any incompatibilities

Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking. Store in a cool, dry place out of direct sunlight. Store at temperatures not exceeding 40°C/104°F. Store in original tightly closed container. Store in a well-ventilated place. Do not store near combustible materials. Store away from incompatible materials (see section 10 of the SDS). Protect from contamination.

7.3 Specific end use(s)

Soil and Groundwater Remediation

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Occupational exposure limit values

Substance	Disodium carbonate, compound with hydrogen peroxide (2:3)
CAS No.	15630-89-4
No exposure limits noted	

Substance	Silicic acid, sodium salt
CAS No.	1310-73-2
No exposure limits noted	

Recommended monitoring procedures: Follow standard monitoring procedures

Derived no effect levels (DNELs):

Sodium percarbonate

Exposure Route	Exposure Patterns	DNEL (workers)
Inhalation	Long term systemic	As no long term systemic toxicity hazard has been identified, there is no requirement to derive a long term systemic DNEL
	Short term systemic	As no short term systemic toxicity hazard has been identified, there is no requirement to derive a short term systemic DNEL
	Long term local	5 mg/m ³
	Short term local	Calculation of DNEL has been waived due to exposure
Dermal	Long term systemic	As no long term systemic toxicity hazard has been identified, there is no requirement to derive a long term systemic DNEL
	Short term systemic	As no short term systemic toxicity hazard has been identified, there is no requirement to derive a short term systemic DNEL

	Long term local	12.8 mg/cm ²
	Short term local	12.8 mg/cm ²

Exposure Route	Exposure Patterns	DNEL (general population)
Inhalation	Long term systemic	No data available
	Short term systemic	No data available
	Long term local	Calculation of DNEL has been waived due to exposure
	Short term local	Calculation of DNEL has been waived due to exposure
Dermal	Long term systemic	No data available
	Short term systemic	No data available
	Long term local	6.4 mg/cm ³
	Short term local	6.4 mg/cm ³
Oral	Long term systemic	Calculation of DNEL has been waived due to exposure
	Short term systemic	Calculation of DNEL has been waived due to exposure

Silicic acid, sodium salt

Exposure Route	Exposure Patterns	DNEL (workers)
Inhalation	Long term systemic	5.61 mg/m ³
	Short term systemic	As no short term systemic toxicity hazard has been identified, there is no requirement to derive short term systemic DNEL
	Long term local	As no local toxicity hazard has been identified, there is no requirement to derive local DNELs
	Short term local	
Dermal	Long term systemic	1.59 mg/kg bw/day
	Short term systemic	As no short term systemic toxicity hazard has been identified, there is no requirement to derive short term systemic DNEL
	Long term local	As no local toxicity hazard has been identified, there is no requirement to derive local DNELs
	Short term local	

Exposure Route	Exposure Patterns	DNEL (general population)
Inhalation	Long term systemic	1.03 mg/m ³
	Short term systemic	295 mg/m ³
	Long term local	1.03 mg/m ³
	Short term local	295 mg/m ³
Dermal	Long term systemic	9.1 mg/kg bw/day
	Short term systemic	200 mg/kg bw/day
	Long term local	0.051 mg/cm ³
	Short term local	1.124 mg/cm ³
Oral	Long term systemic	9.1 mg/kg bw/day
	Short term systemic	30 mg/kg bw/day

Predicted no effect concentrations (PNECs):

Sodium percarbonate

PNEC	Value
Aqua (freshwater)	0.035 mg/L
Aqua (marine water)	0.035 mg/L
STP	16.24 mg/L
Sediment (freshwater)	No data available

Sediment (marine water)	No data available
Soil	No data available
Secondary poisoning	No data available

Silicic acid, sodium salt

PNEC	Value
Aqua (freshwater)	7.5 mg/L
Aqua (marine water)	1 mg/L
STP	348 mg/L
Sediment (freshwater)	No hazard identified
Sediment (marine water)	No hazard identified
Soil	No hazard identified
Secondary poisoning	No potential for bioaccumulation

8.2 Exposure controls

8.2.1 Appropriate engineering controls

Good general ventilation (typically 10 air changes per hour) should be used. Ventilation rates should be matched to conditions. If applicable, use process enclosures, local exhaust ventilation, or other engineering controls to maintain airborne levels below recommended exposure limits. If exposure limits have not been established, maintain airborne levels to an acceptable level. If material is ground, cut, or used in any operation which may generate dusts, use appropriate local exhaust ventilation to keep exposures below the recommended exposure limits. Eye wash facilities and emergency shower must be available when handling this product.

