

Extended Safety Data Sheet
According to Regulation (EC) No 1907/2006, Annex II,
Amended by COMMISSION REGULATION (EU) 2020/878,
According to REGULATION (EC) No 1272/2008

Ethylene carbonate

Version 2.0

Issue date: 10-03-2014

Revision date: 11-05-2024

CIRS eSDS Record Number: CSSS-TCO-010-113337

Section 1 Identification of the substance/mixture and of the company/undertaking

1.1 Product identifier:

Identification on the label/Trade name: Ethylene carbonate
Additional identification: Nanoform is NOT covered by this eSDS.
Identification of the product: CAS#96-49-1 EC#202-510-0
Index Number: N/A
REACH registration No.: 01-2119540523-46-****

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

1.2.1 Identified uses:

Manufacturing and distribution of ethylene carbonate
Formulation and (re)packing of ethylene carbonate and mixtures
Use as an intermediate
Use in coatings
Use in cleaning agents
Use in laboratories Polymer processing
Use as processing aid
Use as functional fluids
Use as lubricant Manufacturing of enamel
Use in electrical wire enameling
Professional-Use in cleaning agents
Professional-Use in agrochemicals
Professional-Use in laboratories Polymer processing
Professional-Use as processing aid Use as functional fluids
Professional-Use as lubricant
Consumers-waterborne latex wall paint
Consumers-remover

1.2.2 Uses advised against:

No uses advised against are identified.

1.3 Details of the supplier of the safety data sheet:

Supplier(Only representative): Chemical Inspection & Regulation Service Limited
Supplier(Manufacturer): Shinghwa Amperex Technology (Dongying) Co.,Ltd.
Address: NO.198,TONGXING ROAD KENLI DISTRICT,DONGYING SHANDONG CHINA
Contact person(E-mail): vivian.wang@sinodmc.com
Telephone: +86-546-2169208
Fax: +86-546-2169286

1.4 Emergency telephone Number:

+353 (1) 477 3710. Only available during office hours (9:00a.m.-17:30p.m.)

Available outside office hours? YES NO

Section 2 Hazards Identification

2.1 Classification of the substance or mixture:

2.1.1 Classification of the substance:

The substance is classified as following according to REGULATION (EC) No 1272/2008:

REGULATION (EC) No 1272/2008	
Hazard classes/Hazard categories	Hazard statement
Acute Tox. 4	H302
Eye Irrit. 2	H319
STOT Rep. Exp. 2	H373

For full text of H- phrases: see section 2.2.

2.2 Label elements:

Hazard pictogram(s):



Signal word:

Warning

Hazard statement(s):

H302: Harmful if swallowed.

H319: Causes serious eye irritation.

H373: May cause damage to organs (Affected organs: Kidney) through prolonged or repeated exposure (Route of exposure: Oral).

Precautionary statement(s):

P260: Do not breathe dust/fume/ gas/mist/vapours/spray.

P264: Wash hands thoroughly after handling.

P270: Do not eat, drink or smoke when using this product.

P280: Wear protective gloves/ protective clothing/eye protection/face protection.

P301+P312: IF SWALLOWED: Call a POISON CENTRE/doctor if you feel unwell.

P305+P351+P338: IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

P314: Get medical advice/ attention if you feel unwell.

P330: Rinse mouth.

P337+P313: If eye irritation persists: Get medical advice/attention.

P501: Dispose of contents/container in accordance with local regulations.

Supplemental Hazard information (EU)

Not applicable.

2.3 Other hazards:

The substance is not PBT / vPvB.

The substance is not identified as having endocrine disrupting properties.

Section 3 Composition/information on ingredients

Substance/Mixture:

Substance

Ingredient(s):

Chemical Name	Registration No.	CAS No.	EC No.	Concentration	Specific Concentration limits, M-Factors, Acute Toxicity Estimates (ATE)
Ethylene carbonate	01-2119540523-46-****	96-49-1	202-510-0	99.8 % (w/w)	N/A

Section 4 First aid measures

Product name: Ethylene carbonate
Version #: 2.0 Issue date: 10-03-2014.

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4.1 Description of first aid measures:

In all cases of doubt, or when symptoms persist, seek medical attention.

4.1.1 In case of inhalation:

Remove victim to fresh air and keep at rest in a position comfortable for breathing. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Get medical attention if adverse health effects persist or are severe. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.

4.1.2 In case of skin contact:

Flush contaminated skin with plenty of water. Remove contaminated clothing and shoes. Get medical attention if symptoms occur. Wash clothing before reuse. Clean shoes thoroughly before reuse.

4.1.3 In case of eyes contact:

Immediately flush eyes with plenty of water, occasionally lifting the upper and lower eyelids. Check for and remove any contact lenses. Continue to rinse for at least 10 minutes. Get medical attention.

4.1.4 In case of ingestion:

Wash out mouth with water. Remove dentures if any. Remove victim to fresh air and keep at rest in a position comfortable for breathing. If material has been swallowed and the exposed person is conscious, give small quantities of water to drink. Stop if the exposed person feels sick as vomiting may be dangerous. Do not induce vomiting unless directed to do so by medical personnel. If vomiting occurs, the head should be kept low so that vomit does not enter the lungs. Get medical attention if adverse health effects persist or are severe. Never give anything by mouth to an unconscious person. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.

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

Harmful if swallowed. Causes serious eye irritation. May cause damage to organs (Affected organs: Kidney) through prolonged or repeated exposure (Route of exposure: Oral).

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

Treatment: Treat according to symptoms (decontamination, vital functions), no known specific antidote. Symptomatic treatment and supportive therapy as indicated. Following severe exposure the patient should be kept under medical review for at least 48 hours.

Section 5 Firefighting measures

5.1 Extinguishing media:

Suitable extinguishing media:

Use an extinguishing agent suitable for the surrounding fire.

Unsuitable extinguishing media:

Not available.

5.2 Special hazards arising from the substance or mixture

No specific fire or explosion hazard.

Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training. Hazardous thermal decomposition products:

Decomposition products may include the following materials: carbon dioxide, carbon monoxide.

5.3 Advice for firefighters:

Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode. Clothing for fire-fighters (including helmets, protective boots and gloves) conforming to European standard EN 469 will provide a basic level of protection for chemical incidents.

Section 6 Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures:

6.1.1 For non-emergency personnel: Provide adequate ventilation. Wear protective equipment. Avoid contact with skin and eyes.

6.1.2 For emergency responders: No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilt material. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment.

6.2 Environmental Precautions:

Avoid dispersal of spilt material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air).

6.3 Methods and material for Containment and Cleaning up:

Small spill: Move containers from spill area. Vacuum or sweep up material and place in a designated, labelled waste container. Dispose of via a licensed waste disposal contractor. Large spill: Move containers from spill area. Approach the release from upwind. Prevent entry into sewers, water courses, basements or confined areas. Vacuum or sweep up material and place in a designated, labelled waste container. Dispose of via a licensed waste disposal contractor.

6.4 Reference to other sections:

See Section 7 for information on safe handling.

See Section 8 for information on personal protection equipment.

See Section 13 for information on disposal.

Section 7 Handling and storage

7.1 Precautions for safe handling:

7.1.1 Protective measures: Put on appropriate personal protective equipment. Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. Do not ingest. Avoid contact with eyes, skin and clothing. Keep in the original container or an approved alternative made from a compatible material, kept tightly closed when not in use. Empty containers retain product residue and can be hazardous. Do not reuse container.

7.1.2 Advice on general occupational hygiene: Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.

7.2 Conditions for safe storage, including any incompatibilities:

Store in accordance with local regulations. Store in original container protected from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see section 10) and food and drink. Keep container tightly closed and sealed until ready for use. Containers that have been opened must be carefully resealed and kept upright to prevent leakage. Do not store in unlabelled containers. Use appropriate containment to avoid environmental contamination.

