Safety Data Sheet
according to Regulation (EC) 1907/2006 (REACH)

Revision date: 2022-02-07
Supercedes date: 2022-01-19

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

1.1. Product identifier:

Product trade name:	Kalama* Cinnamic Aldehyde, FCC
Company product number:	CINNALD
REACH registration number:	01-2119935242-45-0004
Substance name:	Cinnamaldehyde
Substance identification number:	EC 203-213-9
Other means of identification:	Cinnamal, Cinnamaldehyde, 3-Phenylpropenal

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

Uses:	Flavor and fragrance ingredient/additive. Intermediate. Odour agent. See Annex for covered uses.
Uses advised against:	None identified

1.3. Details of the supplier of the safety data sheet:

Manufacturer/Supplier:	Emerald Kalama Chemical, LLC 1296 NW Third Street Kalama, WA 98625 United States Telephone: +1-360-673-2550 1499 SE Tech Center Place, Suite 300 Vancouver, WA 98683 United States Telephone: +1-360-954-7100
EU Only Representative:	Penman Consulting bvba Avenue des Arts 10 B-1210 Brussels Belgium Telephone: +32 (0) 2 403 7239 email: pcbvba09@penmanconsulting.com
For further information about this SDS:	Email: product.compliance@emeraldmaterials.com

1.4. Emergency telephone number:

ChemTel (24 hours): 1-800-255-3924 (USA); +1-813-248-0585 (outside USA).

SECTION 2: Hazards identification

2.1. Classification of the substance or mixture:

Product classification according to Regulation (EC) 1272/2008 (CLP) as amended:

Acute Toxicity, Dermal, category 4 , H312
Skin Irritation, category 2, H315
Skin Sensitizer, category 1, H317
Eye Irritation, category 2, H319

See Section 2.2 for full text of H (Hazard) statements (EC 1272/2008).

2.2. Label elements:

Product labeling according to Regulation (EC) 1272/2008 (CLP) as amended:

Hazard pictogram(s):

Signal word:
Warning

Hazard statements:
H312 Harmful in contact with skin.

H315 Causes skin irritation.
H317 May cause an allergic skin reaction.
H319 Causes serious eye irritation.

Precautionary statements:
P261 Avoid breathing dust/fume/gas/mist/vapours/spray.
P264 Wash skin thoroughly after handling.
P280 Wear protective gloves/protective clothing/eye protection/face protection.
P302+P352 IF ON SKIN: Wash with plenty of soap and water.
P305+P351+P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P312 Call a POISON CENTRE/doctor if you feel unwell.
P333+P313 If skin irritation or rash occurs: Get medical advice/attention.
P337+P313 If eye irritation persists: Get medical advice/attention.
P362+P364 Take off contaminated clothing and wash it before reuse.

Supplemental information: No Additional Information

Precautionary statements are listed according to the United Nations Globally Harmonized System of Classification and Labelling of Chemicals (GHS) - Annex III and ECHA Guidance on Labelling and Packaging. Regulations in individual countries/regions may determine which statements are required on the product label. See product label for specifics.

2.3. Other hazards:

PBT/vPvB criteria: This product does not meet the PBT and vPvB classification criteria.
Endocrine disrupting properties: No specific information available.
Other hazards: No Additional Information

See Section 11 for toxicological information.

SECTION 3: Composition/information on ingredients

3.1. Substance:

CAS-No.	Chemical Name	Weight%	Classification	H Statements
000104-55-2	Cinnamaldehyde	99-100	Acute Tox. 4 Dermal- Eye Irrit. 2- Skin Irrit. 2- Skin Sens. 1	H312-315-317-319

CAS-No.	Chemical Name	REACH Registration No.	EC/List Number
000104-55-2	Cinnamaldehyde	01-2119935242-45-0004	203-213-9

CAS-No.	Chemical Name	M-factor	SCLs	ATE
000104-55-2	Cinnamaldehyde	N/A	N/E	Dermal ATE 1160 mg/kg

See Section 16 for full text of H (Hazard) statements (EC 1272/2008).

Amounts specified are typical and do not represent a specification. Remaining components are proprietary, non-hazardous, and/or present at amounts below reportable limits.

SECTION 4: First aid measures

4.1. Description of first aid measures:

General: If irritation or other symptoms occur or persist from any route of exposure, remove the affected individual from the area: see a physician/get medical attention.

Following eye contact: Immediately flush eyes with plenty of clean water for an extended time, not less than fifteen (15) minutes. Flush longer if there is any indication of residual chemical in the eye. Ensure adequate flushing of the eyes by separating the eyelids with fingers and roll eyes in a circular motion. If eye irritation persists: Get medical advice/attention.

Following skin contact: Immediately remove contaminated clothing and shoes. Wash the affected area with plenty of soap and water until no evidence of the chemical remains (at least 15-20 minutes). Launder clothing before reuse. If skin irritation occurs: Get medical advice/attention.

Following inhalation: If affected, remove to fresh air. If breathing is difficult, give oxygen. If not breathing, give artificial respiration. Call a POISON CENTER or doctor/physician if you feel unwell.

Following ingestion: Do not induce vomiting. Never give anything by mouth to an unconscious person. Rinse out the mouth with water. Get medical attention immediately.

Protection of first aid responders: Wear proper personal protective clothing and equipment.

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

Irritation. Pre-existing skin problems may be aggravated by prolonged or repeated contact. See section 11 for additional information.

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

Treat symptomatically.

SECTION 5: Firefighting measures

5.1. Extinguishing media:

Suitable: Use water spray, ABC dry chemical, foam or carbon dioxide. Water or foam may cause frothing. Use water to keep fire-exposed containers cool. Water spray may be used to flush spills away from exposures.

Unsuitable: None known.

5.2. Special hazards arising from the substance or mixture:

Unusual fire/explosion hazards: Product is not considered a fire hazard, but will burn if ignited. Closed container may rupture (due to build up in pressure) when exposed to extreme heat. Combustion hazard: waste soaked with this product may heat to temperatures causing self-ignition if improperly discarded. Many aldehydes readily oxidize exothermically when exposed to air. Any clean up materials, like rags, towels, etc. should be washed with water with mild soap or laundered with mild detergent before proper disposal to avoid the potential temperature rise from oxidation.

Hazardous combustion products: Irritating or toxic substances may be emitted upon burning, combustion or decomposition. See section 10 (10.6 Hazardous decomposition products) for additional information.

5.3. Advice for firefighters:

Wear self-contained breathing apparatus (SCBA) equipped with a full facepiece and operated in a pressure-demand mode (or other positive pressure mode) and approved protective clothing. Personnel without suitable respiratory protection must leave the area to prevent significant exposure to hazardous gases from combustion, burning or decomposition. In an enclosed or poorly ventilated area, wear SCBA during cleanup immediately after a fire as well as during the attack phase of firefighting operations.

See section 9 for additional information.

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures:

See Section 8 for recommendations on the use of personal protective equipment. If spilled in an enclosed area, ventilate. Eliminate ignition sources. Personal Protective Equipment must be worn.

6.2. Environmental precautions:

Do not flush liquid into public sewer, water systems or surface waters.

6.3. Methods and material for containment and cleaning up:

Contain by diking with sand, earth or other non-combustible material. Wear proper personal protective clothing and equipment. Absorb spill with an inert material. Place into labeled, closed container; store in safe location to await disposal. Change contaminated clothing and launder before reuse. Combustion hazard: waste soaked with this product may heat to temperatures causing self-ignition if improperly discarded. Immediately after use, rags, steel wool or other waste should be wetted or cleaned with water with mild soap or laundered with mild detergent or placed into a water-filled metal container before proper disposal.

6.4. References to other sections:

See Section 8 for recommendations on the use of personal protection and Section 13 for waste disposal.

SECTION 7: Handling and storage

7.1. Precautions for safe handling:

As with any chemical product, use good laboratory/workplace procedures. Do not cut, puncture, or weld on or near the container. Do not get in eyes, on skin or clothing. Wash thoroughly after handling this product. Always wash up before eating, smoking or using the facilities. Use under well-ventilated conditions. Avoid inhalation of aerosol, mist, spray, fume or vapor. Avoid drinking, tasting, swallowing or ingesting this product. Wash contaminated clothing before reuse. Provide eyewash fountains and safety showers in the work area.

7.2. Conditions for safe storage, including any incompatibilities:

Store cool and dry, under well-ventilated conditions. Keep away from heat, sparks and open flames. Store this material away from incompatible substances (see section 10). Do not store in open, unlabeled or mislabeled containers. Keep container closed when not in use. Do not reuse empty container without commercial cleaning or reconditioning. Empty container contains residual product which may exhibit hazards of product. Product can easily oxidize. It is recommended that opened containers be padded with nitrogen.

7.3. Specific end use(s):

Further information concerning special risk management measures: see annex of this safety data sheet (exposure scenarios).

SECTION 8: Exposure controls / personal protection

8.1. Control parameters:

Occupational exposure limits (OEL):

Chemical Name	EU OELV	EU IOELV	ACGIH - TWA/Ceiling	ACGIH - STEL
Cinnamaldehyde	N/E	N/E	N/E	N/E

Chemical Name	UK WEL	Ireland OEL
Cinnamaldehyde	N/E	N/E

N/E=Not established (no exposure limits established for the listed substances for listed country/region/organization).

Derived No Effect Levels (DNELs):

Cinnamaldehyde

Population	Route	Acute (local)	Acute (systemic)	Long Term (local)	Long Term (systemic)
Workers	Inhalation	N/E	N/E	N/E	18,366 mg/m3
Workers	Dermal	N/E	N/E	N/E	10,417 mg/kg bw/day
General population	Inhalation	N/E	N/E	N/E	4,529 mg/m3
General population	Dermal	N/E	N/E	N/E	5,208 mg/kg bw/day
General population	Oral	N/E	N/E	N/E	2,604 mg/kg bw/day
Human via the environment	Inhalation	N/E	N/E	N/E	4,529 mg/m3
Human via the environment	Oral	N/E	N/E	N/E	2,604 mg/kg bw/day

Predicted No Effect Concentration (PNECs):

Cinnamaldehyde

Compartment	PNEC
Freshwater	0,001202 mg/L
Freshwater sediment	1,709 mg/kg dw
Marine water	0,0001202 mg/L
Marine water sediment	1,709 mg/kg dw
Intermittent releases	0,01202 mg/L
Soil	0,577 mg/kg dw
STP	7,1 mg/L
Oral	No potential for bioaccumulation

N/E=Not established; N/A=Not applicable (not required); bw=body weight; dw=dry weight; ww=wet weight.

8.2. Exposure controls:

Appropriate engineering controls: Always provide effective general and, when necessary, local exhaust ventilation to draw spray, aerosol, fume, mist and vapor away from workers to prevent routine inhalation. Ventilation must be adequate to maintain the ambient workplace atmosphere below the exposure limit(s) outlined in the SDS.

Individual protection measures, such as personal protective equipment:

Eye/face protection: Safety glasses or goggles required.