8.2.2 Individual protection measures, such as personal protective equipment

General information	Use personal protective equipment as required. Personal protection equipment should be chosen according to the CEN standards and in discussion with the supplier of the personal protective equipment.
Eye/face protection	Unvented, tight fitting goggles should be worn in dusty areas
Skin protection	
Hand protection	Wear appropriate chemical resistant gloves. Suitable gloves can be recommended by the glove supplier. Frequent change is advisable. Rubber, neoprene or PVC gloves are recommended
Other	Wear appropriate chemical resistant clothing.
Respiratory protection	Wear respirator with dust filter
Thermal	Wear appropriate thermal protective clothing, when necessary.
Hygiene measures	Keep from contact with clothing and other combustible materials. Remove and wash contaminated clothing promptly. Keep away from food and drink. Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants.

8.2.3 Environmental exposure controls

Environmental manager must be informed of all major releases.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

Appearance	
Physical state	Solid
Form	Powder
Colour	White
Odour	Odourless
Odour threshold	No data available
pH	10.5 (3% solution/water)

Melting point/freezing point	No data available
Initial boiling point and boiling range	No data available
Flash point	No data available
Evaporation rate	No data available
Flammability (solid, gas)	No data available
Upper/lower flammability or explosive limits	No data available
Vapour pressure	No data available
Vapour density	No data available
Relative density	1.2 – 1.86
Solubility(ies)	14.5 g/100g water @ 20 °C (minimum)
Partition coefficient: n-octanol/water	No data available
Auto-ignition temperature	No data available
Decomposition temperature	50 °C (122 °F)
Viscosity	No data available
Explosive properties	No data available
Oxidising properties	No data available

SECTION 10: Stability and reactivity

10.1 Reactivity	Keep away from combustible material. Greatly increases the burning rate of combustible materials
10.2 Chemical stability	Decomposes on heating. Product may be unstable at temperatures above: 50°C/122°F
10.3 Possibility of hazardous reactions	Reacts slowly with water.
10.4 Conditions to avoid	Moisture. Heat. Avoid temperatures exceeding the decomposition temperature. Contact with incompatible materials.
10.5 Incompatible materials	Acids. Bases. Salts of heavy metals. Reducing Agents. Combustible material.
10.6 Hazardous decomposition products	Oxygen. Steam. Heat.

SECTION 11: Toxicological information

11.1 Information on toxicological effects

RegenOx® Part A

No data available on product itself. Classification determined based on toxicological data available on constituent substances.

Sodium percarbonate

<u>Acute toxicity</u>	<u>Species</u>	<u>Test Results</u>	<u>Method</u>
Oral LD50	Rat	LD50 1,034 mg/kg bw	Health Effects Test Guidelines, U.S. Environmental Protection Agency Office of Pesticides and Toxic Substances (1984) "Acute Exposure Oral Toxicity"
Inhalation LC50	No data available		
Dermal LD50	Rabbit	LD50 > 2,000 mg/kg bw	EPA Guideline
Skin corrosion/irritation	Rabbit	Not irritating	Health Effects Test Guidelines of the US Environmental Protection Agency Office of Pesticides and Toxic Substances, pp. 41-48 (August

Serious eye damage/irritation	Rabbit	Causes serious eye damage	1982) EPA OPP 81-4 (Acute Eye Irritation)
Respiratory or skin sensitisation	Guinea pig	Not sensitising to skin	Health Effects Test Guideline of the US Environmental Protection Agency Office of Pesticides and Toxic Substances, pp. 33-39 (August 1982)
Germ cell mutagenicity	No data available; not considered to be mutagenic		
Carcinogenicity	No data available; not considered to be carcinogenic		
Reproductive toxicity	No data available; not considered to be reprotoxic		
STOT-single exposure	Not considered to cause specific target organ toxicity via single exposure		
STOT-repeated exposure	No data available; not considered to cause specific target organ toxicity via repeat exposure		
Aspiration hazard	No data available; not considered to cause an aspiration hazard		