7.3 Specific end use(s):

Not applicable.

Section 8 Exposure Controls/Personal Protection

8.1 Control parameters:

8.1.1 Occupational exposure limits: Not available.

8.1.2 Additional exposure limits under Not available.

the conditions of use:

8.1.3 DNEL/DMEL and PNEC-Values:

Workers - Hazard via inhalation route	Systemic effects-Long term exposure	DNEL=15 mg/m ³
Workers - Hazard via dermal route	Systemic effects-Long term exposure	DNEL=4.3 mg/kg bw/day
General Population - Hazard via inhalation route	Systemic effects-Long term exposure	DNEL=3.7 mg/m ³
General Population - Hazard via dermal route	Systemic effects-Long term exposure	DNEL=2.1 mg/kg bw/day
General Population - Hazard via oral route	Systemic effects-Long term exposure	DNEL=2.1 mg/kg bw/day
Hazard for aquatic organisms	Freshwater	PNEC=5.9 mg/L
Hazard for aquatic organisms	Marine water	PNEC=0.59 mg/L
Hazard for aquatic organisms	STP	No hazard identified
Hazard for aquatic organisms	Sediment (freshwater)	PNEC=28.3 mg/kg sediment dw
Hazard for aquatic organisms	Sediment (marine water)	PNEC=2.83 mg/kg sediment dw
Hazard for terrestrial organisms	Soil	PNEC=2.2 mg/kg soil dw
Hazard for predators	Secondary poisoning	No potential for bioaccumulation

8.2 Exposure controls:

8.2.1 Appropriate engineering controls:

Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday. Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.

8.2.2 Individual protection measures, such as personal protective equipment:

Eye/face protection:

Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists, gases or dusts.

Skin protection

Hand protection:

Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary.

Body protection:

Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

Other skin protection: Appropriate footwear and any additional skin protection measures should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product

Respiratory protection:

In case of inadequate ventilation wear respiratory protection. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator.

Thermal hazards:

Wear suitable protective clothing to prevent heat.

8.2.3 Environmental exposure controls:

Avoid discharge into the environment. According to local regulations, Federal and official regulations. Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.

Section 9 Physical and chemical properties

9.1 Information on basic physical and chemical properties:

Physical state:	Solid at 20°C and 1013 hPa
Colour:	Colorless
Odour:	Odourless
Melting point/freezing point (°C):	36 °C at 101.3 kPa
Boiling point or initial boiling point and boiling range (°C):	247 °C at 101.3 kPa
Flammability (gas, liquid, solid):	Non flammable
Lower and upper explosion limit:	Not available
Flash point (°C):	143 °C
Auto-ignition temperature:	Not available
Decomposition temperature:	Not available
pH:	Not available
Kinematic viscosity (mm ² /s):	Not available
Solubility in water (g/l, 20°C):	778 g/L at 20 °C
Solubility in other polar and non-polar solvents (g/l, 20°C):	Not available
Partition coefficient n-octanol/water (log Po/w, 20°C):	Log Kow (Log Pow): 0.11 at 20 °C
Vapour pressure (20°C):	1 Pa at 20 °C
Bulk density (kg/m ³):	Not available
Relative Density (g/cm ³):	1.32 g/cm ³ at 40 °C
Relative vapour density:	Not available
Particle characteristics:	Not applicable
Evaporation rate:	Not available
Flammability limit - lower (%):	Not available
Ignition temperature (°C):	Not available
Explosive properties:	Non explosive
Oxidising properties:	Oxidising: no
Molecular Formula:	C3H4O3
Molecular Weight:	88.06

9.2. Other information:

Fat solubility(solvent-oil to be specified) etc:	Not available
Surface tension:	Based on chemical structure, no surface activity is to be expected.
Dissociation constant in water(pKa):	pKa at 20 °C: 3.86
Oxidation-reduction Potential:	Not available

Section 10 Stability and reactivity

10.1 Reactivity:	The substance is stable under normal storage and handling conditions.
10.2 Chemical stability:	Stable under normal temperatures and pressures
10.3 Possibility of hazardous reactions:	No dangerous reaction known under conditions of standard use
10.4 Conditions to avoid:	Incompatible materials. High temperatures. Proximity to sources of ignition.
10.5 Incompatible materials:	Reactive or incompatible with the following materials: oxidizing materials.
10.6 Hazardous decomposition products:	Decomposition products may include the following materials: carbon dioxide, carbon monoxide.

Section 11 Toxicological information

11.1 Information on hazard classes as defined in Regulation (EC) No 1272/2008:

Acute toxicity:	
LD50(Oral, Rat):	10400 mg/kg bw
LD50(Dermal, Rabbit):	> 2000 mg/kg bw
LC50(Inhalation, Rat):	730 mg/m ³ air (8h)
Skin corrosion/Irritation:	Not classified
Serious eye damage/irritation:	Causes serious eye irritation.
Respiratory or skin sensitization:	Not classified
Germ cell mutagenicity:	Not classified
Carcinogenicity:	Not classified
Reproductive toxicity:	Not classified
STOT- single exposure:	Not classified
STOT-repeated exposure:	May cause damage to organs (Affected organs: Kidney) through prolonged or repeated exposure (Route of exposure: Oral).
Aspiration hazard:	Not classified

11.2 Information on other hazards

Endocrine disrupting properties	The substance is not identified as having endocrine disrupting properties.
Other information	Not applicable

Section 12 Ecological information

12.1 Toxicity:

Acute (short-term) toxicity:

LC50(96h, Fish):	> 100 mg/L
EC50(48h, Ceriodaphnia dubia):	5900 mg/L
EC50(72h, Algae/aquatic plants):	> 100 mg/L

Chronic (long-term) toxicity:

NOEC(Fish):	Not available
NOEC(Ceriodaphnia dubia):	Not available
NOEC(Algae/aquatic plants):	100 mg/L

12.2 Persistence and degradability:

Readily biodegradable

12.3 Bioaccumulative potential:

Pow < 3 (log Pow = 0.11).

12.4 Mobility in soil:

Koc at 20 °C: 11.9; LogKoc: 1.08

12.5 Results of PBT and vPvB assessment:

The substance is not PBT / vPvB.

12.6 Endocrine disrupting properties:

The substance is not identified as having endocrine disrupting properties.

12.7 Other adverse effects:

Not available.

12.8 Additional information

Not available.

Section 13 Disposal considerations

13.1 Waste treatment methods:

Dispose of in accordance with all applicable local and national regulations. Use recovery/recycling where feasible, otherwise incineration is the recommended method of disposal. Empty containers may contain hazardous residues. Do not cut, puncture or weld on or near to the container. Labels should not be removed

from containers until they have been cleaned. Contaminated containers must not be treated as household waste. Containers should be cleaned by appropriate methods and then re-used or disposed of by landfill or incineration as appropriate. Do not incinerate closed containers.

Section 14 Transport information

	Land transport (ADR/RID)	Inland waterways (ADN)	Sea transport (IMDG)	Air transport (ICAO/IATA)
14.1 UN number or ID number	Not regulated	Not regulated	Not regulated	Not regulated
14.2 UN Proper shipping name	Not regulated	Not regulated	Not regulated	Not regulated
14.3 Transport hazard Class(es)	Not regulated	Not regulated	Not regulated	Not regulated
14.4 Packing group	Not regulated	Not regulated	Not regulated	Not regulated
14.5 Environmental hazards	No	No	No	No
14.6 Special precautions for user	See section 2.2	See section 2.2	See section 2.2	See section 2.2
14.7 Maritime transport in bulk according to IMO instruments	Not regulated	Not regulated	Not regulated	Not regulated

Section 15 Regulatory information

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

Relevant information regarding authorization: Not applicable.