Hand protection: Avoid skin contact when mixing or handling the material by wearing impervious and chemical resistant gloves. In case of prolonged immersion or frequently repeated contact, gloves with breakthrough times greater than 480 minutes (protection class 6) are recommended. For brief contact or splash applications, gloves with breakthrough times of 60 minutes or greater are recommended (protection class 3 or greater). Suggested materials for protective gloves: Butyl rubber. The protective gloves to be used must comply with the specifications of the Regulation (EU) 2016/425 and the resultant standard EN 374. Suitability and durability of a glove is dependent on usage (e.g. frequency and duration of contact, other chemicals which may be handled, chemical resistance of glove material and dexterity). Always seek advice of the glove supplier as to the most suitable glove material.

Skin and body protection: Use good laboratory/workplace procedures including personal protective clothing: labcoat, safety glasses and protective gloves.

Respiratory protection: Wear an approved respirator (e.g., an organic vapor respirator, a full face air purifying respirator for organic vapors, or a self-contained breathing apparatus) whenever exposure to aerosol, mist, spray, fume or vapor exceed the applicable exposure limit(s) of any chemical substance listed in this SDS. Organic vapor filter (Type A).

Further information: Eyewash fountains and safety showers are recommended in the work area.

Environmental exposure controls: See Sections 6 and 12.

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties:

Physical state:	Liquid
Colour:	Clear, Pale yellow
Odour:	Cinnamon-like
Odour threshold:	Not Available
Melting point/Freezing point:	-7.5°C (18.5°F)
Boiling point °C:	252 °C

Boiling point °F:	486 °F
Flammability:	Not flammable
Lower and upper explosion limit:	LEL: Not Available UEL: Not Available
Flash point:	110 °C (230 °F) Tag Closed Cup
Auto-ignition temperature:	Not Available
Decomposition temperature:	Not Available
pH:	Not Available
Kinematic viscosity:	Not Available
Solubility in water:	1084 mg/L @ 20°C
Partition coefficient n-octanol/water (log value):	1.9
Vapour pressure:	0.03 mm Hg (20°C)
Density and/or relative density:	1.046-1.050 (25°C)
Relative vapour density:	4.6 (Air=1)
Particle characteristics:	Not Applicable
% Volatile by weight:	100%
VOC:	100%
Surface tension:	38.962 mN/m @ 25°C (estimated)

Amounts specified are typical and do not represent a specification.

9.2. Other information:

Information with regard to physical hazard classes:
Explosive properties: Not explosive
Oxidising properties: Not oxidizing

Other safety characteristics:
Evaporation rate: <1

SECTION 10: Stability and reactivity

10.1. Reactivity:

None known.

10.2. Chemical stability:

This product is stable. Readily undergoes oxidation by air.

10.3. Possibility of hazardous reactions:

Hazardous polymerization will not occur.

10.4. Conditions to avoid:

Avoid exposure to air, moisture, ignition sources and elevated temperatures.

10.5. Incompatible materials:

Avoid strong bases and oxidizing agents. Avoid contact with amines. May ignite after a delay period in contact with sodium hydroxide.

10.6. Hazardous decomposition products:

Carbon dioxide and carbon monoxide.

SECTION 11: Toxicological information

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

Acute toxicity: Harmful in contact with skin - Category 4.

Chemical Name	Inhalation LC50	Species	Oral LD50	Species	Dermal LD50	Species
Cinnamaldehyde	757 mg/L (4 hours, vapor, estimated)	Rat/ adult	2220 mg/kg	Rat/ adult	1160 mg/kg	Guinea Pig/ adult

Skin corrosion/irritation: Causes skin irritation - Category 2.

Chemical Name	Skin irritation	Species
Cinnamaldehyde	Moderate irritant	Rabbit/ adult

Serious eye damage/irritation: Causes serious eye irritation - Category 2.

Chemical Name	Eye irritation	Species

Chemical Name	Eye irritation	Species
Cinnamaldehyde	Moderate irritant	Rabbit/ adult

Respiratory or skin sensitization: Skin sensitization - Category 1.

Chemical Name	Skin sensitisation	Species
Cinnamaldehyde	Sensitizer	Guinea Pig/ adult

Carcinogenicity: Not classified (based on available data, the classification criteria are not met).

Germ cell mutagenicity: Not classified (based on available data, the classification criteria are not met). CINNAMALDEHYDE: Mostly negative results were obtained in bacterial test systems for mutagenic or genotoxic activity with some weakly positive results. Evidence of genotoxic activity was observed in isolated mammalian cells with the cinnamaldehyde producing chromosome aberrations and/or mutations in the respective test systems regardless of the presence or absence of metabolic activation. However, the in vitro activity did not translate into mutagenic, clastogenic, or genotoxic activity in vivo.

Reproductive toxicity: Not classified (based on available data, the classification criteria are not met). CINNAMALDEHYDE: Repeated exposure via the oral route indicate an effect on body weight and toxicity to multiple organs (forestomach in rats and mice and liver, kidney, testicular atrophy in rats). Developmental toxicity data suggest that rats are more sensitive than mice. Developmental effects in rats included decreased ossification of the cranium and tympanic bulla, increased evidence of dilated pelvis/reduced papilla in kidney, dilated ureter and incidences of hypoplastic/dysplastic kidneys.

Specific target organ toxicity (STOT) - single exposure: Not classified (based on available data, the classification criteria are not met).

Specific target organ toxicity (STOT) - repeated exposure: Not classified (based on available data, the classification criteria are not met). CINNAMALDEHYDE: Repeated dose toxicity study: LOAEL (Lowest-Observed-Adverse-Effect-Level), oral, rat - 470 mg/kg bw/day; LOAEL, dermal, mouse - 750 mg/kg bw/day. Repeated exposure via the oral route indicate an effect on body weight and toxicity to multiple organs (forestomach in rats and mice and liver, kidney, testicular atrophy in rats).

Aspiration hazard: Not classified (based on available data, the classification criteria are not met).

Other toxicity information: No additional information available.

Information on likely routes of exposure:

General: Caution must be exercised through the prudent use of protective equipment and handling procedures to minimize exposure.

Eyes: Causes serious eye irritation.

Skin: Harmful in contact with skin. May cause allergic skin reaction. Causes skin irritation.

Inhalation: Inhalation may cause irritation of the respiratory tract and mucous membranes.

Ingestion: May be harmful if swallowed. Ingestion may cause irritation.

11.2. Information on other hazards

Endocrine disrupting properties: No specific information available.

Other information: No additional information available.

SECTION 12: Ecological information

12.1. Toxicity:

Chemical Name	Species	Acute	Acute	Chronic
Cinnamaldehyde	Fish	LC50 >3.5 mg/L (96 hours)	N/E	N/E
Cinnamaldehyde	Invertebrates	EC50 1.20-7.05 mg/L (48 hours)	EC50 3.1 mg/L(24 hours)	N/E
Cinnamaldehyde	Algae	EC50 6.87 mg/L (72 hours)	EC50 7.55 mg/L(96 hours)	N/E
Cinnamaldehyde	Micro-organisms	EC50 71 mg/L (3 hours)		

12.2. Persistence and degradability:

Chemical Name	Biodegradation
Cinnamaldehyde	Readily biodegradable (weight of evidence)

12.3. Bioaccumulative potential:

Chemical Name	Bioconcentration Factor (BCF)	Log Kow
Cinnamaldehyde	8.3 (estimated)	1.83 (27°C)

12.4. Mobility in soil:

Chemical Name	Mobility in soil (Koc/Kow)
Cinnamaldehyde	29.456 L/kg @ 20°C (estimated)

12.5. Results of PBT and vPvB assessment:

This product does not meet the PBT and vPvB classification criteria.

12.6. Endocrine disrupting properties:

No specific information available.

12.7. Other adverse effects:

No additional information available.

SECTION 13: Disposal considerations

13.1. Waste treatment methods:

Dispose of unused contents (incineration) in accordance with national and local regulations. Dispose of container in accordance with national and local regulations. Ensure the use of properly authorized waste management companies, where appropriate.

See Section 8 for recommendations on the use of personal protective equipment.

SECTION 14: Transport information

The information below is provided to assist in documentation. It may supplement the information on the package. The package in your possession may carry a different version of the label depending on the date of manufacture. Depending on inner packaging quantities and packaging instructions, it may be subject to specific regulatory exceptions.

14.1. UN number or ID number: N/A

14.2. UN proper shipping name:

Not regulated - See Bill of Lading for Details

14.3. Transport hazard class(es):

U.S. DOT hazard class: N/A
Canada TDG hazard class: N/A
Europe ADR/RID/ADN hazard class: N/A
IMDG Code (ocean) hazard class: N/A
ICAO/IATA (air) hazard class: N/A

A "N/A" listing for the hazard class indicates the product is not regulated for transport by that regulation.

14.4. Packing group: N/A

14.5. Environmental hazards:

Marine pollutant: Not Applicable

Hazardous substance (USA): Not Applicable

14.6. Special precautions for user:

Not Applicable

14.7. Maritime transport in bulk according to IMO instruments

Not Applicable

SECTION 15: Regulatory information

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

Europe REACH (EC) 1907/2006: Applicable components are registered, exempt or otherwise compliant. EU REACH is only relevant to substances either manufactured or imported into the EU. Emerald Kalama Chemical has met its obligations under the EU REACH regulation. EU REACH information regarding this product is provided for informational purposes only. Each Legal Entity may have differing EU REACH obligations, depending on their place in the supply chain. Emerald's compliance with EU REACH does not imply automatic coverage for Downstream Users located in the EU. For material manufactured outside of the EU, the importer of record must understand and meet their specific obligations under the regulation.

EU Authorizations and/or restrictions on use: Not Applicable

Other EU information: No Additional Information

National regulations: No Additional Information

Chemical inventories:

Regulation	Status
Australian Inventory of Industrial Chemicals (AIIC):	Y
Canadian Domestic Substances List (DSL):	Y
Canadian Non-Domestic Substances List (NDSL):	N

Regulation	Status
China Inventory of Existing Chemical Substances (IECSC):	Y
European EC Inventory (EINECS, ELINCS, NLP):	Y
Japan Existing and New Chemical Substances (ENCS):	Y
Japan Industrial Safety and Health Law (ISHL):	Y
Korean Existing and Evaluated Chemical Substances (KECL):	Y
New Zealand Inventory of Chemicals (NZIoC):	N
Philippines Inventory of Chemicals and Chemical Substances (PICCS):	Y
Taiwan Inventory of Existing Chemicals:	Y
U.S. Toxic Substances Control Act (TSCA) (Active):	Y

A "Y" listing indicates all intentionally added components are either listed or are otherwise compliant with the regulation. A "N" listing indicates that for one or more components: 1) there is no listing on the public inventory (or is not on the ACTIVE inventory for U.S. TSCA); 2) no information is available; or 3) the component has not been reviewed. A "Y" for New Zealand may mean that a qualified group standard may exist for the components in this product.