Silicic acid, sodium salt

<u>Acute toxicity</u>	<u>Species</u>	<u>Test Results</u>	<u>Method</u>
Oral LD50	Rat	LD50 3,400 mg/kg bw and LD50 5,150 mg/kg bw	equivalent/similar to OECD 401
Inhalation LC50	Rat	LC50 > 2.06 mg/L air	EPA OPPTS 870.1300
Dermal LD50	Rat	LD50 > 5,000 mg/kg bw	EPA OPPTS 870.1200
Skin corrosion/irritation	Rabbit	Irritating to skin	OECD 404
Serious eye damage/irritation	Rabbit	Causes serious eye damage	No guideline followed; published data (based on a weight of evidence approach)
Respiratory or skin sensitisation	Mouse	Not sensitising	OECD 429
Germ cell mutagenicity	Not considered to be mutagenic (OECD 471, OECD 473, OECD 476)		
Carcinogenicity	Not considered to be carcinogenic. No reliable data available.		
Reproductive toxicity	Rat	NOAEL > 159 mg/kg bw/day (nominal)	No guideline followed
STOT-single exposure	Rat	May cause respiratory irritation	EPA OPPTS 870.1300
STOT-repeated exposure	Rat	Not considered to cause specific target organic toxicity by repeated exposure	equivalent/similar to OECD 407
Aspiration hazard	Not considered to cause an aspiration hazard		

SECTION 12: Ecological information

12.1 Toxicity

RegenOx® Part A

The product is not classified as environmentally hazardous. However, this does not exclude the possibility that large or frequent spills can have a harmful or damaging effect on the environment. No data available on product itself. Classification determined based on ecotoxicological data available on constituent substances.

Sodium percarbonate

<u>Ecotoxicological endpoint</u>	<u>Value</u>	<u>Species, Method</u>
Acute (short term toxicity):		

RegenOx® Part A

924384

Version #: 03

Revision Date: 03/08/2018

8

Fish	LC50 (96h) 70.7 mg/L	Pimephales promelas; EPA guidelines
Crustacea	EC50 (48h) 4.9 mg/L	Daphnia pulex; EPA guidelines
Algae/aquatic plants	No reliable studies available	
Activated sludge respiration	No data available	
Chronic (long-term toxicity):		
Fish	No data available	
Crustacea	No data available	

Silicic acid, sodium salt

Ecotoxicological endpoint	Value	Species, Method
Acute (short term toxicity):		
Fish	LC50 (96h) 260 – 310 mg/L	Oncorhynchus mykiss; no guideline followed
Crustacea	LC50 (96h) 1,108 mg/L	Danio rerio; OECD 203
Algae/aquatic plants	EC50 (48h) 1,700 mg/L EC50 (72h, biomass) 207 mg/L EC50 (72h, growth rate) > 345.4 mg/L	Daphnia magna; EU Method C.2 Desmodesmus subspicatus; DIN 38412, Teil 9 (Algal growth inhibition test), German National Guideline; equivalent/similar to OECD 201 growth inhibition test; Umweltbundesamt, Berlin: Bewertung wassergefährdender Stoffe. Erarbeitet von der ad-hoc-Arbeitsgruppe 1 "Bewertung wassergefährdender Stoffe"
Activated sludge respiration	EC0 (18h) >3,480 mg/L	
Chronic (long-term toxicity):		
Fish	No reliable data available	
Crustacea	No reliable data available	

12.2 Persistence and biodegradability

No data is available on the degradability of this product. All constituent substances are inorganic and so biodegradation studies are not applicable.

12.3 Bioaccumulative potential

No data is available on the bioaccumulative potential of this product.

Sodium hydroxide is not expected to bioaccumulate. Silicic acid, sodium salt is also determined to have a low potential for bioaccumulation.

12.4 Mobility in soil

No data available of the mobility of this product.

12.5 Results of PBT and vPvB assessment

The constituent substances, and therefore the mixture, are not considered to be PBT or vPvB.

12.6 Other adverse effects

None known

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Residual waste	Dispose of in accordance with local regulations. Empty containers or liners may retain some product residues. This material and its container must be disposed of in a safe manner.
----------------	---

Contaminated packaging	Empty containers should be taken to an approved waste handling site for recycling or disposal. Since emptied containers may retain product residue, follow label warnings even after container is emptied.
EU waste code	The Waste code should be assigned in discussion between the user, the producer and the waste disposal company.
Disposal methods/information	Collect and reclaim or dispose in sealed containers at licensed waste disposal site. Dispose of contents/container in accordance with local/regional/national/international regulations.
Special precautions	Dispose in accordance with all applicable regulations.