Relevant information regarding restriction: Not applicable.

Other EU regulations: Employment restrictions concerning young person must be observed. For use only by technically qualified individuals.

Other National regulations: Not applicable

15.2 Chemical safety assessment

YES NO

Section 16 Other information

16.1 Indication of changes:

Version 1.0 Amended by (EU) 2020/878

Version 2.0 Exposure scenarios are placed after section 16.

16.2 Abbreviations and acronyms:

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

RID: Regulation for rail International transportation of Dangerous goods

ADN: European Agreement concerning the International Carriage of Dangerous Goods by Inland Waterways

IMDG: Code international maritime dangerous goods code

ICAO: International Civil Aviation Organization

IATA: International Air Transport Association

Product name: Ethylene carbonate

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LC50: median lethal concentration

EC50: The effective concentration of substance that causes 50% of the maximum response.

NOEC: No Observed Effect Concentration

DNEL: derived no-effect level

PNEC: predicted no-effect concentration

16.3 Key literature references and sources for data

ECHA Registered substances data

16.4 Classification and procedure used to derive the classification for mixtures according to Regulation (EC)

1272/2008 [CLP]

Classification according to Regulation (EC) No. 1272/2008		Classification procedure
Acute Tox. 4	H302	On basis of ethylene glycol, the main metabolite of ethylene carbonate
Eye Irrit. 2	H319	On basis of test data
STOT Rep. Exp. 2	H373	On basis of ethylene glycol, the main metabolite of ethylene carbonate

16.5 Relevant H-statements (number and full text):

H302: Harmful if swallowed.

H319: Causes serious eye irritation.

H373: May cause damage to organs (Affected organs: Kidney) through prolonged or repeated exposure (Route of exposure: Oral).

16.6 Training instructions:

Not applicable.

16.7 Further information:

This information is based upon the present state of our knowledge. This eSDS has been compiled and is solely intended for this product.

16.8 Notice to reader:

Employers should use this information only as a supplement to other information gathered by them, and should make independent judgment of suitability of this information to ensure proper use and protect the health and safety of employees. This information is furnished without warranty, and any use of the product not in conformance with this Safety Data Sheet, or in combination with any other product or process, is the responsibility of the user.

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The exposure scenario section is extracted from the CSR.

1. Exposure scenario 1: Manufacturing and distribution of ethylene carbonate

1.1 Exposure scenario

1 Exposure Scenario 1: Manufacturing and distribution of ethylene carbonate	
Use descriptors	SU 8, 9 PROC 1, 2, 3, 4, 8a, 8b, 9, 15 ERC 1
Processes, tasks activities covered	Manufacture of the substance. Includes recycling / recovery, material transfers, storage, maintenance, loading, sampling and associated laboratory activities Loading and repacking of the substance, including its distributing and associated laboratory activities
Assessment Method	Occupational Assessment Tool: ECETOC TRA Environmental Assessment: not performed as the substance is only imported.
2. Operational conditions and risk management measures	
2.1 Control of workers exposure	
Product characteristic	
Ethylene carbonate is used as a liquid with a low vapour pressure. It is classified as moderately irritating to eyes.	
Frequency and duration of use/exposure	
Duration: > 4 h per day; shifts worked are 12 hours. Frequency: 240 days per year	
Human factors not influenced by risk management	
Where engineering controls are not present or potential exposure is possible, PPE is required per written procedures.	
Operational conditions affecting workers exposure	
The process is open air. Ventilation controls (LEV) is in place for transfer of products (drumming) (PROC 8a, 8b and 9).	
Technical conditions and measures at process level (source) to prevent release	
Process equipment is designed to contain all chemicals (liquid and vapour) and route emissions to appropriate control device. All process areas are located within concrete secondary containment to capture any incidental spills or releases. The site developed and maintains Emergency Action Plans along with other specific procedures (Haz Com/SPCC) to prevent / limit releases. The site personnel attend routine trainings and the site conducts routine emergency drills. Trained emergency response personnel are on site around the clock to mitigate a release.	
Technical conditions and measures to control dispersion from source towards the worker	
Process equipment is designed to contain all chemicals (liquid and vapour) and route emissions to appropriate control device. Engineering controls are also available during sampling, drumming and bulk transfer operations. Local Exhaust Ventilation is required for processes that are not covered by PROC 1, 2 and 3. The latter can be performed outdoors, in open air.	
Conditions and measures related to personal protection, hygiene and health evaluation	

Appropriate PPE and associated risk management measures are available where a potential for exposure occurs.

1.2 Exposure estimation

1.2.1 Workers exposure

Exposure was modelled with ECETOC TRA (version April 2010). For this exposure assessment, it is assumed that processes covered by PROC 1, 2 and 3 are performed in open air. Other processes are performed indoors with Local Exhaust Ventilation (LEV) present.

1.2.1.1 Long-term exposure

Long-term exposure concentrations to workers

PROC	Duration?	LEV?	PPE?	Conc	Exposure estimation		
					inhalation (mg/m ³)	dermal (mg/kg/d)	total (mg/kg/d)
1	>4h	N	N	>25%	0.03	0.34	0.35
2	>4h	N	N	>25%	2.57	1.37	1.74
3	>4h	N	N	>25%	7.71	0.34	1.44
4	>4h	Y	N	>25%	1.84	0.69	0.95
8a	>4h	Y	N	>25%	3.67	0.14	0.66
8b	>4h	Y	N	>25%	0.55	0.69	0.76
9	>4h	Y	N	>25%	1.84	0.69	0.95
15	>4h	Y	N	>25%	1.84	0.03	0.30

1.2.1.2 Acute/Short term exposure

For acute effects, the full shift estimations based on ECETOC TRA calculations, can be used to derive acute exposure estimates. Since full shift estimates in ECETOC TRA are assumed to represent the 90th percentile of the exposure distribution and since in general the variability is not very high, a multiplying factor of 2 is recommended to estimate the 95th percentile of the related short term exposure distribution.

For this exposure assessment, it is assumed that processes covered by PROC 1, 2 and 3, are performed in open air. Other processes are performed indoors with Local Exhaust Ventilation (LEV) present.

Acute exposure concentrations to workers

PROC	LEV?	PPE?	Conc	Exposure estimation		
				inhalation (mg/m ³)	dermal (mg/kg/d)	total (mg/kg/d)
1	N	N	>25%	0.05	0.69	0.69
2	N	N	>25%	5.14	2.74	3.48
3	N	N	>25%	15.41	0.69	2.89
4	Y	N	>25%	3.67	1.37	1.90
8a	Y	N	>25%	7.34	0.27	1.32
8b	Y	N	>25%	1.10	1.37	1.53
9	Y	N	>25%	3.67	1.37	1.90
15	Y	N	>25%	3.67	0.07	0.59

1.3 RISK CHARACTERISATION

1.3.1 Human health - workers

Quantitative risk characterisation for workers – long term exposure

PROC	Duration?	LEV?	PPE?	Conc	Risk Characterisation Ratio		
					inhalation	dermal	total
1	>4h	N	N	>25%	0.00	0.02	0.02
2	>4h	N	N	>25%	0.05	0.09	0.14
3	>4h	N	N	>25%	0.15	0.02	0.17
4	>4h	Y	N	>25%	0.03	0.05	0.08
8a	>4h	Y	N	>25%	0.07	0.01	0.08
8b	>4h	Y	N	>25%	0.01	0.05	0.06
9	>4h	Y	N	>25%	0.03	0.05	0.08
15	>4h	Y	N	>25%	0.03	0.00	0.04

Quantitative risk characterisation for workers – short term exposure

				Risk Characterisation Ratio		
				inhalation	dermal	total
1	N	N	>25%	0.01	0.05	0.06
2	N	N	>25%	0.05	0.23	0.28
3	N	N	>25%	0.01	0.19	0.21
4	Y	N	>25%	0.03	0.13	0.15
8a	Y	N	>25%	0.01	0.09	0.09
8b	Y	N	>25%	0.03	0.10	0.13
9	Y	N	>25%	0.03	0.13	0.15
15	Y	N	>25%	0.00	0.04	0.04

1.3.2 Environment

Not applicable, as the substance is imported only.

