

SAFETY DATA SHEET

according to Regulation (EC) No. 1907/2006



Guanidine hydrochloride

Version 5.2 / REG_EU

Revision Date: 25.07.2018

Specification: 131922

Material no.:

Date of first issue: 25.07.2018

Print Date: 26.07.2018

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

1.1 Product identifier

Trade name	: Guanidine hydrochloride
Registration number	: 01-2119977063-35-0000
CAS-No.	: 50-01-1
Index-No.	: 607-148-00-0
EC-No.	: 200-002-3

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

Use of the Substance/Mixture	: Preliminary / intermediate product for organic syntheses, Auxiliary substance used in various bioengineering and diagnostic applications.
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1.3 Details of the supplier of the safety data sheet

Company	: AlzChem Trostberg GmbH Dr.-Albert-Frank-Str. 32 83308 Trostberg, Germany
Telephone	: +49 8621 86-3351
E-mail address of person responsible for the SDS	: alz-pst@alzchem.com

1.4 Emergency telephone number

Emergency telephone number	: +49 8621 86-2776 AlzChem Trostberg GmbH, Fire Brigade
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SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

Classification (REGULATION (EC) No 1272/2008)

Acute toxicity, Category 4	H302: Harmful if swallowed.
Acute toxicity, Category 4	H332: Harmful if inhaled.
Skin irritation, Category 2	H315: Causes skin irritation.
Eye irritation, Category 2	H319: Causes serious eye irritation.

Classification deviating from Annex VI, Ordinance (EC) No. 1272/2008 with:, Acute toxicity, inhalation

2.2 Label elements

Labelling (REGULATION (EC) No 1272/2008)

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Hazard pictograms :



Signal word : Warning

Hazard statements : H302 Harmful if swallowed.
H332 Harmful if inhaled.
H315 Causes skin irritation.
H319 Causes serious eye irritation.

Precautionary statements : **Prevention:**
P261 Avoid breathing dust/ fume/ gas/ mist/ vapours/ spray.
P280 Wear protective gloves/protective clothing/eye protection/face protection.
Response:
P302 + P352 IF ON SKIN: Wash with plenty of soap and water.
P304 + P340 IF INHALED: Remove person to fresh air and keep comfortable for breathing.
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 CENTER/doctor if you feel unwell.

2.3 Other hazards

Not a PBT, vPvB substance as per the criteria of the REACH Ordinance

SECTION 3: Composition/information on ingredients

3.1 Substances

Substance name : Guanidine hydrochloride
Index-No. : 607-148-00-0
Chemical nature : Salt of organic compound

Hazardous components

Chemical name	CAS-No. EC-No.	Concentration (% w/w)
Guanidine hydrochloride	50-01-1 200-002-3	>= 98

SECTION 4: First aid measures

4.1 Description of first aid measures

General advice : Seek medical advice in case of symptoms caused by eye or skin contact, inhalation or swallowing.

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- If inhaled : Bring affected person outside and ensure that he/she is comfortable.
In case of massive exposure:
Early application of cortisone spray.
- In case of skin contact : Remove contaminated or saturated clothing.
Wash off with plenty of water.
- In case of eye contact : Open the eyes and rinse thoroughly with plenty of water.
Remove contact lenses if this can be easily done.
- If swallowed : Do NOT induce vomiting.
Clean mouth with water and drink afterwards plenty of water.

4.2 Most important symptoms and effects, both acute and delayed

None known.

4.3 Indication of any immediate medical attention and special treatment needed

Treatment : Symptomatic therapy

SECTION 5: Firefighting measures

5.1 Extinguishing media

- Suitable extinguishing media : Water spray, foam, CO₂, dry powder.
- Unsuitable extinguishing media : high volume water jet

5.2 Special hazards arising from the substance or mixture

- Hazardous combustion products : Carbon oxides
Ammonia
hydrogen chloride (HCl)
Nitrogen oxides (NO_x)

5.3 Advice for firefighters

- Special protective equipment for firefighters : In the case of fire, wear respiratory protective equipment independent of surrounding air and chemical protective suit.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

- Personal precautions : Wear personal protective equipment; see section 8.
Ensure adequate ventilation.

6.2 Environmental precautions

- Environmental precautions : Product or extinguishing water with product must not be allowed to enter soil, sewers or natural bodies of water.

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6.3 Methods and material for containment and cleaning up

Methods for cleaning up : Remove all sources of ignition.
Use mechanical handling equipment.
Avoid dust formation.
Keep in suitable, closed containers for disposal.

6.4 Reference to other sections

SECTION 7: Handling and storage

7.1 Precautions for safe handling

Advice on safe handling : Handle in accordance with good industrial hygiene and safety practice.
Provide appropriate exhaust ventilation at machinery.
Avoid dust formation.

Advice on protection against fire and explosion : Avoid formation of air-dust mixtures and keep away from ignition sources (sparks, flames, open flame) to prevent dust explosions.