UK REACH: As the UK has formally left the European Union, EU REACH [(EC) 1907/2006] is no longer directly applicable within the UK. Please see UK REACH formatted SDS for information related to UK REACH compliance.

15.2. Chemical safety assessment:

A chemical safety assessment has been carried out for the substance or mixture.

SECTION 16: Other information

Hazard (H) Statements in the Composition section (Section 3):

H312	Harmful in contact with skin.
H315	Causes skin irritation.
H317	May cause an allergic skin reaction.
H319	Causes serious eye irritation.

Reason for revision: Changes in Section(s): 1, Safety data sheet format (Regulation (EU) 2020/878)

Evaulation method for classification of mixtures: Not Applicable (substance)

Legend:
* : Trademark owned by Emerald Kalama Chemical, LLC.
ACGIH: American Conference of Governmental Industrial Hygienists
ATE: Acute toxicity estimate
EU OELV: European Union Occupational Exposure Limit Value
EU IOELV: European Union Indicative Occupational Exposure Limit Value
N/A: Not Applicable
N/E: None Established
SCL: Specific concentration limit
STEL: Short Term Exposure Limit
TWA: Time Weighted Average (exposure for 8-hour workday)

Users Responsibility/Disclaimer of Liability:
The information set forth herein is based on our current knowledge, and is intended to describe the product solely with respect to health, safety and the environment. As such, it must not be interpreted as a guarantee of any specific property of the product. As a result, the customer shall be solely responsible for deciding whether said information is suitable and beneficial.

Safety Data Sheet Preparer:
Product Compliance Department
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United States

Annex

Exposure Scenarios

Substance information:

Name of substance: Cinnamaldehyde.
EC# 203-213-9 / CAS# 104-55-2.
REACH Registration number: 01-2119935242-45-0004

List of exposure scenarios:

ES1: Formulation.
ES2: Use at industrial sites - Use as an intermediate.
ES3: Use at industrial sites - Laboratory chemicals, Perfumes, Fragrances
ES4: Use at industrial sites - Processing aids
ES5: Use at industrial sites - Pharmceuticals
ES6: Use at industrial sites - Cosmetic & personal care products
ES7: Use by professional workers - Professional use of cosmetic products
ES8: Consumer use - Consumer use of cosmetics products and pharmaceuticals

ES9: Consumer use - Consumer use in cleaning agents and maintenance products (including air care products)
ES10: Service life (consumers) - Use of substance in scented articles

General remarks:

The environmental exposure assessments have been obtained with EUSES which is part of Chemical Safety Assessment and Reporting tool although the following parameter is outside the boundaries of the EUSES model: half-life in air (0.31 d).

The worker exposure assessments have been performed using Worker TRA Workers 3.0 which is part of Chemical Safety Assessment and Reporting tool. Cinnamaldehyde is non acute toxic to oral and inhalation but is slightly toxic to dermal route; shows irritation effect to skin and eye; was found to be sensitizing to the skin; is not genotoxic; and is not a developmental or reproductive toxin. Adverse irritancy effects, if any, are controlled as proper protection in the form of hand gloves and masks have been considered and no local effects are expected. Also proper ventilation is recommended which includes exhausts wherever applicable.

Consumers: Exposure assessment is not applicable as there are no consumer-related uses for the substance.

Exposure scenario (1): Formulation

1. Exposure scenario (1)

Short title of the exposure scenario:
Formulation

List of use descriptors:
Product category (PC): PC19
Process category (PROC): PROC1, PROC2, PROC3, PROC4, PROC5, PROC8a, PROC8b, PROC9, PROC14, PROC15, PROC19
Environmental release category (ERC): ERC2

List of names of contributing worker scenarios and corresponding PROCs:
PROC1 Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions.
PROC2 Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions.
PROC3 Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition.
PROC4 Chemical production where opportunity for exposure arises.
PROC5 Mixing or blending in batch processes. Covers mixing or blending of solid or liquid materials in the context of manufacturing or formulating sectors, as well as upon end use.
PROC8a Transfer of substance or mixture (charging and discharging) at non-dedicated facilities. Transfer includes loading, filling, dumping, bagging and weighing.
PROC8b Transfer of substance or mixture (charging and discharging) at dedicated facilities. Transfer includes loading, filling, dumping, bagging.
PROC9 Transfer of substance or mixture into small containers (dedicated filling line, including weighing). Filling lines specifically designed to both capture vapour and aerosol emissions and minimise spillage.
PROC14 Tabletting, compression, extrusion, pelletisation, granulation. This covers processing of mixtures and/or substances into a defined shape for further use.
PROC15 Use as laboratory reagent. Use of substances at small scale laboratory (< 1 l or 1 kg present at workplace).
PROC19 Manual activities involving hand contact. Addresses tasks, where exposure of hands and forearms can be expected; no dedicated tools or specific exposure controls other than PPE can be put in place.

Name of contributing environmental scenario and corresponding ERCs:
ERC2 Formulation into mixture.

For further information on standardized use descriptors see the European Chemical Agency (ECHA) Guidance on information requirements and chemical safety assessment, Chapter R.12: Use descriptor system (http://guidance.echa.europa.eu/docs/guidance_document/information_requirements_r12_en.pdf).

2. Conditions of use affecting exposure

2.1 Control of workers exposure

General:
Eye and dermal irritancy controlled by the use of protective gloves (with >80% efficacy) and face shield or goggles. It is expected that the worker will have a bath (cleaning effect) after working so there shall not be continuing long term exposure to have toxic effect on the worker. The main specifications for personal protective equipment (PPE) appropriate for the substance are as follows:
-Respiratory protective equipment: Filter type A to be combined with particulate filter when there is potential for exposure to aerosol (for example in spraying operations).
- Gloves: Butyl rubber gloves conforming to EN 374, with thickness of >0.7 mm. Breakthrough time to be greater than task duration. Gloves should be worn when there is potential for dermal exposure.

Product characteristics:
Concentration of substance:
- PROC1, PROC2, PROC3, PROC4, PROC5, PROC8a, PROC8b, PROC9, PROC14, PROC15: Up to 100%.
- PROC19: 5-25%.
Physical state: liquid.

Frequency and duration of use/exposure:
Duration:
- PROC1, PROC2, PROC3, PROC4, PROC9, PROC14, PROC15, PROC19: <=8 hours/day.
- PROC5, PROC8a, PROC8b: <=4 hours/day.

Human factors not influenced by risk management:
Exposed skin surface:
- PROC1, PROC3, PROC15: 240 cm2 (one hand, face side only).
- PROC2, PROC4, PROC5, PROC9, PROC14: 480 cm2 (two hands, face side only).
- PROC8a, PROC8b: 960 cm2 (two hands).
- PROC19: 1980 cm2 (two hands and forearms).

Other given operational conditions affecting workers exposure:

Location: Indoor use.
Domain: Industrial use.
Process temperature (for liquid): <= 40 °C.

Technical conditions and measures to control dispersion from source towards the worker:
General ventilation: Basic general ventilation (1-3 air changes per hour): 0%.
Containment:
- PROC1: Closed system (minimal contact during routine operations).
- PROC2: Closed continuous process with occasional controlled exposure.
- PROC3: Closed batch process with occasional controlled exposure.
- PROC4, PROC8b, PROC9: Semi-closed process with occasional controlled exposure.
- PROC5, PROC8a, PROC14, PROC15, PROC19: No.

Local exhaust ventilation:
- PROC1, PROC2, PROC3: Not required.
- PROC4, PROC5, PROC8a, PROC9, PROC14, PROC15, PROC19: Yes (90% effectiveness).
- PROC8b: Yes (95% effectiveness).

Local exhaust ventilation (for dermal):
- PROC1, PROC2, PROC3, PROC4, PROC9, PROC14, PROC15, PROC19: Not required.
- PROC5, PROC8a: Yes (90% effectiveness).
- PROC8b: Yes (95% effectiveness).

Occupational Health and Safety Management System: Advanced.

Conditions and measures related to personal protection, hygiene and health evaluation:
Respiratory protection: Not required.
Chemical safety goggles recommended.
Dermal protection:
- PROC1, PROC2, PROC3, PROC4, PROC5, PROC8a, PROC8b, PROC9, PROC14, PROC15: No (Effectiveness Dermal: 0%).
- PROC19: Yes (chemically resistant gloves conforming to EN374 with basic employee training) (Effectiveness Dermal: 90%).

Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply:
Use Local Exhaust ventilation.
Generally accepted standards of occupational hygiene are maintained.
Minimisation of manual phases/work tasks.
Minimisation of splashes and spills.
Avoidance of contact with contaminated tools and objects.
Regular cleaning of equipment and work area.
Training staff on good practice.
Management/supervision in place to check that RMMs in place are being used correctly and OCs followed.

2.2 Control of environmental exposure

General:
All risk management measures utilised must also comply with all relevant local regulations.

Amounts used:
Maximum daily use at a site: 1.5 ton/day.
Maximum annual use at a site: 50 tons/year.
Percentage of tonnage used at regional scale: 100 %.

Environmental factors not influenced by risk management:
Flow rate of receiving surface water: >=1.8E6 m3/day.

Other given operational conditions affecting environmental exposure:
Indoor use.
Industrial use.
Release fraction to air from process (initial release): 0.005; (final release): 0.005. Local release rate: 7,5 kg/day.
Release fraction to wastewater from process (initial release): 0.01; (final release): 0.01. Local release rate: 15 kg/day.
Release fraction to soil from process: 0.0001.

Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil:
Dry sludge application to agricultural soil: Yes (default).

Conditions and measures related to municipal sewage treatment plant:
Municipal Sewage Treatment Plant (STP): Yes (Efficiency=87.38%).
Size of municipal sewage system/treatment plant: >=20000 m3/day.

Conditions and measures related to external treatment of waste for disposal:
Particular considerations on the waste treatment operations: No (low risk) (ERC based assessment demonstrating control of risk with default conditions. Low risk assumed for waste life stage. Waste disposal according to national/local legislation is sufficient.)

Conditions and measures related to external recovery of waste:
External recovery and recycling of waste should comply with applicable local and/or national regulations.

Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply:
Spills are cleaned immediately.
All risk management measures utilised must also comply with all relevant local regulations.

3. Exposure estimation and reference to its source

Assessment method-Health: Worker TRA v3. Only highest figures are presented here.

Assessment method-Environment: EUSES.

Health

Effect/Compartment	Exposure estimate/PEC	RCR	Notes
Worker, long-term, systemic, Dermal	8,486 mg/kg bw/day	0,815	PROC19
Worker, long-term, systemic, Inhalation	16,52 mg/m3	0,9	PROC3

Effect/Compartment	Exposure estimate/PEC	RCR	Notes
Worker, long-term, systemic, Combined routes	N/A	0,994	PROC19

Environment

Effect/Compartment	Exposure estimate/PEC	RCR	Notes
Freshwater	0,0009729 mg/L	0,809	
Freshwater sediment	0.006 mg/kg dw	<0,01	
Marine water	0,00009651 mg/L	0,803	
Marine water sediment	0,0006317 mg/kg dw	<0,01	
Soil	0,0008065 mg/kg dw	<0,01	
STP	0,009 mg/L	<0,01	
Human via environment, Inhalation	0,0001906 mg/m3	<0,01	
Human via environment, Oral	0.0001955 mg/kg bw/day	<0,01	
Human via environment, Combined routes	N/A	<0,01	

RCR=Risk characterization ratio (PEC/PNEC or Exposure estimate/DNEL); PEC=Predicted environmental concentration.