2. Exposure scenario 2: Formulation and (re)packing of of ethylene carbonate

2.1 Exposure scenario

1 Exposure Scenario 2: Formulation and (re)packing of substances and mixtures	
Use descriptors	SU 10 PROC 1, 2, 3, 4, 5, 8a, 8b, 9, 14, 15 ERC 2, 3
Processes, tasks activities covered	Formulation, packing and repacking of the substance and its mixtures in batch or continuous operations, including storage, material transfers, mixing, large and small scale packing, maintenance and associated laboratory activities
Assessment Method	Occupational Assessment Tool: ECETOC TRA Environmental Assessment Tool: ECETOC TRA
2. Operational conditions and risk management measures	
2.1 Control of workers exposure	
Product characteristic	
Ethylene carbonate is used as a liquid with a low vapour pressure. It is classified as moderately irritating to eyes.	
Frequency and duration of use/exposure	
Duration: > 4 h per day Frequency: 240 days per year	
Operational conditions affecting workers exposure	
The work is carried out indoors at ambient temperatures.	
Technical conditions and measures to control dispersion from source towards the worker	
Local Exhaust Ventilation is required for processes that are not covered by PROC 1, 2 & 3.	
Conditions and measures related to personal protection, hygiene and health evaluation	
Appropriate PPE and associated risk management measures are available where a potential for exposure occurs.	
2.2 Control of environmental exposure	
A standard municipal STP is present (default capacity: 10000 eq) with an effluent discharge rate of 2000 m ³ /d. A standard river flow of 18000 m ³ /d is taken into account, resulting in the default dilution factor of 10.	

2.2 Exposure estimation

2.2.1 Workers exposure

Exposure was modelled with ECETOC TRA (version April 2010).

2.2.1.1 Long-term exposure

The duration of the activities is assumed to be a full shift (> 4h/d). Local Exhaust Ventilation is required, except for processes covered by PROC 1, 2 or 3. There are no limitations on concentration. No specific personal protective equipment is required.

Long-term exposure concentrations to workers

PROC	Duration?	LEV?	PPE?	Conc	Exposure estimation		
					inhalation (mg/m ³)	dermal (mg/kg/d)	total (mg/kg/d)

1	>4h	N	N	>25%	0.04	0.34	0.35
2	>4h	N	N	>25%	3.67	1.37	1.90
3	>4h	N	N	>25%	11.01	0.34	1.92
4	>4h	Y	N	>25%	1.84	0.69	0.95
5	>4h	Y	N	>25%	1.84	0.07	0.33
8a	>4h	Y	N	>25%	3.67	0.14	0.66
8b	>4h	Y	N	>25%	0.55	0.69	0.76
9	>4h	Y	N	>25%	1.84	0.69	0.95
14	>4h	Y	N	>25%	1.84	0.34	0.30
15	>4h	Y	N	>25%	1.84	0.03	0.30

2.2.1.2 Acute/Short term exposure

For acute effects, the full shift estimations based on ECETOC TRA calculations, can be used to derive acute exposure estimates. Since full shift estimates in ECETOC TRA are assumed to represent the 90th percentile of the exposure distribution and since in general the variability is not very high, a multiplying factor of 2 is recommended to estimate the 95th percentile of the related short term exposure distribution.

Acute exposure concentrations to workers

PROC	LEV?	PPE?	Conc	Exposure estimation		
				inhalation (mg/m ³)	dermal (mg/kg/d)	total (mg/kg/d)
1	N	N	>25%	0.07	0.69	0.70
2	N	N	>25%	7.34	2.74	3.79
3	N	N	>25%	22.02	0.69	3.83
4	Y	N	>25%	3.67	1.37	1.90
5	Y	N	>25%	3.67	0.14	0.66
8a	Y	N	>25%	7.34	0.27	1.32
8b	Y	N	>25%	1.10	1.37	1.53
9	Y	N	>25%	3.67	1.37	1.90
14	Y	N	>25%	3.67	0.69	1.21
15	Y	N	>25%	3.67	0.07	0.59

2.2.2 Environmental exposure

The following parameters were used in ECETOC TRA:

Local annual tonnage: 1900 tpa (worst-case)

Number of emission days: 100 days (default ECETOC TRA)

Fraction of tonnage to region: 1

STP present: yes

Predicted local environmental concentrations

	ERC 2	ERC 3
PEC for local freshwater (mg/L)	2.43	0.265
PEC for local freshwater sediment (mg/kg d.w.)	11.6	1.27
PEC for local marine water (mg/L)	0.243	0.0265
PEC for local marine sediments (mg/kg d.w.)	1.16	0.127

PEC for local soil (mg/kg d.w.)	0.698	0.247
PEC in STP (mg/L)	24	2.4

2.3 RISK CHARACTERISATION

2.3.1 Human health - Workers

Quantitative risk characterisation for workers

PROC	Duration?	LEV?	PPE?	Conc	Risk Characterisation Ratio		
					inhalation	dermal	total
1	>4h	N	N	>25%	0.00	0.02	0.02
2	>4h	N	N	>25%	0.07	0.09	0.16
3	>4h	N	N	>25%	0.21	0.02	0.23
4	>4h	Y	N	>25%	0.03	0.05	0.08
5	>4h	Y	N	>25%	0.03	0.00	0.04
8a	>4h	Y	N	>25%	0.07	0.01	0.08
8b	>4h	Y	N	>25%	0.01	0.05	0.06
9	>4h	Y	N	>25%	0.03	0.05	0.08
14	>4h	Y	N	>25%	0.03	0.02	0.06
15	>4h	Y	N	>25%	0.03	0.00	0.04

Quantitative risk characterisation for workers – short term exposure

PROC	LEV?	PPE?	Conc	Risk Characterisation Ratio		
				inhalation	dermal	total
1	N	N	>25%	0.00	0.05	0.05
2	N	N	>25%	0.14	0.18	0.32
3	N	N	>25%	0.42	0.05	0.46
4	Y	N	>25%	0.07	0.09	0.16
5	Y	N	>25%	0.07	0.01	0.08
8a	Y	N	>25%	0.14	0.02	0.16
8b	Y	N	>25%	0.02	0.09	0.11
9	Y	N	>25%	0.07	0.09	0.16
14	Y	N	>25%	0.07	0.05	0.11
15	Y	N	>25%	0.07	0.00	0.07

2.3.2 Environment

Quantitative risk characterisation for the local environment

	ERC 2	ERC 3
RCR for local freshwater	0.411	0.0449
RCR for local freshwater sediment	0.411	0.0449
RCR for local marine water	0.411	0.0449
RCR for local marine sediments	0.411	0.0449
RCR for local soil	0.317	0.106
RCR for STP	n.a.	n.a.

It can be concluded that there is no risk for the environment, as all RCR values are below 1.

The PEC values for the STP were lower than the applied concentration (i.e. 49 mg/L) in the ready biodegradability study, at which no toxicity to the inoculum was observed. Therefore, no risk for the STP microorganisms is anticipated.