SECTION 14: Transport information

	ADR/RID	ADN	IMDG	IATA
14.1 UN Number	UN3378	UN3378	UN3378	UN3378
14.2 UN proper shipping name	SODIUM CARBONATE PEROXYHYDRATE	SODIUM CARBONATE PEROXYHYDRATE	SODIUM CARBONATE PEROXYHYDRATE	SODIUM CARBONATE PEROXYHYDRATE
14.3 Transport hazard class(es)				
Class	5.1	5.1	5.1	5.1
Subsidiary risk	-	-	-	-
Label(s)	5.1	5.1	-	-
Hazard No.	50	-	-	-
Tunnel restriction code	E	-	-	-
14.4 Packing group	II	II		II
14.5 Environmental hazards	No	No	Marine pollutant: No	No

14.6 Special precautions for user

Read safety instructions, SDS and emergency procedures before handling.

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

No information available

SECTION 15: Regulatory information

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

None identified

15.2 Chemical safety assessment

A chemical safety assessment has been performed for each of the constituents of this mixture. As the form of silicic acid, sodium salt in this product has been identified as not being classified as hazardous it only relevant to append exposure scenarios for sodium percarbonate to this document.

SECTION 16: Regulatory information

This SDS supersedes the SDS dated 26 January 2018

The following amendments have been made:

- SDS has been fully revised in accordance with Regulation (EU) No 453/2010 and Regulation (EC) No. 1272/2008 (EU CLP) and in accordance with new information on the constituent substances registered under Regulation (EC) 1907/2006 (EU REACH)

List of abbreviations:

ADN: European Agreement Concerning the International Carriage of Dangerous Goods by Inland Waterways.
ADR: European Agreement Concerning the International Carriage of Dangerous Goods by Road.
CAS: Chemical Abstract Service.
CEN: European Committee for Standardization (Comité Européen de Normalisation).
DNEL: Derived No-Effect Level. ECHA: European Chemical Agency.
IATA: International Air Transport Association. IBC: Intermediate Bulk Container. IMDG: International Maritime Dangerous Goods
MARPOL: International Convention for the Prevention of Pollution from Ships. PBT: Persistent, bioaccumulative, toxic.
PNEC: Predicted No-Effect Concentration.
RID: Regulations concerning the International Carriage of Dangerous Goods by Rail. vPvB: very Persistent, very Bioaccumulative.

References:

ECHA registered substances database, accessed July 2018
<https://echa.europa.eu/registration-dossier/-/registered-dossier/15960>
<https://echa.europa.eu/registration-dossier/-/registered-dossier/16162>

Information on evaluation method leading to the classification of mixture

The classification for health and environmental hazards is derived by a combination of calculation methods and test data, if available.

Full text of any H-statements not written out in full under Sections 2 to 15:

H272 May intensify fire; oxidiser
H302 Harmful if swallowed.
H318 Causes serious eye damage.

Training information

Follow training instructions when handling this material.

Disclaimer:

Regenesis cannot anticipate all conditions under which this information and its product, or the products of other manufacturers in combination with its product, may be used. It is the user's responsibility to ensure safe conditions for handling, storage and disposal of the product, and to assume liability for loss, injury, damage or expense due to improper use. The information in the sheet was written based on the best knowledge and experience currently available.

ANNEX

EXPOSURE SCENARIOS

Exposure scenarios prepared by the lead registrant for sodium percarbonate are provided in the tables immediately below.

1.1 Industrial and professional use of cleaning products and other mixtures such as water treatment products (SU 1, 5, 22; PC 8, 14, 15, 20, 25, 34, 35, 36, 37, 39; PROCs 2, 4, 8a, 8b, 9, 10, 11, 13, 15, 19; ERC 8a, 8b, 8e)

1.1.1 ES 3: Industrial and professional use of cleaning products and other mixtures

The exposure scenario describes the use of mixtures (for example cleaning products) containing sodium percarbonate in industrial settings or commercial laundry shops or by other professional users.

1.1.1.1 Description of activities and processes covered in the exposure scenario

The products containing sodium percarbonate are available in form of powders or tablets. The activities described in the scenario are the transfer of the powder/tablets from the package to the machine, the loading of the product into the machine, the operation of the machine and the disposal of the aqueous product solutions via the sewer after use.

1.1.1.2 Operational conditions related to frequency, duration and amount of use

The conditions differ for industrial and professional users.