Notes: The exposure scenario categories consist of a number of activities. An individual worker may conduct one or several of these activities during one shift and a specific PROC or PROCs have been identified as worst-case activities for combined exposure. If parts of the worker's shift are spent conducting PROCs other than the worst-case PROC activities, the daily exposure of this worker will be lower than estimated for the worst case.

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

Health

Predicted exposures are not expected to exceed the DN(M)EL when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented. Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels. Indoor use, no respirator required. Duration: PROC1, PROC2, PROC3, PROC4, PROC9, PROC14, PROC15, PROC19: <=8 hours/day. PROC5, PROC8a, PROC8b: <=4 hours/day. Dermal protection: PROC1, PROC2, PROC3, PROC4, PROC5, PROC8a, PROC8b, PROC9, PROC14, PROC15: No (Effectiveness Dermal: 0%). PROC19: Yes (chemically resistant gloves conforming to EN374 with basic employee training) (Effectiveness Dermal: 90%). Local exhaust ventilation: PROC1, PROC2, PROC3: Not required. PROC4, PROC5, PROC8a, PROC9, PROC14, PROC15, PROC19: Yes (90% effectiveness). PROC8b: Yes (95% effectiveness). Concentration of substance: PROC1, PROC2, PROC3, PROC4, PROC5, PROC8a, PROC8b, PROC9, PROC14, PROC15: Up to 100%. PROC19: 5-25%.

Environment

Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures. Required removal efficiency for wastewater can be achieved using onsite/offsite technologies, either alone or in combination. If scaling reveals a condition of unsafe use (i.e., RCRs > 1), additional RMMs or a site-specific chemical safety assessment is required.

Exposure scenario (2): Use at industrial sites - Use as an intermediate

1. Exposure scenario (2)

Short title of the exposure scenario:

Use at industrial sites - Use as an intermediate

List of use descriptors:

Sector of use category (SU): SU9, SU10
Product category (PC): PC19
Process category (PROC): PROC1, PROC2, PROC3, PROC4, PROC5, PROC8a, PROC8b, PROC9, PROC15
Environmental release category (ERC): ERC6a

List of names of contributing worker scenarios and corresponding PROCs:

PROC1 Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions.
PROC2 Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions.
PROC3 Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition.
PROC4 Chemical production where opportunity for exposure arises.
PROC5 Mixing or blending in batch processes. Covers mixing or blending of solid or liquid materials in the context of manufacturing or formulating sectors, as well as upon end use.
PROC8a Transfer of substance or mixture (charging and discharging) at non-dedicated facilities. Transfer includes loading, filling, dumping, bagging and weighing.
PROC8b Transfer of substance or mixture (charging and discharging) at dedicated facilities. Transfer includes loading, filling, dumping, bagging.
PROC9 Transfer of substance or mixture into small containers (dedicated filling line, including weighing). Filling lines specifically designed to both capture vapour and aerosol emissions and minimise spillage.
PROC15 Use as laboratory reagent. Use of substances at small scale laboratory (< 1 l or 1 kg present at workplace).

Name of contributing environmental scenario and corresponding ERCs:

ERC6a Use of intermediate.

For further information on standardized use descriptors see the European Chemical Agency (ECHA) Guidance on information requirements and chemical safety assessment, Chapter R.12: Use descriptor system (http://guidance.echa.europa.eu/docs/guidance_document/information_requirements_r12_en.pdf).

2. Conditions of use affecting exposure

2.1 Control of workers exposure

General:

Eye and dermal irritancy controlled by the use of protective gloves (with >80% efficacy) and face shield or goggles. It is expected that the worker will have a bath (cleaning effect) after working so there shall not be continuing long term exposure to have toxic effect on the worker. The main

specifications for personal protective equipment (PPE) appropriate for the substance are as follows:
-Respiratory protective equipment: Filter type A to be combined with particulate filter when there is potential for exposure to aerosol (for example in spraying operations).
- Gloves: Butyl rubber gloves conforming to EN 374, with thickness of >0.7 mm. Breakthrough time to be greater than task duration. Gloves should be worn when there is potential for dermal exposure.

Product characteristics:
Concentration of substance: Up to 100%.
Physical state: liquid.

Frequency and duration of use/exposure:
Duration:
- PROC1, PROC2, PROC3, PROC4, PROC9, PROC15: <=8 hours/day.
- PROC5, PROC8a, PROC8b: <=4 hours/day.

Human factors not influenced by risk management:
Exposed skin surface:
- PROC1, PROC3, PROC15: 240 cm2 (one hand, face side only).
- PROC2, PROC4, PROC5, PROC9: 480 cm2 (two hands, face side only).
- PROC8a, PROC8b: 960 cm2 (two hands).

Other given operational conditions affecting workers exposure:
Location: Indoor use.
Domain: Industrial use.
Process temperature (for liquid): <= 40 °C.

Technical conditions and measures to control dispersion from source towards the worker:
General ventilation: Basic general ventilation (1-3 air changes per hour): 0%.
Containment:
- PROC1: Closed system (minimal contact during routine operations).
- PROC2: Closed continuous process with occasional controlled exposure.
- PROC3: Closed batch process with occasional controlled exposure.
- PROC4, PROC8b, PROC9: Semi-closed process with occasional controlled exposure.
- PROC5, PROC8a, PROC15: No.
Local exhaust ventilation:
- PROC1, PROC2, PROC3: Not required.
- PROC4, PROC5, PROC8a, PROC9, PROC15: Yes (90% effectiveness).
- PROC8b: Yes (95% effectiveness).
Local exhaust ventilation (for dermal):
- PROC1, PROC2, PROC3, PROC4, PROC9, PROC15: Not required.
- PROC5, PROC8a: Yes (90% effectiveness).
- PROC8b: Yes (95% effectiveness).
Occupational Health and Safety Management System: Advanced.

Conditions and measures related to personal protection, hygiene and health evaluation:
Respiratory protection: Not required.
Chemical safety goggles recommended.
Dermal protection: No (Effectiveness Dermal: 0%).

Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply:
Use Local Exhaust ventilation.
Generally accepted standards of occupational hygiene are maintained.
Minimisation of manual phases/work tasks.
Minimisation of splashes and spills.
Avoidance of contact with contaminated tools and objects.
Regular cleaning of equipment and work area.
Training staff on good practice.
Management/supervision in place to check that RMMs in place are being used correctly and OCs followed.

2.2 Control of environmental exposure

General:
All risk management measures utilised must also comply with all relevant local regulations.

Amounts used:
Maximum daily use at a site: 2 ton/day.
Maximum annual use at a site: 100 tons/year.
Percentage of tonnage used at regional scale: 100 %.

Environmental factors not influenced by risk management:
Flow rate of receiving surface water: >=1.8E6 m3/day.

Other given operational conditions affecting environmental exposure:
Indoor use.
Industrial use.
Release fraction to air from process (initial release): 0.001; (final release): 0.001. Local release rate: 2 kg/day.
Release fraction to wastewater from process (initial release): 0.005; (final release): 0.005. Local release rate: 10 kg/day.
Release fraction to soil from process: 0.001.

Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil:
Dry sludge application to agricultural soil: Yes (default).

Conditions and measures related to municipal sewage treatment plant:
Municipal Sewage Treatment Plant (STP): Yes (Efficiency=87.38%).
Size of municipal sewage system/treatment plant: >=20000 m3/day.

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

Particular considerations on the waste treatment operations: No (low risk) (ERC based assessment demonstrating control of risk with default conditions. Low risk assumed for waste life stage. Waste disposal according to national/local legislation is sufficient.)

Conditions and measures related to external recovery of waste:
External recovery and recycling of waste should comply with applicable local and/or national regulations.

Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply:
Spills are cleaned immediately.
All risk management measures utilised must also comply with all relevant local regulations.

3. Exposure estimation and reference to its source

Assessment method-Health: Worker TRA v3. Only highest figures are presented here.

Assessment method-Environment: EUSES.

Health

Effect/Compartment	Exposure estimate/PEC	RCR	Notes
Worker, long-term, systemic, Dermal	6,86 mg/kg bw/day	0,659	PROC4, PROC9
Worker, long-term, systemic, Inhalation	16,52 mg/m3	0,9	PROC3
Worker, long-term, systemic, Combined routes	N/A	0,966	PROC3

Environment

Effect/Compartment	Exposure estimate/PEC	RCR	Notes
Freshwater	0,0006575 mg/L	0,547	
Freshwater sediment	0,004 mg/kg dw	<0,01	
Marine water	0,00006497 mg/L	0.54	
Marine water sediment	0,0004253 mg/kg dw	<0,01	
Soil	0,0005194 mg/kg dw	<0,01	
STP	0,006 mg/L	<0,01	
Human via environment, Inhalation	0,00007634 mg/m3	<0,01	
Human via environment, Oral	0,00008431 mg/kg bw/day	<0,01	
Human via environment, Combined routes	N/A	<0,01	

RCR=Risk characterization ratio (PEC/PNEC or Exposure estimate/DNEL); PEC=Predicted environmental concentration.

Notes: The exposure scenario categories consist of a number of activities. An individual worker may conduct one or several of these activities during one shift and a specific PROC or PROCs have been identified as worst-case activities for combined exposure. If parts of the worker's shift are spent conducting PROCs other than the worst-case PROC activities, the daily exposure of this worker will be lower than estimated for the worst case.

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

Health

Predicted exposures are not expected to exceed the DN(M)EL when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented. Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels. Indoor use, no respirator required. Duration: PROC1, PROC2, PROC3, PROC4, PROC9, PROC15: <=8 hours/day. PROC5, PROC8a, PROC8b: <=4 hours/day. Dermal protection: No (Effectiveness Dermal: 0%). Local exhaust ventilation: PROC1, PROC2, PROC3: Not required. PROC4, PROC5, PROC8a, PROC9, PROC15: Yes (90% effectiveness). PROC8b: Yes (95% effectiveness). Concentration of substance: Up to 100%.

Environment

Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures. Required removal efficiency for wastewater can be achieved using onsite/offsite technologies, either alone or in combination. If scaling reveals a condition of unsafe use (i.e., RCRs > 1), additional RMMs or a site-specific chemical safety assessment is required.