3. Exposure scenario 3: Industrial uses of ethylene carbonate

3.1 Exposure scenario

1 Exposure Scenario 3: Industrial uses of ethylene carbonate	
Processes, tasks activities covered	Industrial uses listed below (SU 3)
Use as an intermediate	Industrial use resulting in manufacture of another substance. PROC 1, 2, 3, 4 ERC 6a, 6b
Use in coatings	Covers the use in coatings (paints, inks, adhesives, parting agents, etc.) including exposures during use (incl. materials receipt, storage, preparation and transfer) and equipment cleaning, maintenance and associated laboratory use. PROC 1, 2, 3, 4, 5, 7, 8a, 8b, 10, 13, 15 ERC 4
Use in cleaning agents	Covers the use as a component of cleaning products including transfer from storage, pouring/unloading from drums or containers. Exposures during mixing/diluting in the preparatory phase and cleaning activities (automated and by hand), related equipment cleaning and maintenance. PROC 1, 2, 3, 4, 7, 8a, 8b, 10, 13 ERC 4
Use in laboratories	Use of the substance within laboratory settings, including material transfers and equipment cleaning. PROC 10, 15 ERC 4
Polymer processing	Processing of formulated polymers including material transfers, additives handling, moulding, curing and forming activities, material re-works, storage and associated maintenance. PROC 1, 2, 3, 4, 5, 6, 8a, 8b, 9, 13, 14, 15, 21 ERC 6d
Use as processing aid	Processing aids for building and construction applications (e.g. foundry) and leather industry. PROC 1, 2, 3, 4, 5, 6, 7, 8a, 8b, 9, 10, 12, 13, 14, 15, 21 ERC 4, 5, 6b
Use as functional fluids	Use as functional fluid in industrial equipment including maintenance and related material transfers. PROC 1, 2, 3, 4, 8a, 8b, 9 ERC 7
Use as lubricant	Covers the use of formulated lubricants in closed and open systems including transfer operations, operation of machinery/engines and similar articles, reworking on eject articles, equipment maintenance and disposal of waste.

	PROC 1, 2, 3, 4, 7, 8a, 8b, 10, 13, 17 ERC 4, 7
Use in enamel process	Manufacturing of enamel: PROC 1, 3, 5, 8a, 8b, 9 ERC 4, 5 Use in electrical wire enameling: PROC 2, 3, 5, 8a, 8b, 10, 14 ERC 4, 5
Assessment Method	Occupational Assessment Tool: ECETOC TRA Environmental Assessment Tool: ECETOC TRA
2.1 Control of workers exposure	
Product characteristic	
Ethylene carbonate is used as a liquid with a low vapour pressure. It is classified as moderately irritating to eyes. For spraying activities, the concentration should be limited to 25%.	
Frequency and duration of use/exposure	
Duration: > 4 h per day (full shift), except for spraying, where duration is limited to 4h/d Frequency: 240 days per year	
Operational conditions affecting workers exposure	
The work is carried out indoors at ambient temperatures.	
Technical conditions and measures to control dispersion from source towards the worker	
Local Exhaust Ventilation is required for processes that are not covered by PROC 1, 2, 3, 12 (blowing), 21 (manual cutting etc.).	
Conditions and measures related to personal protection, hygiene and health evaluation	
Appropriate PPE and associated risk management measures are available where a potential for exposure occurs. No personal protection is assumed in the model.	
2.2 Control of environmental exposure	
A standard municipal STP is present (default capacity: 10000 eq) with an effluent discharge rate of 2000 m ³ /d. A standard river flow of 18000 m ³ /d is taken into account, resulting in the default dilution factor of 10.	

3.2 Exposure estimation

3.2.1 Workers exposure

Exposure was modelled with ECETOC TRA (version April 2010).

3.2.1.1 Long-term exposure

The duration of the activities is assumed to be a full shift (> 4h/d). Only for spraying activities, the duration should be limited to 4h. Local Exhaust Ventilation is required, except for processes covered by PROC 1, 2 or 3. There are no limitations on concentration, except for spraying (PROC 7) where the concentration should be limited to 25%. No specific personal protective equipment is required.

Long-term exposure concentrations to workers

PROC	Duration?	LEV?	PPE?	Conc	Exposure estimation		
					inhalation (mg/m ³)	dermal (mg/kg/d)	total (mg/kg/d)

1	>4h	N	N	>25%	0.04	0.34	0.35
2	>4h	N	N	>25%	3.67	1.37	1.90
3	>4h	N	N	>25%	11.01	0.34	1.92
4	>4h	Y	N	>25%	1.84	0.69	0.95
5	>4h	Y	N	>25%	1.84	0.07	0.33
6	>4h	Y	N	>25%	1.84	1.37	1.63
7	1-4h	Y	N	5-25%	6.60	2.14	3.09
8a	>4h	Y	N	>25%	3.67	0.14	0.66
8b	>4h	Y	N	>25%	0.55	0.69	0.76
9	>4h	Y	N	>25%	1.84	0.69	0.95
10	>4h	Y	N	>25%	3.67	1.37	1.90
12	>4h	N	N	>25%	7.34	0.34	1.39
13	>4h	Y	N	>25%	3.67	0.69	1.21
14	>4h	Y	N	>25%	1.84	0.34	0.61
15	>4h	Y	N	>25%	1.84	0.03	0.30
17	4h	Y	N	>25%	3.67	1.37	1.90
21	>4h	N	N	>25%	1.00	2.83	2.97

3.2.1.2 Acute/Short term exposure

For acute effects, the full shift estimations based on ECETOC TRA calculations, can be used to derive acute exposure estimates. Since full shift estimates in ECETOC TRA are assumed to represent the 90th percentile of the exposure distribution and since in general the variability is not very high, a multiplying factor of 2 is recommended to estimate the 95th percentile of the related short term exposure distribution.

Acute exposure concentrations to workers

PROC	LEV?	PPE?	Conc	Exposure estimation		
				inhalation (mg/m ³)	dermal (mg/kg/d)	total (mg/kg/d)
1	N	N	>25%	0.07	0.69	0.70
2	N	N	>25%	7.34	2.74	3.79
3	N	N	>25%	22.02	0.69	3.83
4	Y	N	>25%	3.67	1.37	1.90
5	Y	N	>25%	3.67	0.14	0.66
6	Y	N	>25%	3.67	2.74	3.27
7	Y	N	5-25%	13.20	4.28	6.18
8a	Y	N	>25%	7.34	0.27	1.32
8b	Y	N	>25%	1.10	1.37	1.53
9	Y	N	>25%	3.67	1.37	1.90
10	Y	N	>25%	7.34	2.74	3.79
12	N	N	>25%	14.68	0.69	2.78
13	Y	N	>25%	7.34	1.37	2.42
14	Y	N	>25%	3.67	0.69	1.21

15	Y	N	>25%	3.67	0.07	0.59
17	Y	N	>25%	7.34	2.74	3.79
21	N	N	>25%	0.20	0.57	0.59

3.2.2 Environmental exposure

The following parameters were used in ECETOC TRA:

Local annual tonnage: 1200 tpa

Number of emission days: 100 days (default ECETOC TRA)

Fraction of tonnage to region: 1

STP present: yes

Predicted local environmental concentrations

	ERC 4	ERC 5	ERC 6a	ERC 6b	ERC 6d	ERC 7
PEC for local freshwater (mg/L)	75.9	38.0	1.54	3.82	0.0306	3.82
PEC for local freshwater sediment (mg/kg d.w.)	364	182	7.4	18.3	0.146	18.3
PEC for local marine water (mg/L)	7.59	3.8	0.154	0.382	0.00307	0.382
PEC for local marine sediments (mg/kg d.w.)	36.4	18.2	0.74	1.83	0.0147	1.83
PEC for local soil (mg/kg d.w.)	19.6	9.87	0.48	1.05	0.204	1.06
PEC in STP (mg/L)	759	379	15.2	37.9	0.0379	37.9

The PEC values for **ERC4 and ERC5** result in RCR values above 1 and thus refinement is needed.