Industrial use

According to the exposure scenarios for the institutional and industrial use of cleaning products proposed by the International Association for Soaps, Detergents and Maintenance Products (AISE 2009b), the industrial use of laundry detergents and associated products such as conditioners and laundry-aids occurs in automated processes. The loading of product into industrial machines is performed once a day at the beginning of the shift using dedicated filling lines. This loading operation takes about 15 minutes. The machines may be operated up to five times a day and every operation of industrial machines takes about 1 minute.

Mixtures containing sodium percarbonate are used to produce aqueous solutions, which are then used in roller and brushing applications, metal and non-metal surface treatment applications and similar uses. The contact with the solid mixture containing sodium percarbonate is represented by the activity described above. In these cases, no longer-term exposure to sodium percarbonate is expected because the substance in water rapidly dissociates into hydrogen peroxide and sodium carbonate. Thus, it is more appropriate to assess long-term occupational exposure to hydrogen peroxide, which exhibits the more adverse health effects in comparison with sodium carbonate.

Professional use

Professionals use laundry detergents and associated products in semi-automated or manual processes. The conditions of use in semi-automated processes are similar to those in industrial processes. The loading operations during manual processes occur up to ten times a day, which is more frequent than during automated industrial or semi-automated professional processes. However, the duration of each loading operation during manual processes is only 2 minutes.

The operational conditions of use of other products such as dishwashing products by professional users in automated or semi-automated processes are similar to those documented for laundry detergents. The operational conditions of use of dishwashing products or general purpose cleaning products in professional manual processes may differ from the conditions given above with regard to the frequency of application and the duration of exposure, which can be up to 8 hours per shift according to the exposure scenarios for professional use of cleaning products proposed by AISE (2009b). However, it has to be realised that the products are used in aqueous solutions during these processes, which leads to a considerable dilution of the concentrations of sodium percarbonate or its dissociation products. Moreover, professional users are wearing appropriate protective gloves during dishwashing or general cleaning (AISE 2009b) and these gloves reduce exposure to the substance or the product solutions considerably.

Mixtures containing sodium percarbonate are used to produce aqueous solutions, which are then used in roller and brushing applications, metal and non-metal surface treatment applications and similar uses. The contact with the solid

mixture containing sodium percarbonate is represented by the activity described above. In these cases, no longer-term exposure to sodium percarbonate is expected because the substance in water rapidly dissociates into hydrogen peroxide and sodium carbonate. Thus, it is more appropriate to assess long-term occupational exposure to hydrogen peroxide, which exhibits the more adverse health effects in comparison with sodium carbonate.

Table 1: Duration, frequency and amount

Information type	Data field	Explanation
Number of uses/applications per day by worker or professional user	1	Loading in automated and semi-automated processes
	10	Loading in manual processes
	1	Use of aqueous solutions
Used amount of substance (as such or in mixture) per application	Not considered	In the calculations of the ECETOC TRA tool, the used amount of substance is not directly taken into account
Duration of use per task	15 minutes	Loading in automated and semi-automated processes
	2 minutes	Loading in manual processes
	480 minutes	Use of aqueous solutions

1.1.1.3 Operational conditions and risk management measures related to product characteristics

Cleaning products and other mixtures in powder form are designed to exhibit minimal dustiness. The majority of mixtures contain sodium percarbonate in concentrations not exceeding 25 %, but bleaches in powder form can contain higher concentrations or may consist of unformulated sodium percarbonate. The solutions that are prepared by dissolving mixtures containing sodium percarbonate in water in most cases do not contain more than 5 % sodium percarbonate (around 1.4 % hydrogen peroxide); in the assessment below concentrations of sodium percarbonate in aqueous solution leading to acceptable exposure levels are indicated.

1.1.1.4 Operational conditions related to available dilution capacity and characteristics of exposed humans

The inhalation volume is 10 m³/working shift. The body weight of a worker is assumed to be 70 kg. Skin contact to the undiluted product is assumed to occur during the transfer of the product from the package to the machine (480 to 960 cm² skin surface area in contact with product). Cleaning products and other mixtures containing sodium percarbonate are always diluted in water before they are used to wash laundry or dishes, to clean by hand, to treat surfaces or water (1980 cm² skin surface are in contact with aqueous solutions).