Exposure scenario (3): Use at industrial sites - Laboratory chemicals, Perfumes, Fragrances

1. Exposure scenario (3)

Short title of the exposure scenario:
Use at industrial sites - Laboratory chemicals, Perfumes, Fragrances

List of use descriptors:
Sector of use category (SU): SU9, SU10
Product category (PC): PC21, PC28
Process category (PROC): PROC2, PROC3, PROC4, PROC15
Environmental release category (ERC): ERC4

List of names of contributing worker scenarios and corresponding PROCs:
PROC2 Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions.
PROC3 Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition.
PROC4 Chemical production where opportunity for exposure arises.
PROC15 Use as laboratory reagent. Use of substances at small scale in laboratories (less than or equal to 1 l or 1 kg present at workplace).

Name of contributing environmental scenario and corresponding ERCs:
ERC4 Use of non-reactive processing aid at industrial site (no inclusion into or onto article).

For further information on standardized use descriptors see the European Chemical Agency (ECHA) Guidance on information requirements and chemical safety assessment, Chapter R.12: Use descriptor system (http://guidance.echa.europa.eu/docs/guidance_document/information_requirements_r12_en.pdf).

2. Conditions of use affecting exposure

2.1 Control of workers exposure

General:
Eye and dermal irritancy controlled by the use of protective gloves (with >80% efficacy) and face shield or goggles. It is expected that the worker will have a bath (cleaning effect) after working so there shall not be continuing long term exposure to have toxic effect on the worker. The main specifications for personal protective equipment (PPE) appropriate for the substance are as follows:
-Respiratory protective equipment: Filter type A to be combined with particulate filter when there is potential for exposure to aerosol (for example in spraying operations).
- Gloves: Butyl rubber gloves conforming to EN 374, with thickness of >0.7 mm. Breakthrough time to be greater than task duration. Gloves should be worn when there is potential for dermal exposure.

Product characteristics:
Concentration of substance: Up to 100%.
Physical state: liquid.

Frequency and duration of use/exposure:
Duration: <=8 hours/day.

Human factors not influenced by risk management:
Exposed skin surface:
- PROC3, PROC15: 240 cm2 (one hand, face side only).
- PROC2, PROC4: 480 cm2 (two hands, face side only).

Other given operational conditions affecting workers exposure:
Location: Indoor use.
Domain: Industrial use.
Process temperature (for liquid): <= 40 °C.

Technical conditions and measures to control dispersion from source towards the worker:
General ventilation: Basic general ventilation (1-3 air changes per hour): 0%.
Containment:
- PROC2: Closed continuous process with occasional controlled exposure.
- PROC3: Closed batch process with occasional controlled exposure.
- PROC4: Semi-closed process with occasional controlled exposure.
- PROC15: No.
Local exhaust ventilation:
- PROC2, PROC3: Not required.
- PROC4, PROC15: Yes (90% effectiveness).
Local exhaust ventilation (for dermal): Not required.
Occupational Health and Safety Management System: Advanced.

Conditions and measures related to personal protection, hygiene and health evaluation:
Respiratory protection: Not required.
Chemical safety goggles recommended.
Dermal protection: No (Effectiveness Dermal: 0%).

Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply:
Use Local Exhaust ventilation.
Generally accepted standards of occupational hygiene are maintained.
Minimisation of manual phases/work tasks.
Minimisation of splashes and spills.
Avoidance of contact with contaminated tools and objects.
Regular cleaning of equipment and work area.
Training staff on good practice.
Management/supervision in place to check that RMMs in place are being used correctly and OCs followed.

2.2 Control of environmental exposure

General:
All risk management measures utilised must also comply with all relevant local regulations.

Amounts used:
Maximum daily use at a site: 0.5 ton/day.
Maximum annual use at a site: 30 tons/year.
Percentage of tonnage used at regional scale: 100 %.

Environmental factors not influenced by risk management:
Flow rate of receiving surface water: >=7.2E6 m3/day.

Other given operational conditions affecting environmental exposure:
Indoor use.
Industrial use.
Release fraction to air from process (initial release): 0.05; (final release): 0.05. Local release rate: 25 kg/day.
Release fraction to wastewater from process (initial release):0.1; (final release): 0.1. Local release rate: 50 kg/day.
Release fraction to soil from process (final release): 0.05.

Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil:
Dry sludge application to agricultural soil: Yes (default).

Conditions and measures related to municipal sewage treatment plant:
Municipal Sewage Treatment Plant (STP): Yes (Efficiency=87.38%).
Size of municipal sewage system/treatment plant: >=8E5 m3/day.

Conditions and measures related to external treatment of waste for disposal:
Particular considerations on the waste treatment operations: No (low risk) (ERC based assessment demonstrating control of risk with default conditions. Low risk assumed for waste life stage. Waste disposal according to national/local legislation is sufficient.)

Conditions and measures related to external recovery of waste:
External recovery and recycling of waste should comply with applicable local and/or national regulations.

Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply:
Spills are cleaned immediately.
All risk management measures utilised must also comply with all relevant local regulations.

3. Exposure estimation and reference to its source

Assessment method-Health: Worker TRA v3. Only highest figures are presented here.

Assessment method-Environment: EUSES.

Health

Effect/Compartment	Exposure estimate/PEC	RCR	Notes
Worker, long-term, systemic, Dermal	6,86 mg/kg bw/day	0,659	PROC4
Worker, long-term, systemic, Inhalation	16,52 mg/m3	0,9	PROC3
Worker, long-term, systemic, Combined routes	N/A	0,966	PROC3

Environment

Effect/Compartment	Exposure estimate/PEC	RCR	Notes
Freshwater	0,0008152 mg/L	0.678	
Freshwater sediment	0,005 mg/kg dw	<0,01	
Marine water	0,00008074 mg/L	0.672	
Marine water sediment	0,0005285 mg/kg dw	<0,01	
Soil	0,001 mg/kg dw	<0,01	
STP	0,008 mg/L	<0,01	
Human via environment, Inhalation	0,001 mg/m3	<0,01	
Human via environment, Oral	0,001 mg/kg bw/day	<0,01	
Human via environment, Combined routes	N/A	<0,01	

RCR=Risk characterization ratio (PEC/PNEC or Exposure estimate/DNEL); PEC=Predicted environmental concentration.

Notes: The exposure scenario categories consist of a number of activities. An individual worker may conduct one or several of these activities during one shift and a specific PROC or PROCs have been identified as worst-case activities for combined exposure. If parts of the worker's shift are spent conducting PROCs other than the worst-case PROC activities, the daily exposure of this worker will be lower than estimated for the worst case.

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

Health

Predicted exposures are not expected to exceed the DN(M)EL when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented. Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels. Indoor use, no respirator required. Duration: <=8 hours/day. Dermal protection: No (Effectiveness Dermal: 0%). Local exhaust ventilation: PROC2, PROC3: Not required. PROC4, PROC15: Yes (90% effectiveness). Concentration of substance: Up to 100%.

Environment

Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures. Required removal efficiency for wastewater can be achieved using onsite/offsite technologies, either alone or in combination. If scaling reveals a condition of unsafe use (i.e., RCRs > 1), additional RMMs or a site-specific chemical safety assessment is required.

Exposure scenario (4): Use at industrial sites - Processing aids

1. Exposure scenario (4)

Short title of the exposure scenario:
Use at industrial sites - Processing aids

List of use descriptors:
Sector of use category (SU): SU9, SU10
Product category (PC): PC21, PC28
Process category (PROC): PROC2, PROC3, PROC4, PROC15
Environmental release category (ERC): ERC6b

List of names of contributing worker scenarios and corresponding PROCs:
PROC2 Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions.
PROC3 Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition.
PROC4 Chemical production where opportunity for exposure arises.
PROC15 Use as laboratory reagent. Use of substances at small scale in laboratories (less than or equal to 1 l or 1 kg present at workplace).

Name of contributing environmental scenario and corresponding ERCs:
ERC6b Use of reactive processing aid at industrial site (no inclusion into or onto article).

For further information on standardized use descriptors see the European Chemical Agency (ECHA) Guidance on information requirements and chemical safety assessment, Chapter R.12: Use descriptor system (http://guidance.echa.europa.eu/docs/guidance_document/information_requirements_r12_en.pdf).

2. Conditions of use affecting exposure

2.1 Control of workers exposure

General:
Eye and dermal irritancy controlled by the use of protective gloves (with >80% efficacy) and face shield or goggles. It is expected that the worker will have a bath (cleaning effect) after working so there shall not be continuing long term exposure to have toxic effect on the worker. The main specifications for personal protective equipment (PPE) appropriate for the substance are as follows:

-Respiratory protective equipment: Filter type A to be combined with particulate filter when there is potential for exposure to aerosol (for example in spraying operations).
- Gloves: Butyl rubber gloves conforming to EN 374, with thickness of >0.7 mm. Breakthrough time to be greater than task duration. Gloves should be worn when there is potential for dermal exposure.

Product characteristics:
Concentration of substance: Up to 100%.
Physical state: liquid.

Frequency and duration of use/exposure:
Duration: <=8 hours/day.

Human factors not influenced by risk management:
Exposed skin surface:
- PROC3, PROC15: 240 cm2 (one hand, face side only).
- PROC2, PROC4: 480 cm2 (two hands, face side only).

Other given operational conditions affecting workers exposure:
Location: Indoor use.
Domain: Industrial use.
Process temperature (for liquid): <= 40 °C.

Technical conditions and measures to control dispersion from source towards the worker:
General ventilation: Basic general ventilation (1-3 air changes per hour): 0%.
Containment:
- PROC2: Closed continuous process with occasional controlled exposure.
- PROC3: Closed batch process with occasional controlled exposure.
- PROC4: Semi-closed process with occasional controlled exposure.
- PROC15: No.
Local exhaust ventilation:
- PROC2, PROC3: Not required.
- PROC4, PROC15: Yes (90% effectiveness).
Local exhaust ventilation (for dermal): Not required.
Occupational Health and Safety Management System: Advanced.

Conditions and measures related to personal protection, hygiene and health evaluation:
Respiratory protection: Not required.
Chemical safety goggles recommended.
Dermal protection: No (Effectiveness Dermal: 0%).

Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply:
Use Local Exhaust ventilation.
Generally accepted standards of occupational hygiene are maintained.
Minimisation of manual phases/work tasks.
Minimisation of splashes and spills.
Avoidance of contact with contaminated tools and objects.
Regular cleaning of equipment and work area.
Training staff on good practice.
Management/supervision in place to check that RMMs in place are being used correctly and OCs followed.

2.2 Control of environmental exposure

General:
All risk management measures utilised must also comply with all relevant local regulations.

Amounts used:
Maximum daily use at a site: 1.5 ton/day.
Maximum annual use at a site: 50 tons/year.
Percentage of tonnage used at regional scale: 100 %.

Environmental factors not influenced by risk management:
Flow rate of receiving surface water: >=7.5E5 m3/day.

Other given operational conditions affecting environmental exposure:
Industrial use.
Indoor use.
Release fraction to air from process (initial release): 0.001; (final release): 0.001. Local release rate: 1.5 kg/day.
Release fraction to wastewater from process (initial release): 0.005; (final release): 0.005. Local release rate: 7,5 kg/day.
Release fraction to soil from process (final release): 0.00025.

Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil:
Dry sludge application to agricultural soil: Yes (default).