As an extra risk management measure, sewage sludge should not be applied to agricultural soil but should be incinerated.

This results in PEC soil values of 0.428 and 0.255 mg/kg d.w. for ERC4 and ERC5, respectively. which is enough to lower the RCR's to below 1. If this is not possible, maximum safe use volumes of 1325 kg/d (ERC 4) or 2650 kg/d (ERC 5) are prescribed, in order to show safe use.

It has been calculated that under the aforementioned standard/default conditions, the daily emission to wastewater should be at maximum 900 kg/day (ERC 4) or 1800 kg/day (ERC 5), in order to get RCR values < 1 for freshwater and marine water. It is known from the largest user, that their total daily emission of ethylene carbonate is less than 20 kg/day, proving safe use. It has been assumed that other (smaller) users will release amounts which are significantly lower than the above mentioned maximum daily emission values.

3.3 RISK CHARACTERISATION

3.3.1 Human health - Workers

Quantitative risk characterisation for workers

PROC	Duration?	LEV?	PPE?	Conc	Risk Characterisation Ratio		
					inhalation	dermal	total
1	>4h	N	N	>25%	0.00	0.02	0.02
2	>4h	N	N	>25%	0.07	0.09	0.16
3	>4h	N	N	>25%	0.21	0.02	0.23
4	>4h	Y	N	>25%	0.03	0.05	0.08

5	>4h	Y	N	>25%	0.03	0.00	0.04
6	>4h	Y	N	>25%	0.03	0.09	0.13
7	1-4h	Y	N	5-25%	0.12	0.14	0.27
8a	>4h	Y	N	>25%	0.07	0.01	0.08
8b	>4h	Y	N	>25%	0.01	0.05	0.06
9	>4h	Y	N	>25%	0.03	0.05	0.08
10	>4h	Y	N	>25%	0.07	0.09	0.16
12	>4h	N	N	>25%	0.14	0.02	0.16
13	>4h	Y	N	>25%	0.07	0.05	0.11
14	>4h	Y	N	>25%	0.03	0.02	0.06
15	>4h	Y	N	>25%	0.03	0.00	0.04
17	>4h	Y	N	>25%	0.07	0.09	0.16
21	>4h	N	N	>25%	0.02	0.19	0.21

Quantitative risk characterisation for workers – short term exposure

PROC	LEV?	PPE?	Conc	Risk Characterisation Ratio		
				inhalation	dermal	total
1	N	N	>25%	0.00	0.05	0.05
2	N	N	>25%	0.14	0.18	0.32
3	N	N	>25%	0.42	0.05	0.46
4	Y	N	>25%	0.07	0.09	0.16
5	Y	N	>25%	0.07	0.01	0.08
6	Y	N	>25%	0.07	0.18	0.25
7	Y	N	5-25%	0.24	0.28	0.52
8a	Y	N	>25%	0.14	0.02	0.16
8b	Y	N	>25%	0.02	0.09	0.11
9	Y	N	>25%	0.07	0.09	0.16
10	Y	N	>25%	0.14	0.18	0.32
12	N	N	>25%	0.28	0.05	0.32
13	Y	N	>25%	0.14	0.09	0.23
14	Y	N	>25%	0.07	0.05	0.11
15	Y	N	>25%	0.07	0.00	0.07
17	Y	N	>25%	0.14	0.18	0.32
21	N	N	>25%	0.00	0.04	0.04

3.3.2 Environment

Quantitative risk characterisation for the local environment

	ERC 4	ERC 5	ERC 6a	ERC 6b	ERC 6d	ERC 7
RCR for local freshwater	12.9	6.43	0.262	0.648	0.00518	0.648
RCR for local freshwater sediment	12.8	6.43	0.261	0.647	0.00517	0.647
RCR for local marine water	12.9	6.43	0.262	0.648	0.00521	0.648
RCR for local marine sediments	12.8	6.43	0.261	0.647	0.00520	0.647
RCR for local soil	8.93	4.48	0.218	0.478	0.0698	0.482
RCR in STP	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.

It can be concluded that there is no risk for the environment for ERC 6a, 6b, 6d and 7, as all RCR values are below 1. For ERC4 and ERC5 refinement is needed.

The PEC values for the STP were lower than the applied concentration (i.e. 49 mg/L) in the ready biodegradability study, at which no toxicity to the inoculum was observed. Therefore, no risk for the STP microorganisms is anticipated.

Refinement for ERC4 and ERC5:

When not applying sewage sludge to agricultural soil as an extra risk management measure, the RCR values for local soil are decreased to 0.128 and 0.0830, respectively, proving safe use.

In case the emission to wastewater is at maximum 800 kg/day, the RCR values for fresh- and marine water (incl. sediment) are at maximum ca. 0.86.

In case the direct emission to soil is at maximum 40 kg/day, the RCR value for local soil is at maximum ca. 0.61, when application of sewage sludge to agricultural soil cannot be avoided.

As the emissions of the largest user are known to be significantly lower than the prescribed maximum daily emission volumes, no risk is anticipated for ERC4 and ERC5. As it has been assumed that other (smaller) users will also stay below these emission volumes, no risk for ERC4 and ERC5 is anticipated for these users as well.

4. Exposure scenario 4: Professional uses of ethylene carbonate

4.1 Exposure scenario

1 Exposure Scenario 4: Professional uses of ethylene carbonate	
Processes, tasks activities covered	Professional uses listed below (SU 22)
Use in cleaning agents	Covers the use as a component of cleaning products including transfer from storage, pouring/unloading from drums or containers. Exposures during mixing/diluting in the preparatory phase and cleaning activities (automated and by hand) PROC 4, 8a, 8b, 10, 11, 13 ERC 8a, 8d
Use in agrochemicals	Use as an agrochemical excipient for application by manual or machine spraying, smokes and fogging, including equipment cleaning PROC 4, 5, 8a, 8b, 11, 13 ERC 8a, 8d
Use in laboratories	Use of small quantities within laboratory settings, including material transfers and equipment cleaning PROC 10, 15 ERC 8a
Polymer processing	Processing of formulated polymers including material transfers, additives handling, moulding, curing and forming activities, material re-works, storage and associated maintenance. PROC 8a, 8b, 14, 21 ERC 8a, 8c, 8d, 8f
Use as processing aid	Processing aids for building and construction applications (e.g. foundry) and leather industry. PROC 4, 5, 8a, 8b, 9, 10, 11, 13, 14, 15, 21 ERC 8c, 8d, 8f, 10a, 11a
Use as functional fluids	Use as functional fluid in professional equipment including maintenance and related material transfers PROC 8a, 9, 20 ERC 9a, 9b
Use as lubricant	Covers the use of formulated lubricants in closed and open systems including transfer operations, operation of engines and similar articles, reworking on eject articles, equipment maintenance and disposal of waste oil PROC 4, 8a, 8b, 9, 13, 20 ERC 8a, 8d, 9a, 9b
Assessment Method	Occupational Assessment Tool: ECETOC TRA Environmental Assessment Tool: ECETOC TRA
2.1 Control of workers exposure	

Product characteristic
Ethylene carbonate is used as a liquid with a low vapour pressure. It is classified as moderately irritating to eyes. The concentration of ethylene carbonate in solution should be limited to 5% for spraying activities.
Frequency and duration of use/exposure
Duration: > 4 h per day. For spraying (PROC 11), the duration should be limited to 4h per day. Frequency: 240 days per year
Operational conditions affecting workers exposure
The work is carried out indoors at ambient temperatures.
Technical conditions and measures to control dispersion from source towards the worker
Local Exhaust Ventilation is required for processes that are not covered by PROC 21.
Conditions and measures related to personal protection, hygiene and health evaluation
No personal protection is required.
2.2 Control of environmental exposure
Not taken into account. Assumed that no municipal STP is present (worst case assumption)

4.2 Exposure estimation

4.2.1 Workers exposure

Exposure was modelled with ECETOC TRA (version April 2010).