1.1.1.5 Other operational conditions of use

Nearly 100 % of the amount of cleaning products and other mixtures is diluted in water before use and will be discharged into the sewer after use. The losses of products due to formation of dust during transfer of product are considered as negligible.

1.1.1.6 Risk management measures

According to the exposure scenarios proposed for the institutional and industrial use of cleaning products (AISE 2009b), workers and professional users are recommended to wear safety goggles and protective gloves during the loading operations. The same personal protective equipment is taken into account for the use of mixtures containing sodium percarbonate in other fields. In general, the areas where loading operations occur are not equipped with local

exhaust ventilation systems. The machines are fully contained so that no contact with the products or product solutions occurs under normal operating conditions after filling.

1.1.1.7 Waste related measures

Nearly 100 % of the applied amount of product is disposed of via the sewer system and the wastewater is treated in a municipal wastewater treatment plant before it is released into the aquatic environment. A small amount of product may remain in the packages, which will finally be discharged with the regular waste.

1.1.1.8 Exposure estimation for industrial and professional users

Exposure modelling was performed with the ECETOC TRA tool (ECETOC 2009). The inhalation and dermal exposures resulting from direct contact with the solid mixture containing sodium percarbonate were considered for the transfer from packages to machines or cleaning vessels. Exposures were determined for typical processes/activities (see Table 23 for the according PROCs) using the following input: solid substance of low dustiness, industrial or professional indoor activity, local exhaust ventilation not installed, no respiratory protection used, duration of activity >4 hours. For processes/activities involving the use of aqueous solutions, inhalation and dermal exposure to hydrogen peroxide was assessed using the following input: liquid substance, volatility of 300 Pa, professional indoor or outdoor activity, local exhaust ventilation present or not installed, respiratory protection used or not used, duration of activity >4 hours. The highest possible concentration leading to acceptable exposure levels was calculated by taking into account the actual concentration of hydrogen peroxide in the aqueous solution.

1.1.1.8.1 Acute/Short-term exposure

In industrial laundries, contact with products containing sodium percarbonate normally occurs only once a day during the loading of the machines, i.e. for approximately 15 minutes. Solid mixtures containing sodium percarbonate exhibit a low dustiness. According to the TRA tool (ECETOC 2009) the maximum concentration of suspended particulate matter for products exhibiting low dustiness is 1 mg/m³. The majority of mixtures contain not more than 25 % sodium percarbonate. The AISE generally expects negligible inhalation exposure during transfer and use of mixtures in powder form (AISE 2009c). Consequently, the concentration of 1 mg/m³ of suspended solids in the air is considered as a reasonable worst-case acute exposure concentration.

The maximal dermal exposure during loading operations in industrial settings was 1 mg/cm². The maximum dermal exposure concentration in professional settings was 1 mg/cm² for direct handling of solid mixtures. In the case of handling of the product solutions, the dermal exposure concentration (in this case to hydrogen peroxide, as sodium percarbonate dissociates into hydrogen peroxide and sodium carbonate in contact with water) increased to 5 * 0.287 = 1.44 mg/cm². However, it has to be considered that the products in these cases are used in dilution (not considered by the model) and that professional users wear gloves during handling of solutions (AISE 2009b), which reduces dermal exposure considerably.

1.1.1.8.2 Long-term exposure

In the present assessment the duration of exposure was 8 hours to obtain reasonable worst-case occupational exposure concentrations (Table 30). The maximum inhalation exposure to sodium percarbonate of 0.5 mg/m³ occurred during handling of the substance in open processes, loading and transfer and hand-mixing. The type of loading facility (dedicated or non-dedicated) had an influence on the magnitude of exposure concentrations, and lower concentrations were modelled for dedicated loading facilities.

The exposure concentrations of sodium percarbonate calculated for different uses of solid mixtures containing sodium percarbonate were 0.5 mg/m³ for all activities performed by professional users during a full shift of 8 hours. Such activities include the transfer of the mixtures from packages to machines or cleaning vessels and the preparation of aqueous solutions for the use in various applications. The concentrations of sodium percarbonate in aqueous solutions

used in different applications during a full working shift of 8 hours can range from 12 to 49 %, depending on the use conditions (Table 30), in order to respect the inhalation exposure limit of 1.4 mg/m³ established for hydrogen peroxide.