Conditions and measures related to municipal sewage treatment plant:
Municipal Sewage Treatment Plant (STP): Yes (Efficiency=87.38%).
Size of municipal sewage system/treatment plant: >=8E4 m3/day.

Conditions and measures related to external treatment of waste for disposal:
Particular considerations on the waste treatment operations: No (low risk) (ERC based assessment demonstrating control of risk with default conditions. Low risk assumed for waste life stage. Waste disposal according to national/local legislation is sufficient.)

Conditions and measures related to external recovery of waste:
External recovery and recycling of waste should comply with applicable local and/or national regulations.

Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply:
Spills are cleaned immediately.
All risk management measures utilised must also comply with all relevant local regulations.

3. Exposure estimation and reference to its source

Assessment method-Health: Worker TRA v3. Only highest figures are presented here.

Assessment method-Environment: EUSES.

Health

Effect/Compartment	Exposure estimate/PEC	RCR	Notes
Worker, long-term, systemic, Dermal	6,86 mg/kg bw/day	0,659	PROC4
Worker, long-term, systemic, Inhalation	16,52 mg/m3	0,9	PROC3
Worker, long-term, systemic, Combined routes	N/A	0,966	PROC3

Environment

Effect/Compartment	Exposure estimate/PEC	RCR	Notes
Freshwater	0,001 mg/L	0,971	
Freshwater sediment	0,008 mg/kg dw	<0,01	
Marine water	0,0001202 mg/L	1,0	
Marine water sediment	0,0007865 mg/kg dw	<0,01	
Soil	0,0009333 mg/kg dw	<0,01	
STP	0,012 mg/L	<0,01	
Human via environment, Inhalation	0,00003826 mg/m3	<0,01	
Human via environment, Oral	0,00006055 mg/kg bw/day	<0,01	
Human via environment, Combined routes	N/A	<0,01	

RCR=Risk characterization ratio (PEC/PNEC or Exposure estimate/DNEL); PEC=Predicted environmental concentration.

Notes: The exposure scenario categories consist of a number of activities. An individual worker may conduct one or several of these activities during one shift and a specific PROC or PROCs have been identified as worst-case activities for combined exposure. If parts of the worker's shift are spent conducting PROCs other than the worst-case PROC activities, the daily exposure of this worker will be lower than estimated for the worst case.

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

Health

Predicted exposures are not expected to exceed the DN(M)EL when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented. Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels. Indoor use, no respirator required. Duration: <=8 hours/day. Dermal protection: No (Effectiveness Dermal: 0%). Local exhaust ventilation: PROC2, PROC3: Not required. PROC4, PROC15: Yes (90% effectiveness). Concentration of substance: Up to 100%.

Environment

Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures. Required removal efficiency for wastewater can be achieved using onsite/offsite technologies, either alone or in combination. If scaling reveals a condition of unsafe use (i.e., RCRs > 1), additional RMMs or a site-specific chemical safety assessment is required.

Exposure scenario (5): Use at industrial sites - Pharmceuticals

1. Exposure scenario (5)

Short title of the exposure scenario:
Use at industrial sites - Pharmceuticals

List of use descriptors:
Sector of use category (SU): SU20
Product category (PC): PC29
Process category (PROC): PROC2, PROC4
Environmental release category (ERC): ERC6a

List of names of contributing worker scenarios and corresponding PROCs:
PROC2 Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions.
PROC4 Chemical production where opportunity for exposure arises.

Name of contributing environmental scenario and corresponding ERCs:
ERC6a Use of intermediate.

For further information on standardized use descriptors see the European Chemical Agency (ECHA) Guidance on information requirements and chemical safety assessment, Chapter R.12: Use descriptor system (http://guidance.echa.europa.eu/docs/guidance_document/information_requirements_r12_en.pdf).

2. Conditions of use affecting exposure

2.1 Control of workers exposure

General:
Eye and dermal irritancy controlled by the use of protective gloves (with >80% efficacy) and face shield or goggles. It is expected that the worker will have a bath (cleaning effect) after working so there shall not be continuing long term exposure to have toxic effect on the worker. The main specifications for personal protective equipment (PPE) appropriate for the substance are as follows:
-Respiratory protective equipment: Filter type A to be combined with particulate filter when there is potential for exposure to aerosol (for example in spraying operations).
- Gloves: Butyl rubber gloves conforming to EN 374, with thickness of >0.7 mm. Breakthrough time to be greater than task duration. Gloves should be worn when there is potential for dermal exposure.

Product characteristics:
Concentration of substance: Up to 100%.
Physical state: liquid.

Frequency and duration of use/exposure:

Duration: <=8 hours/day.

Human factors not influenced by risk management:
Exposed skin surface: 480 cm2 (two hands, face side only).

Other given operational conditions affecting workers exposure:
Location: Indoor use.
Domain: Industrial use.
Process temperature (for liquid): <= 40 °C.

Technical conditions and measures to control dispersion from source towards the worker:
General ventilation: Basic general ventilation (1-3 air changes per hour): 0%.
Containment:
- PROC2: Closed continuous process with occasional controlled exposure.
- PROC4: Semi-closed process with occasional controlled exposure.
Local exhaust ventilation:
- PROC2: Not required.
- PROC4: Yes (90% effectiveness).
Local exhaust ventilation (for dermal): Not required.
Occupational Health and Safety Management System: Advanced.

Conditions and measures related to personal protection, hygiene and health evaluation:
Respiratory protection: Not required.
Chemical safety goggles recommended.
Dermal protection: No (Effectiveness Dermal: 0%).

Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply:
Use Local Exhaust ventilation.
Generally accepted standards of occupational hygiene are maintained.
Minimisation of manual phases/work tasks.
Minimisation of splashes and spills.
Avoidance of contact with contaminated tools and objects.
Regular cleaning of equipment and work area.
Training staff on good practice.
Management/supervision in place to check that RMMs in place are being used correctly and OCs followed.

2.2 Control of environmental exposure

General:
All risk management measures utilised must also comply with all relevant local regulations.

Amounts used:
Maximum daily use at a site: 1.3 ton/day.
Maximum annual use at a site: 50 tons/year.
Percentage of tonnage used at regional scale: 100 %.

Environmental factors not influenced by risk management:
Flow rate of receiving surface water: >=1.8E6 m3/day.

Other given operational conditions affecting environmental exposure:
Indoor use.
Industrial use.
Release fraction to air from process (initial release): 0.012; (final release): 0.012. Local release rate: 15.6 kg/day.
Release fraction to wastewater from process (initial release): 0.01; (final release): 0.01. Local release rate: 13 kg/day.
Release fraction to soil from process: 0,001.

Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil:
Dry sludge application to agricultural soil: Yes (default).

Conditions and measures related to municipal sewage treatment plant:
Municipal Sewage Treatment Plant (STP): Yes (Efficiency=87.38%).
Size of municipal sewage system/treatment plant: >=20000 m3/day.

Conditions and measures related to external treatment of waste for disposal:
Particular considerations on the waste treatment operations: No (low risk) (ERC based assessment demonstrating control of risk with default conditions. Low risk assumed for waste life stage. Waste disposal according to national/local legislation is sufficient.)

Conditions and measures related to external recovery of waste:
External recovery and recycling of waste should comply with applicable local and/or national regulations.

Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply:
Spills are cleaned immediately.
All risk management measures utilised must also comply with all relevant local regulations.

3. Exposure estimation and reference to its source

Assessment method-Health: Worker TRA v3. Only highest figures are presented here.

Assessment method-Environment: EUSES.

Health

Effect/Compartment	Exposure estimate/PEC	RCR	Notes
Worker, long-term, systemic, Dermal	6,86 mg/kg bw/day	0,659	PROC4
Worker, long-term, systemic, Inhalation	5,507 mg/m3	0,3	PROC2
Worker, long-term, systemic, Combined routes	N/A	0,808	PROC4

Environment

Effect/Compartment	Exposure estimate/PEC	RCR	Notes
Freshwater	0,0008467 mg/L	0,704	

Effect/Compartment	Exposure estimate/PEC	RCR	Notes
Freshwater sediment	0,006 mg/kg dw	<0,01	
Marine water	0,0000839 mg/L	0,698	
Marine water sediment	0,0005491 mg/kg dw	<0,01	
Soil	0,0008078 mg/kg dw	<0,01	
STP	0,008 mg/L	<0,01	
Human via environment, Inhalation	0,0004572 mg/m3	<0,01	
Human via environment, Oral	0,0004379 mg/kg bw/day	<0,01	
Human via environment, Combined routes	N/A	<0,01	

RCR=Risk characterization ratio (PEC/PNEC or Exposure estimate/DNEL); PEC=Predicted environmental concentration.

Notes: The exposure scenario categories consist of a number of activities. An individual worker may conduct one or several of these activities during one shift and a specific PROC or PROCs have been identified as worst-case activities for combined exposure. If parts of the worker's shift are spent conducting PROCs other than the worst-case PROC activities, the daily exposure of this worker will be lower than estimated for the worst case.

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

Health

Predicted exposures are not expected to exceed the DN(M)EL when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented. Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels. Indoor use, no respirator required. Duration: <=8 hours/day. Dermal protection: No (Effectiveness Dermal: 0%). Local exhaust ventilation: PROC2: Not required. PROC4: Yes (90% effectiveness). Concentration of substance: Up to 100%.

Environment

Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures. Required removal efficiency for wastewater can be achieved using onsite/offsite technologies, either alone or in combination. If scaling reveals a condition of unsafe use (i.e., RCRs > 1), additional RMMs or a site-specific chemical safety assessment is required.

Exposure scenario (6): Use at industrial sites - Cosmetic & personal care products

1. Exposure scenario (6)

Short title of the exposure scenario:
Use at industrial sites - Cosmetic & personal care products

List of use descriptors:
Sector of use category (SU): SU9
Product category (PC): PC39
Process category (PROC): PROC2, PROC4
Environmental release category (ERC): ERC7

List of names of contributing worker scenarios and corresponding PROCs:
PROC2 Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions.
PROC4 Chemical production where opportunity for exposure arises.

Name of contributing environmental scenario and corresponding ERCs:
ERC7 Use of functional fluid at industrial site.

For further information on standardized use descriptors see the European Chemical Agency (ECHA) Guidance on information requirements and chemical safety assessment, Chapter R.12: Use descriptor system (http://guidance.echa.europa.eu/docs/guidance_document/information_requirements_r12_en.pdf).

2. Conditions of use affecting exposure

2.1 Control of workers exposure

General:
Eye and dermal irritancy controlled by the use of protective gloves (with >80% efficacy) and face shield or goggles. It is expected that the worker will have a bath (cleaning effect) after working so there shall not be continuing long term exposure to have toxic effect on the worker. The main specifications for personal protective equipment (PPE) appropriate for the substance are as follows:
-Respiratory protective equipment: Filter type A to be combined with particulate filter when there is potential for exposure to aerosol (for example in spraying operations).
- Gloves: Butyl rubber gloves conforming to EN 374, with thickness of >0.7 mm. Breakthrough time to be greater than task duration. Gloves should be worn when there is potential for dermal exposure.