4.2.1.1 Long-term exposure

The duration of the activities is assumed to be a full shift (> 4h/d). Only for spraying activities, the duration should be limited to 4h. Local Exhaust Ventilation is required, except for processes covered by PROC 21. There are no limitations on concentration, except for spraying (PROC 11) where the concentration should be limited to 5%. No specific personal protective equipment is required.

Long-term exposure concentrations to workers

PROC	Duration?	LEV?	PPE?	Conc	Exposure estimation		
					inhalation (mg/m ³)	dermal (mg/kg/d)	total (mg/kg/d)
4	>4h	Y	N	>25%	7.34	0.69	1.73
5	>4h	Y	N	>25%	7.34	0.07	1.12
8a	>4h	Y	N	>25%	11.01	0.14	1.71
8b	>4h	Y	N	>25%	3.67	0.69	1.21
9	>4h	Y	N	>25%	7.34	0.69	1.73
10	>4h	Y	N	>25%	11.01	1.37	2.94
11	1-4h	Y	N	1-5%	8.81	2.14	3.40
13	>4h	Y	N	>25%	7.34	0.69	1.73
14	>4h	Y	N	>25%	7.34	0.34	1.39
15	>4h	Y	N	>25%	3.67	0.03	0.56
20	>4h	Y	N	>25%	3.67	0.14	0.66
21	>4h	N	N	>25%	3.00	2.83	3.26

4.2.1.2 Acute/Short term exposure

For acute effects, the full shift estimations based on ECETOC TRA calculations, can be used to derive acute exposure estimates. Since full shift estimates in ECETOC TRA are assumed to represent the 90th percentile of the exposure distribution and since in

general the variability is not very high, a multiplying factor of 2 is recommended to estimate the 95th percentile of the related short term exposure distribution.

Acute exposure concentrations to workers

PROC	LEV?	PPE?	Conc	Exposure estimation		
				inhalation (mg/m ³)	dermal (mg/kg/d)	total (mg/kg/d)
4	Y	N	>25%	14.68	1.37	3.47
5	Y	N	>25%	14.68	0.14	2.23
8a	Y	N	>25%	22.02	0.28	3.42
8b	Y	N	>25%	7.34	1.37	2.42
9	Y	N	>25%	14.68	1.37	3.47
10	Y	N	>25%	22.02	2.74	5.89
11	Y	N	1-5%	17.61	4.29	6.80
13	Y	N	>25%	14.68	1.37	3.47
14	Y	N	>25%	14.68	0.69	2.78
15	Y	N	>25%	7.34	0.07	1.12
20	Y	N	>25%	7.34	0.27	1.32
21	N	N	>25%	6.00	5.66	6.51

4.2.2 Environmental exposure

The following parameters were used in ECETOC TRA:

Local annual tonnage: 1000 tpa (worst-case assumption)

Number of emission days: 365 days (default ECETOC TRA)

Fraction of tonnage to region: 1 (worst-case assumption)

STP present: no (worst-case assumption)

Predicted local environmental concentrations

	ERC 8a	ERC 8c	ERC 8d	ERC 8f	ERC 9a	ERC 9b	ERC 10a	ERC 11a
PEC for local freshwater (mg/L)	0.301	0.0295	0.301	0.0295	0.0268	0.0405	0.0355	0.0268
PEC for local freshwater sediment (mg/kg d.w.)	1.44	0.141	1.44	0.141	0.128	0.194	0.170	0.128
PEC for local marine water (mg/L)	0.0301	0.00297	0.0301	0.00297	0.00269	0.00406	0.00357	0.00269
PEC for local marine sediments (mg/kg d.w.)	0.144	0.0142	0.144	0.0142	0.0129	0.0195	0.0171	0.0129
PEC for local soil (mg/kg d.w.)	0.0825	0.0825	0.0825	0.0825	0.0825	0.0825	0.0825	0.0825
PEC in STP (mg/L)	no STP	no STP	no STP	no STP	no STP	no STP	no STP	no STP

4.3 RISK CHARACTERISATION

4.3.1 Human health - Workers

Quantitative risk characterisation for workers

PROC	Duration?	LEV?	PPE?	Conc	Risk Characterisation Ratio		
					inhalation	dermal	total
4	>4h	Y	N	>25%	0.14	0.05	0.18
5	>4h	Y	N	>25%	0.14	0.00	0.14
8a	>4h	Y	N	>25%	0.21	0.01	0.22
8b	>4h	Y	N	>25%	0.07	0.05	0.11
9	>4h	Y	N	>25%	0.14	0.05	0.18
10	>4h	Y	N	>25%	0.21	0.09	0.30
11	1-4h	Y	N	1-5%	0.17	0.14	0.31
13	>4h	Y	N	>25%	0.14	0.05	0.18
14	>4h	Y	N	>25%	0.14	0.02	0.16
15	>4h	Y	N	>25%	0.07	0.00	0.07
20	>4h	Y	N	>25%	0.07	0.01	0.08
21	>4h	N	N	>25%	0.06	0.19	0.25

Quantitative risk characterisation for workers – short term exposure

PROC	LEV?	PPE?	Conc	Risk Characterisation Ratio		
				inhalation	dermal	total
4	Y	N	>25%	0.28	0.09	0.37
5	Y	N	>25%	0.28	0.01	0.29
8a	Y	N	>25%	0.42	0.02	0.43
8b	Y	N	>25%	0.14	0.09	0.23
9	Y	N	>25%	0.28	0.09	0.37
10	Y	N	>25%	0.42	0.18	0.60
11	Y	N	1-5%	0.33	0.29	0.62
13	Y	N	>25%	0.28	0.09	0.37
14	Y	N	>25%	0.28	0.05	0.32
15	Y	N	>25%	0.14	0.00	0.14
20	Y	N	>25%	0.14	0.02	0.16
21	N	N	>25%	0.11	0.38	0.49

4.3.2 Environment

Quantitative risk characterisation for the local environment

	ERC 8a	ERC 8c	ERC 8d	ERC 8f	ERC 9a	ERC 9b	ERC 10a	ERC 11a
RCR for local freshwater	0.0510	0.0050	0.0510	0.0050	0.00454	0.00686	0.00602	0.00453
RCR for local freshwater sediment	0.0509	0.00499	0.0509	0.00499	0.00453	0.00685	0.00601	0.00453
RCR for local marine water	0.0510	0.00503	0.0510	0.00503	0.00457	0.00689	0.00605	0.00457
RCR for local marine	0.0509	0.00502	0.0509	0.00502	0.00456	0.00688	0.00604	0.00456

sediments								
RCR for local soil	0.0375	0.0375	0.0375	0.0375	0.0375	0.0375	0.0375	0.0375
RCR for STP	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.

It can be concluded that there is no risk for the environment, as all RCR values are below 1.

It was assumed that no STP was present, so no risk for the STP microorganisms is anticipated.

In case an STP would have been present, all ERC's show even lower RCR values. In addition, PEC values for the STP are lower than the applied concentration (i.e. 49 mg/L) in the ready biodegradability study, at which no toxicity to the inoculum was observed. Therefore, no risk for the STP microorganisms is anticipated in case an STP is present.