Table 2: Long-term exposure concentrations estimated for industrial and professional users (according to ECETOC TRA tool)

PROC	Activity	Location	Presence of RMMs		Content PCS ^{d)} (%)	Maximal exposed skin area (cm ²)	Inhalation Exposure Estimate (mg/m ³)	Dermal Exposure Estimate ^{e)} (mg/kg/day)	
			LEV	PPE					
2	Industrial ^{a)}	Indoors	No	No	100	480	0.01	1.37	
4	Industrial ^{a)}	Indoors	No	No	100	480	0.5	6.85	
8a	Industrial ^{a)}	Indoors	No	No	100	960	0.5	13.7	
8b	Industrial ^{a)}	Indoors	No	No	100	480	0.1	6.85	
9	Industrial ^{a)}	Indoors	No	No	100	480	0.1	6.85	
15	Industrial ^{a)}	Indoors	No	No	100	240	0.1	0.34	
19	Industrial ^{a)}	Indoors	No	No	100	1980	0.5	141	
8a	Professional ^{a)}	Indoors	No	No	100	960	0.5	13.7	
8b	Professional ^{a)}	Indoors	No	No	100	480	0.5	6.85	
9	Professional ^{a)}	Indoors	No	No	100	480	0.5	6.85	
19	Professional ^{a)}	Indoors	No	No	100	1980	0.5	141	
10	Professional ^{b)}	Indoors	No	No	12.2	960	1.24	27.4	
10	Professional ^{b)}	Outdoors	Yes ^{c)}	No	19.1	960	1.34	27.4	
11	Professional ^{b)}	Indoors	No	Yes ^{f)}	33.1	1500	1.35	107	
11	Professional ^{b)}	Outdoors	Yes ^{c)}	Yes	48.8	1500	1.39	107	
13	Professional ^{b)}	Indoors	No	No	No	19.1	480	1.34	13.7
19	Professional ^{b)}	Indoors	No	No	No	12.2	1980	1.24	141

a) Scenarios consider contact with solid sodium percarbonate; b) Scenarios consider contact with aqueous solutions and thus exposure to hydrogen peroxide; c) Natural ventilation is taken into account that reduces exposure concentrations by 30 %; d) The highest concentration leading to acceptable exposure concentrations is given; e) Sodium percarbonate and hydrogen peroxide are not systemically available via the skin. Only local effects are expected. Sodium percarbonate is not irritating to the skin and hydrogen peroxide is irritating to the skin at concentrations greater than 35 %; f) Personal protective equipment in this case is respiratory protection with an efficiency of 90 %.

1.1.1.9 Indirect exposure of humans via the environment (oral)

No indirect exposure of humans to sodium percarbonate via the environment is expected. Sodium percarbonate rapidly dissolves in water and dissociates into sodium carbonate and hydrogen peroxide, which are expected to

remain in the water phase rather than distributing into other environmental compartments. Hydrogen peroxide has short aquatic half-lives under environmental conditions and does not bio-accumulate. In water the carbonate ions will re-equilibrate with bicarbonate and carbon dioxide.

1.1.1.10 Environmental exposure

The following sections describe the potential environmental exposure resulting from the professional use of cleaning products containing the substance.

1.1.1.10.1 Environmental releases

Nearly 100 % of the amount of sodium percarbonate contained in the cleaning products used by industrial and professional users will be released into the sewer system as an aqueous solution after use.

1.1.1.10.2 Exposure concentration in sewage treatment plants (STP)

The concentration of sodium percarbonate in the sewage water reaching municipal sewage treatment plants may originate from industrial, professional and private use of cleaning products and other products containing sodium percarbonate. Thus, it is feasible to calculate the potential maximum concentration of sodium percarbonate in the sewage directed to a municipal sewage treatment plant by taking into account the releases from all these uses on the basis of the EUSES model (version 2.1.1). The estimation of substance release in the EUSES model in the present scenario was based on Industrial Category 5 (Personal/domestic use), Use Category 9 (Cleaning/washing agents and additives), Use of regular powder. An annual total production volume of 250,000 tonnes was taken into consideration, which was completely used in washing products. A fraction of 10 % was considered for the regional use, corresponding to 25,000 tonnes per year. EUSES assumes that 20,000,000 inhabitants are populating the region. A municipal sewage treatment plant is fed by 10,000 inhabitants. The resulting fraction of the main local source of 0.0005 is multiplied by a factor of 4 to obtain a reasonable worst case of 0.002 for the fraction of the main local source. A release of 100 % of the substance contained in mixtures to the sewer after use on 365 days per year was taken into account. No dissociation of sodium percarbonate was taken into account in order to calculate the potential maximum concentration in the untreated wastewater.