Product characteristics:
Concentration of substance: Up to 100%.
Physical state: liquid.

Frequency and duration of use/exposure:
Duration: <=8 hours/day.

Human factors not influenced by risk management:
Exposed skin surface: 480 cm2 (two hands, face side only).

Other given operational conditions affecting workers exposure:
Location: Indoor use.
Domain: Industrial use.
Process temperature (for liquid): <= 40 °C.

Technical conditions and measures to control dispersion from source towards the worker:
General ventilation: Basic general ventilation (1-3 air changes per hour): 0%.
Containment:
- PROC2: Closed continuous process with occasional controlled exposure.

- PROC4: Semi-closed process with occasional controlled exposure.
Local exhaust ventilation:
- PROC2: Not required.
- PROC4: Yes (90% effectiveness).
Local exhaust ventilation (for dermal): Not required.
Occupational Health and Safety Management System: Advanced.

Conditions and measures related to personal protection, hygiene and health evaluation:
Respiratory protection: Not required.
Chemical safety goggles recommended.
Dermal protection: No (Effectiveness Dermal: 0%).

Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply:
Use Local Exhaust ventilation.
Generally accepted standards of occupational hygiene are maintained.
Minimisation of manual phases/work tasks.
Minimisation of splashes and spills.
Avoidance of contact with contaminated tools and objects.
Regular cleaning of equipment and work area.
Training staff on good practice.
Management/supervision in place to check that RMMs in place are being used correctly and OCs followed.

2.2 Control of environmental exposure

General:
All risk management measures utilised must also comply with all relevant local regulations.

Amounts used:
Maximum daily use at a site: 1.5 ton/day.
Maximum annual use at a site: 60 tons/year.
Percentage of tonnage used at regional scale: 100 %.

Environmental factors not influenced by risk management:
Flow rate of receiving surface water: >=3.6E6 m3/day.

Other given operational conditions affecting environmental exposure:
Indoor use.
Industrial use.
Release fraction to air from process (initial release): 0.015; (final release): 0.015. Local release rate: 22.5 kg/day.
Release fraction to wastewater from process (initial release): 0.02; (final release): 0.02. Local release rate: 30 kg/day.
Release fraction to soil from process (final release): 0.05.

Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil:
Dry sludge application to agricultural soil: Yes (default).

Conditions and measures related to municipal sewage treatment plant:
Municipal Sewage Treatment Plant (STP): Yes (Efficiency=87.38%).
Size of municipal sewage system/treatment plant: >=4E5 m3/day.

Conditions and measures related to external treatment of waste for disposal:
Particular considerations on the waste treatment operations: No (low risk) (ERC based assessment demonstrating control of risk with default conditions. Low risk assumed for waste life stage. Waste disposal according to national/local legislation is sufficient.)

Conditions and measures related to external recovery of waste:
External recovery and recycling of waste should comply with applicable local and/or national regulations.

Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply:
Spills are cleaned immediately.
All risk management measures utilised must also comply with all relevant local regulations.

3. Exposure estimation and reference to its source

Assessment method-Health: Worker TRA v3. Only highest figures are presented here.

Assessment method-Environment: EUSES.

Health

Effect/Compartment	Exposure estimate/PEC	RCR	Notes
Worker, long-term, systemic, Dermal	6,86 mg/kg bw/day	0,659	PROC4
Worker, long-term, systemic, Inhalation	5,507 mg/m3	0,3	PROC2
Worker, long-term, systemic, Combined routes	N/A	0,808	PROC4

Environment

Effect/Compartment	Exposure estimate/PEC	RCR	Notes
Freshwater	0,0009729 mg/L	0,809	
Freshwater sediment	0,006 mg/kg dw	<0,01	
Marine water	0,00009651 mg/L	0,803	
Marine water sediment	0,0006317 mg/kg dw	<0,01	
Soil	0,0009907 mg/kg dw	<0,01	
STP	0,009 mg/L	<0,01	
Human via environment, Inhalation	0,0006857 mg/m3	<0,01	
Human via environment, Oral	0,.0006505 mg/kg bw/day	<0,01	
Human via environment, Combined routes	N/A	<0,01	

RCR=Risk characterization ratio (PEC/PNEC or Exposure estimate/DNEL); PEC=Predicted environmental concentration.

Notes: The exposure scenario categories consist of a number of activities. An individual worker may conduct one or several of these activities during one shift and a specific PROC or PROCs have been identified as worst-case activities for combined exposure. If parts of the worker's shift are spent conducting PROCs other than the worst-case PROC activities, the daily exposure of this worker will be lower than estimated for the worst case.

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

Health

Predicted exposures are not expected to exceed the DN(M)EL when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented. Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels. Indoor use, no respirator required. Duration: <=8 hours/day. Dermal protection: No (Effectiveness Dermal: 0%). Local exhaust ventilation: PROC2: Not required. PROC4: Yes (90% effectiveness). Concentration of substance: Up to 100%.

Environment

Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures. Required removal efficiency for wastewater can be achieved using onsite/offsite technologies, either alone or in combination. If scaling reveals a condition of unsafe use (i.e., RCRs > 1), additional RMMs or a site-specific chemical safety assessment is required.

Exposure scenario (7): Use by professional workers - Professional use of cosmetic products

1. Exposure scenario (7)

Short title of the exposure scenario:
Use by professional workers - Professional use of cosmetic products

List of use descriptors:
Process category (PROC): PROC19
Environmental release category (ERC): ERC8a

List of names of contributing worker scenarios and corresponding PROCs:
PROC19 Manual activities involving hand contact. Addresses tasks, where exposure of hands and forearms can be expected; no dedicated tools or specific exposure controls other than PPE can be put in place.

Name of contributing environmental scenario and corresponding ERCs:
ERC8a Widespread use of non-reactive processing aid (no inclusion into or onto article, indoor).

For further information on standardized use descriptors see the European Chemical Agency (ECHA) Guidance on information requirements and chemical safety assessment, Chapter R.12: Use descriptor system (http://guidance.echa.europa.eu/docs/guidance_document/information_requirements_r12_en.pdf).

2. Conditions of use affecting exposure

2.1 Control of workers exposure

General:
Eye and dermal irritancy controlled by the use of protective gloves (with >80% efficacy) and face shield or goggles. It is expected that the worker will have a bath (cleaning effect) after working so there shall not be continuing long term exposure to have toxic effect on the worker. The main specifications for personal protective equipment (PPE) appropriate for the substance are as follows:
-Respiratory protective equipment: Filter type A to be combined with particulate filter when there is potential for exposure to aerosol (for example in spraying operations).
- Gloves: Butyl rubber gloves conforming to EN 374, with thickness of >0.7 mm. Breakthrough time to be greater than task duration. Gloves should be worn when there is potential for dermal exposure.

Product characteristics:
Concentration of substance: 5-25%.
Physical state: liquid.

Frequency and duration of use/exposure:
Duration: <=8 hours/day.

Human factors not influenced by risk management:
Exposed skin surface: 1980 cm2 (two hands and forearms).

Other given operational conditions affecting workers exposure:
Location: Indoor use.
Domain: Professional use.
Process temperature (for liquid): <= 40 °C.

Technical conditions and measures to control dispersion from source towards the worker:
General ventilation: Basic general ventilation (1-3 air changes per hour): 0%.
Containment: No.
Local exhaust ventilation: Yes (80% effectiveness).
Local exhaust ventilation (for dermal): Not required.
Occupational Health and Safety Management System: Basic.

Conditions and measures related to personal protection, hygiene and health evaluation:
Respiratory protection: Yes (Respirator with APF of 10) (Effectiveness Inhalation: 90%).
Chemical safety goggles recommended.
Dermal protection: Yes (chemically resistant gloves conforming to EN374 with basic employee training) (Effectiveness Dermal: 90%).

Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply:
Use Local Exhaust ventilation.
Generally accepted standards of occupational hygiene are maintained.
Minimisation of manual phases/work tasks.
Minimisation of splashes and spills.
Avoidance of contact with contaminated tools and objects.
Regular cleaning of equipment and work area.
Training staff on good practice.
Management/supervision in place to check that RMMs in place are being used correctly and OCs followed.

2.2 Control of environmental exposure

General:
All risk management measures utilised must also comply with all relevant local regulations.

Amounts used:
Daily wide dispersive use: 0,00000275 tons/day.
Percentage of tonnage used at regional scale: 10 %.

Environmental factors not influenced by risk management:
Flow rate of receiving surface water: >=18,000 m3/day (default).

Other given operational conditions affecting environmental exposure:
Professional use.
Indoor use.
Release fraction to air from process (initial release): 1.00; (final release): 1.00.
Release fraction to wastewater from process (initial release): 1.00; (final release): 1.00. Local release rate: 0.003 kg/day.
Release fraction to surface water from process: 0.

Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil:
Dry sludge application to agricultural soil: Yes (default).

Conditions and measures related to municipal sewage treatment plant:
Municipal Sewage Treatment Plant (STP): Yes (Efficiency=87.38%).
Size of municipal sewage system/treatment plant: >=2000 m3/day (standard town).

Conditions and measures related to external treatment of waste for disposal:
Particular considerations on the waste treatment operations: No (low risk) (ERC based assessment demonstrating control of risk with default conditions. Low risk assumed for waste life stage. Waste disposal according to national/local legislation is sufficient.)

Conditions and measures related to external recovery of waste:
External recovery and recycling of waste should comply with applicable local and/or national regulations.

Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply:
Spills are cleaned immediately.
All risk management measures utilised must also comply with all relevant local regulations.

3. Exposure estimation and reference to its source

Assessment method-Health: Worker TRA v3. Only highest figures are presented here.

Assessment method-Environment: EUSES.

Health

Effect/Compartment	Exposure estimate/PEC	RCR	Notes
Worker, long-term, systemic, Dermal	8,486 mg/kg bw/day	0,815	
Worker, long-term, systemic, Inhalation	1,652 mg/m3	0,09	
Worker, long-term, systemic, Combined routes	N/A	0,905	

Environment

Effect/Compartment	Exposure estimate/PEC	RCR	Notes
Freshwater	0,00004409 mg/L	0,037	
Freshwater sediment	0,0002886 mg/kg dw	<0,01	
Marine water	0,00000363 mg/L	0,03	
Marine water sediment	0,00002376 mg/kg dw	<0,01	
Soil	0,00001529 mg/kg dw	<0,01	
STP	0,0001735 mg/L	<0,01	
Human via environment, Inhalation	0,0000001793 mg/m3	<0,01	
Human via environment, Oral	0,000002146 mg/kg bw/day	<0,01	
Human via environment, Combined routes	N/A	<0,01	

RCR=Risk characterization ratio (PEC/PNEC or Exposure estimate/DNEL); PEC=Predicted environmental concentration.