5. Exposure scenario 5: Consumer uses of ethylene carbonate

5.1 Exposure scenario

1 Exposure Scenario 5: Consumer uses of ethylene carbonate	
Processes, tasks activities covered	Consumer uses listed below (SU 21)
	PC9a: Coatings and Paints - Waterborne latex wall paint ERC 11a
	PC9a: Coatings and Paints - Removers (paint-, glue-, wall paper-, sealant-remover) ERC 8a, 8d
Assessment Method	Consumer Assessment Tool: Refined calculation based on ECETOC TRA Environmental Assessment Tool: ECETOC TRA
2.1 Control of consumer exposure	
Product characteristic	
Ethylene carbonate is used as a liquid with a low vapour pressure. It is classified as moderately irritating to eyes.	
Frequency and duration of use/exposure	
Duration: > 4 h per day Frequency: 2 days per year	
Amounts used	
It is assumed that the concentration of ethylene carbonate is limited: the maximum concentration in waterborne latex wall paint is assumed to be 10%, while the concentration in removers is assumed to be maximally 20%.	
Operational conditions affecting consumers exposure	
The work is carried out indoor at ambient temperatures.	
Conditions and measures related to personal protection, hygiene and health evaluation	
Users are advised to wear suitable gloves.	
2.2 Control of environmental exposure	
Not taken into account. Assumed that no municipal STP is present (worst case assumption)	

5.2 Exposure estimation

5.2.1 Consumer exposure

Several consumer products might contain ethylene carbonate. The main consumer use will be specific coatings or paints. The concentration in waterborne latex wall paint is assumed to be maximally 10%, while the concentration in removers (paint-, glue-, wall paper-, sealant-remover) is assumed to be maximally 20%.

No measurement or monitoring data are available. As a consequence the exposure was modelled, based on following formulas (taken from ECETOC TRA).

5.2.1.1 Exposure to waterborne latex wall paint

Estimated inhalatory exposure = $(PI \times A \times FQ \times F \times ET \times IR \times CF) / (V \times BW) = 0.00047 \text{ mg/kg bw/d}$

Estimated inhalatory exposure = $(PI \times A \times FQ \times F \times CF) / V = 0.0094 \text{ mg/m}^3$

Estimated dermal exposure = $(PI \times CA \times FQ \times TL \times D \times CF) / BW = 0.03573 \text{ mg/kg bw/d}$

Explanation of elements in the formula:

PI = Product ingredient = 0.10 g/g. The concentration in waterborne latex wall paint is assumed to be maximally 10%.

A = Amount of the product used per application = 3750 g/event (default value in ECETOC TRA)

FQ = Frequency of exposure = 0.005 event /day: 2 days/year.

F = Fraction released to air = 0.0001 g/g. Since the vapour pressure of ethylene carbonate is low (VP = 1 Pa), it is expected that a limited fraction of the substance will be released to air.

ET = Exposure time = 2.2 h (default value in ECETOC TRA).

IR = Inhalation Rate = 1.37 (m³/h) (default value in ECETOC TRA)

CF = Conversion Factor = 1000 mg/g (default value in ECETOC TRA)

V = room Volume = 20 m³ (default value in ECETOC TRA)

BW = body weight = 60 kg (default value in ECETOC TRA for consumers)

CA = contact area = 428.8 cm² (default value in ECETOC TRA) (inside hands)

TL = Thickness of Layer = 0.01 cm (default value in ECETOC TRA)

D = Density = 1 g/cm³ (default value in ECETOC TRA)

5.2.1.2 Exposure to removers

Estimated inhalatory exposure = $(PI \times A \times FQ \times F \times ET \times IR \times CF) / (V \times BW) = 0.0009 \text{ mg/kg bw/d}$

Estimated inhalatory exposure = $(PI \times A \times FQ \times F \times CF) / V = 0.01 \text{ mg/m}^3$

Estimated dermal exposure = $(PI \times CA \times FQ \times TL \times D \times CF) / BW = 0.0715 \text{ mg/kg bw/d}$

Explanation of elements in the formula:

PI = Product ingredient = 0.20 g/g. The concentration in removers (paint-, glue-, wall paper-, sealant-remover) is assumed to be maximally 20%.

A = Amount of the product used per application = 2000 g/event (default value in ECETOC TRA)

FQ = Frequency of exposure = 0.005 event /day: a worst case scenario: 2days/year.

F = Fraction released to air = 0.0001 g/g. Since the vapour pressure of ethylene carbonate is low (VP = 1 Pa), it is expected that a limited fraction of the substance will be released to air.

ET = Exposure time = 4 h (default value in ECETOC TRA).

IR = Inhalation Rate = 1.37 (m³/h) (default value in ECETOC TRA)

CF = Conversion Factor = 1000 mg/g (default value in ECETOC TRA)

V = room Volume = 20 m³ (default value in ECETOC TRA)

BW = body weight = 60 kg (default value in ECETOC TRA for consumers)

CA = contact area = 428.8 cm² (inside hands)

TL = Thickness of Layer = 0.01 cm (default value in ECETOC TRA)

D = Density = 1 g/cm³ (default value in ECETOC TRA)

5.2.2 Environmental exposure

The following parameters were used in ECETOC TRA:

Local annual tonnage: 1000 tpa (worst-case assumption)

Number of emission days: 365 days (default ECETOC TRA)

Fraction of tonnage to region: 1 (worst-case assumption)

STP present: no (worst-case assumption)

Predicted local environmental concentrations

	ERC 8a	ERC 8d	ERC 11a
PEC for local freshwater (mg/L)	0.301	0.301	0.0268
PEC for local freshwater sediment (mg/kg d.w.)	1.44	1.44	0.128
PEC for local marine water (mg/L)	0.0301	0.0301	0.00269
PEC for local marine sediments (mg/kg d.w.)	0.144	0.144	0.0129
PEC for local soil (mg/kg d.w.)	0.0825	0.0825	0.0825
PEC in STP (mg/L)	no STP	no STP	no STP

5.3 RISK CHARACTERISATION

5.3.1 Human health - Consumers

Quantitative risk characterisation for the general population – long term exposure

Use	Risk Characterisation Ratio			
	inhalation	dermal	oral	total
Waterborne latex wall paint	0.0007	0.005	not relevant	0.005
Removers	0.0008	0.009	not relevant	0.010

5.3.2 Environment

Quantitative risk characterisation for the local environment

	ERC 8a	ERC 8d	ERC 11a
RCR for local freshwater	0.0510	0.0510	0.00453
RCR for local freshwater sediment	0.0509	0.0509	0.00453
RCR for local marine water	0.0510	0.0510	0.00457
RCR for local marine sediments	0.0509	0.0509	0.00456
RCR for local soil	0.0375	0.0375	0.0375
RCR for STP	n.a.	n.a.	n.a.

It can be concluded that there is no risk for the environment, as all RCR values are below 1.

It was assumed that no STP was present, so no risk for the STP microorganisms is anticipated.

In case an STP would have been present, all ERC's show even lower RCR values. In addition, PEC values for the STP are lower than the applied concentration (i.e. 49 mg/L) in the ready biodegradability study, at which no toxicity to the inoculum was observed.

Therefore, no risk for the STP microorganisms is anticipated in case an STP is present.

6. Regional exposure concentrations

6.1 The regional exposure concentrations for the environment are calculated in ECETOC TRA and shown in the below table.

Predicted regional environmental concentrations

PEC for regional freshwater (mg/L)	0.603
PEC for regional freshwater sediment (mg/kg d.w.)	1.58
PEC for regional marine water (mg/L)	0.0603
PEC for regional marine sediments (mg/kg d.w.)	0.158
PEC for regional soil (mg/kg d.w.)	0.0728

6.2 Regional risk characterization

Quantitative risk characterisation for the regional environment

RCR for regional freshwater	0.102
RCR for regional freshwater sediment	0.0560
RCR for regional marine water	0.102
RCR for regional marine sediments	0.0560
RCR for regional soil	0.0331

It can be concluded that there is no risk for the regional environment, as all RCR values are below 1.