Based on above defined inputs, the EUSES model calculates a potential maximum concentration of sodium percarbonate in untreated wastewater reaching the STP and a Predicted Environmental Concentration (PEC) for micro-organisms in STPs of 68.5 mg/L. The aquatic toxicity of sodium percarbonate can be fully explained by the toxicity of hydrogen peroxide released during the dissociation of sodium percarbonate. The PEC_{STP} must not exceed 4.66 mg hydrogen peroxide/L, so that the modelled maximum concentration of sodium percarbonate is above the $PNEC_{STP}$ considering that the concentration of hydrogen peroxide is $68.5 * 0.287 = 19.65$ mg/L. However, in the model no degradation of hydrogen peroxide/sodium percarbonate in the sewage or in the STP was considered. It has to be realised, though, that once released to sewage, hydrogen peroxide will rapidly react with microbes and organic matter and be decomposed by microbial catalase and dissolved transition metal ions such as iron. The half-life of hydrogen peroxide under these conditions is approximately six minutes and based on single first-order kinetics and a residence time for wastewater of half an hour in the sewage system, it can be estimated that approximately 3 % of the hydrogen peroxide released to the sewer reaches the STP:

$$F_{sewage} = \exp(-\ln(2)/DT50 * 30 \text{ min}) = 0.031$$

Thus, the initial maximum concentration of hydrogen peroxide in wastewater released to the sewer of $68.5 * 0.287 = 19.65$ mg/L is considerably reduced, before the sewage reaches the STP. The reasonable maximum concentration of hydrogen peroxide in the influent reaching the STP due to the use of cleaning products containing sodium percarbonate is approximately $19.65 * 0.031 = 0.6$ mg/L (corresponding to 2.1 mg/L sodium percarbonate). The reasonable PEC_{STP} for the predicted concentration in the influent of 0.6 mg/L under consideration of the removal efficiency of 99.3 % is $0.6 * 0.007 = 0.004$ mg/L.

1.1.1.10.3 Exposure concentration in aquatic pelagic compartment

Sodium percarbonate released from the use of cleaning and other retail products by industrial, professional, and private users does not reach the aquatic pelagic compartment because the substance rapidly dissociates into hydrogen peroxide and sodium carbonate in water. Hydrogen peroxide will be degraded rapidly in a biological sewage treatment plant (a removal efficiency of 99.3 % in the STP is realistic). The predicted environmental concentration of hydrogen peroxide based on the worst-case emission scenario described in the previous section is 0.0004 mg/L when the default dilution factor of 10 is taken into account. Carbonate will be neutralised. Sodium will pass through the wastewater treatment. However, the amounts of sodium released from sewage treatment plants are not sufficient to increase notably the natural background concentration of this element in surface waters (OECD 2006).

1.1.1.10.4 Exposure concentration in sediments

Sodium percarbonate in water rapidly dissociates into hydrogen peroxide and sodium carbonate. Carbonate ions in water will equilibrate with bicarbonate and CO₂. Hydrogen peroxide, carbonate ions and sodium ions will not adsorb to sediments. They will remain in dissolution in the water phase. No exposure of the sediment compartment is expected and for this reason, a prediction of exposure concentrations is not necessary.

1.1.1.10.5 Exposure concentrations in soil and groundwater

No exposure of the soil compartment to sodium percarbonate resulting from the industrial and professional use of the substance is expected and exposure concentrations need not be estimated. Sodium percarbonate reaching the soil would rapidly dissociate into hydrogen peroxide and sodium carbonate. Hydrogen peroxide rapidly degrades in soil. Sodium carbonate occurs widely in natural soils.

1.1.1.10.6 Atmospheric compartment

The atmospheric emissions of sodium percarbonate from the industrial and professional use are negligible. The vapour pressure of solid sodium percarbonate is negligible. It is therefore not necessary to determine a predicted environmental concentration of sodium percarbonate in the atmospheric compartment.

1.1.1.10.7 Exposure concentration relevant for the food chain (Secondary poisoning)

Sodium percarbonate will rapidly dissociate in water or in contact with sediment or soil. The substance does not bio-accumulate. Sodium carbonate and hydrogen peroxide are highly water-soluble and will remain in the water phase. They do not accumulate in the food webs. Thus, a secondary poisoning does not occur.