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

Health

Predicted exposures are not expected to exceed the DN(M)EL when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented. Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels. Indoor use. Duration: <=8 hours/day. Dermal protection: Yes (chemically resistant gloves conforming to EN374 with basic employee training) (Effectiveness Dermal: 90%). Local exhaust ventilation: Yes (80% effectiveness). Respiratory protection: Yes (Respirator with APF of 10) (Effectiveness Inhalation: 90%). Concentration of substance: 5-25%.

Environment

Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures. Required removal efficiency for wastewater can be achieved using onsite/offsite technologies, either alone or in combination. If scaling reveals a condition of unsafe use (i.e., RCRs > 1), additional RMMs or a site-specific chemical safety assessment is required.

Exposure scenario (8): Consumer use - Consumer use of cosmetics products and pharmaceuticals

1. Exposure scenario (8)

Short title of the exposure scenario:
Consumer use - Consumer use of cosmetics products and pharmaceuticals

List of use descriptors:
Product category (PC): PC28, PC29, PC39
Environmental release category (ERC): ERC8a

Name of contributing environmental scenario and corresponding ERCs:
ERC8a Widespread use of non-reactive processing aid (no inclusion into or onto article, indoor).

Further explanations:
PC28 Perfumes, fragrances; PC29 Pharmaceuticals; PC39 Cosmetics, personal care products.

For further information on standardized use descriptors see the European Chemical Agency (ECHA) Guidance on information requirements and chemical safety assessment, Chapter R.12: Use descriptor system (http://guidance.echa.europa.eu/docs/guidance_document/information_requirements_r12_en.pdf).

2. Conditions of use affecting exposure

2.1 Control of consumer exposure

General:
Exposure assessment not defined.

2.2 Control of environmental exposure

General:
All risk management measures utilised must also comply with all relevant local regulations.

Amounts used:
Daily wide dispersive use: 0.0000055 tons/day.
Percentage of tonnage used at regional scale: 10 %.

Environmental factors not influenced by risk management:
Flow rate of receiving surface water: >=18,000 m3/day (default).

Other given operational conditions affecting environmental exposure:
Consumer use.
Release fraction to air from process (initial release): 1.00; (final release): 1.00.
Release fraction to wastewater from process (initial release): 1.00; (final release): 1.00. Local release rate: 0.006 kg/day.
Release fraction to surface water from process: 0 (EUSES).
Release fraction to soil from process (final release): 0,0.

Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil:
Dry sludge application to agricultural soil: Yes (default).

Conditions and measures related to municipal sewage treatment plant:
Municipal Sewage Treatment Plant (STP): Yes (Efficiency=87.38%).
Size of municipal sewage system/treatment plant: >=2000 m3/day (standard town).

Conditions and measures related to external treatment of waste for disposal:
Particular considerations on the waste treatment operations: No (low risk) (ERC based assessment demonstrating control of risk with default conditions. Low risk assumed for waste life stage. Waste disposal according to national/local legislation is sufficient.)

Conditions and measures related to external recovery of waste:
External recovery and recycling of waste should comply with applicable local and/or national regulations.

Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply:
Spills are cleaned immediately.
All risk management measures utilised must also comply with all relevant local regulations.

3. Exposure estimation and reference to its source

Assessment method-Environment: EUSES.

Environment

Effect/Compartment	Exposure estimate/PEC	RCR	Notes
Freshwater	0,00006144 mg/L	0.051	
Freshwater sediment	0,0004021 mg/kg dw	<0,01	
Marine water	0,000005365 mg/L	0.045	
Marine water sediment	0,00003512 mg/kg dw	<0,01	
Soil	0,00002874 mg/kg dw	<0,01	
STP	0,0003469 mg/L	<0,01	
Human via environment, Inhalation	0,0000001796 mg/m3	<0,01	
Human via environment, Oral	0,000002975 mg/kg bw/day	<0,01	
Human via environment, Combined routes	N/A	<0,01	

RCR=Risk characterization ratio (PEC/PNEC or Exposure estimate/DNEL); PEC=Predicted environmental concentration.

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

Environment

Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures. Required removal efficiency for wastewater can be achieved using onsite/offsite technologies, either alone or in combination. If scaling reveals a condition of unsafe use (i.e., RCRs > 1), additional RMMs or a site-specific chemical safety assessment is required.

Exposure scenario (9): Consumer use - Consumer use in cleaning agents and maintenance products (including air care products)

1. Exposure scenario (9)

Short title of the exposure scenario:
Consumer use - Consumer use in cleaning agents and maintenance products (including air care products)

List of use descriptors:
Product category (PC): PC3, PC31, PC35.
Environmental release category (ERC): ERC8a

Name of contributing environmental scenario and corresponding ERCs:
ERC8a Widespread use of non-reactive processing aid (no inclusion into or onto article, indoor).

Further explanations:
PC3 Air care products; PC31 Polishes and wax blends; PC35 Washing and cleaning products (including solvent based products).

For further information on standardized use descriptors see the European Chemical Agency (ECHA) Guidance on information requirements and chemical safety assessment, Chapter R.12: Use descriptor system (http://guidance.echa.europa.eu/docs/guidance_document/information_requirements_r12_en.pdf).

2. Conditions of use affecting exposure

2.1 Control of consumer exposure

General:
Exposure assessment not defined.

2.2 Control of environmental exposure

General:
All risk management measures utilised must also comply with all relevant local regulations.

Amounts used:
Daily wide dispersive use: 0.0000055 tons/day.
Percentage of tonnage used at regional scale: 10 %.

Environmental factors not influenced by risk management:
Flow rate of receiving surface water: >=18,000 m3/day (default).

Other given operational conditions affecting environmental exposure:
Consumer use.
Release fraction to air from process (initial release): 1,00; (final release): 1,00.
Release fraction to wastewater from process (initial release): 1.00; (final release): 1.00. Local release rate: 0.006 kg/day.
Release fraction to soil from process (final release): 0.0.

Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil:
Dry sludge application to agricultural soil: Yes (default).

Conditions and measures related to municipal sewage treatment plant:
Municipal Sewage Treatment Plant (STP): Yes (Efficiency=87.38%).
Size of municipal sewage system/treatment plant: >=2000 m3/day (standard town).

Conditions and measures related to external treatment of waste for disposal:
Particular considerations on the waste treatment operations: No (low risk) (ERC based assessment demonstrating control of risk with default conditions. Low risk assumed for waste life stage. Waste disposal according to national/local legislation is sufficient.)

Conditions and measures related to external recovery of waste:
External recovery and recycling of waste should comply with applicable local and/or national regulations.

Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply:
Spills are cleaned immediately.
All risk management measures utilised must also comply with all relevant local regulations.

3. Exposure estimation and reference to its source

Assessment method-Environment: EUSES.

Environment

Effect/Compartment	Exposure estimate/PEC	RCR	Notes
Freshwater	0,00006144 mg/L	0,051	
Freshwater sediment	0,0004021 mg/kg dw	<0,01	
Marine water	0,000005365 mg/L	0,045	
Marine water sediment	0,00003512 mg/kg dw	<0,01	
Soil	0,00002874 mg/kg dw	<0,01	
STP	0,0003469 mg/L	<0,01	
Human via environment, Inhalation	0,0000001796 mg/m3	<0,01	
Human via environment, Oral	0,000002975 mg/kg bw/day	<0,01	
Human via environment, Combined routes	N/A	<0,01	

RCR=Risk characterization ratio (PEC/PNEC or Exposure estimate/DNEL); PEC=Predicted environmental concentration.

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

Environment

Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures. Required removal efficiency for wastewater can be achieved using onsite/offsite technologies, either alone or in combination. If scaling reveals a condition of unsafe use (i.e., RCRs > 1), additional RMMs or a site-specific chemical safety assessment is required.

Exposure scenario (10): Service life (consumers) - Use of substance in scented articles

1. Exposure scenario (10)

Short title of the exposure scenario:
Service life (consumers) - Use of substance in scented articles

List of use descriptors:
Environmental release category (ERC): ERC11b
Article category (AC): AC31, AC32, AC34, AC35, AC36

Name of contributing environmental scenario and corresponding ERCs:
ERC11b Widespread use of articles with high or intended release (indoor).

Further explanations:
AC31 Scented clothes; AC32 Scented eraser; AC34 Scented toys; AC35 Scented paper articles; AC36 Scented CD.

For further information on standardized use descriptors see the European Chemical Agency (ECHA) Guidance on information requirements and chemical safety assessment, Chapter R.12: Use descriptor system (http://guidance.echa.europa.eu/docs/guidance_document/information_requirements_r12_en.pdf).

2. Conditions of use affecting exposure

2.1 Control of consumer exposure

General:
Exposure assessment not defined.

2.2 Control of environmental exposure

General:
All risk management measures utilised must also comply with all relevant local regulations.

Amounts used:
Daily wide dispersive use: 0,00000275 tons/day.
Percentage of tonnage used at regional scale: 10 %.

Environmental factors not influenced by risk management:
Flow rate of receiving surface water: >=18,000 m3/day (default).

Other given operational conditions affecting environmental exposure:
Consumer use.
Release fraction to air from process (initial release): 1,00; (final release): 1,00.
Release fraction to wastewater from process (initial release): 1.00; (final release): 1.00. Local release rate: 0.003 kg/day.
Release fraction to soil from process (final release): 0.0.

Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil:
Dry sludge application to agricultural soil: Yes (default).

Conditions and measures related to municipal sewage treatment plant:
Municipal Sewage Treatment Plant (STP): Yes (Efficiency=87.38%).
Size of municipal sewage system/treatment plant: >=2000 m3/day (standard town).

Conditions and measures related to external treatment of waste for disposal:
Particular considerations on the waste treatment operations: No (low risk) (ERC based assessment demonstrating control of risk with default conditions. Low risk assumed for waste life stage. Waste disposal according to national/local legislation is sufficient.)

Conditions and measures related to external recovery of waste:
External recovery and recycling of waste should comply with applicable local and/or national regulations.

Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply:
All risk management measures utilised must also comply with all relevant local regulations.

3. Exposure estimation and reference to its source

Assessment method-Environment: EUSES.

Environment

Effect/Compartment	Exposure estimate/PEC	RCR	Notes
Freshwater	0,00004409 mg/L	0,037	
Freshwater sediment	0,0002886 mg/kg dw	<0,01	
Marine water	0,00000363 mg/L	0,03	
Marine water sediment	0,00002376 mg/kg bw	<0,01	
Soil	0,00001529 mg/kg dw	<0,01	
STP	0,0001735 mg/L	<0,01	
Human via environment, Inhalation	0,0000001793 mg/m3	<0,01	
Human via environment, Oral	0,000002146 mg/kg bw/day	<0,01	
Human via environment, Combined routes	N/A	<0,01	

RCR=Risk characterization ratio (PEC/PNEC or Exposure estimate/DNEL); PEC=Predicted environmental concentration.

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

Environment

Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures. Required removal efficiency for wastewater can be achieved using onsite/offsite technologies, either alone or in combination. If scaling reveals a condition of unsafe use (i.e., RCRs > 1), additional RMMs or a site-specific chemical safety assessment is required.