Hygiene measures : Do not breathe dust. Avoid contact with skin, eyes and clothing. Take off clothing and shoes contaminated with product. Clean before reuse. Wash hands before breaks and immediately after handling the product. Do not eat, drink or smoke during use. Keep away from food, drink and animal feed-stuffs.

Dust explosion class : no data available

7.2 Conditions for safe storage, including any incompatibilities

Requirements for storage areas and containers : Keep containers tightly closed in a cool, well-ventilated place.

Further information on storage conditions : Protect against humid air and water.

Advice on common storage : Do not store together with strong bases, strong acids and oxidizing agents.

Further information on storage stability : The product is hygroscopic.

Packaging material : Suitable material: polyethylene, enamel, Teflon (R), glass
Unsuitable material: Metal

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7.3 Specific end use(s)

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Derived No Effect Level (DNEL) according to Regulation (EC) No. 1907/2006:

Substance name	End Use	Exposure routes	Potential health effects	Value
Guanidine hydrochloride	Indirect exposure to humans via the environment	Inhalation	Long-term systemic effects	0,87 mg/m ³
	Indirect exposure to humans via the environment	Oral	Long-term - systemic effects	0,5 mg/kg bw/day
	Worker	Inhalation	Long-term systemic effects	3,5 mg/m ³
	Worker	Inhalation	Acute systemic effects	10,5 mg/m ³
	Worker	dermal	Long-term systemic effects	1 mg/kg bw/day
	Worker	dermal	Local effects	
Remarks:	No values determined.			
	Worker	Eye contact	Local effects	
Remarks:	No values determined.			
	Consumers	Inhalation	Long-term systemic effects	0,87 mg/m ³
	Consumers	Inhalation	Acute systemic effects	
Remarks:	No values determined.			
	Consumers	dermal	Long-term systemic effects	0,5 mg/kg bw/day
	Consumers	dermal	Local effects	
Remarks:	No values determined.			
	Consumers	Oral	Long-term systemic effects	0,5 mg/kg bw/day
	Consumers	Oral	Acute systemic effects	
Remarks:	No values determined.			
	Consumers	Eye contact	Local effects	
Remarks:	No values determined.			

8.2 Exposure controls

Personal protective equipment

Eye protection : Safety glasses

Hand protection

Material : Nitrile rubber, Recommendation: Camatril 730
Break through time : 480 min
Glove thickness : 0,4 mm
Directive : DIN EN 374

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Manufacturer	:	Kächele-Cama Latex GmbH (KCL), Germany
Material	:	Chloroprene, Recommendation: Camapren 722
Break through time	:	480 min
Glove thickness	:	0,6 mm
Directive	:	DIN EN 374
Manufacturer	:	Kächele-Cama Latex GmbH (KCL), Germany
Skin and body protection	:	Protective clothing
Respiratory protection	:	Do not inhale gases, vapours, aerosols or dust - use respiratory protection equipment. Recommendation: Dust mask FFP3 or P3 particle filter

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

Appearance	:	solid
Colour	:	colourless
Odour	:	odourless
pH	:	4,8 (25 °C) Concentration: 200 g/l
Melting point/range	:	178 - 185 °C
Boiling point/boiling range	:	> 231 °C
Flash point	:	Not applicable
Flammability (solid, gas)	:	BZ 1 - does not ignite.
Burning number	:	Method: Combustibility test in accordance with VDI 2263 BZ 1 - does not ignite.
Density	:	1,345 g/cm ³ (20 °C)
Bulk density	:	ca. 800 kg/m ³
Solubility(ies)	:	
Water solubility	:	2150 g/l (20 °C) 2280 g/l (30 °C) 2950 g/l (50 °C)
Partition coefficient: n-octanol/water	:	log Pow: ca. -1,7 (20 °C)
Auto-ignition temperature	:	> 600 °C Ignition temperature for swirling (airborne) dust

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Decomposition temperature : > 360 °C
Ignition temperature for deposited dust
No burning at 360°C.
: ca. 231 °C
Method: DSC analysis
Exothermic decomposition

9.2 Other information

Sublimation point : ca. \geq 215 °C Decomposition
Molecular weight : 95,53 g/mol
Dust explosion class : no data available

SECTION 10: Stability and reactivity

10.1 Reactivity

|| See section 10.3

10.2 Chemical stability

No decomposition if stored and applied as directed.

10.3 Possibility of hazardous reactions

Hazardous reactions : No hazardous reactions are known if properly handled and stored.

10.4 Conditions to avoid

Conditions to avoid : > 180 - 230 °C
decomposition
Exothermic reaction at overheating.

10.5 Incompatible materials

Materials to avoid : Strong acids and strong bases
Strong oxidizing agents

10.6 Hazardous decomposition products

Hazardous decomposition products formed under fire conditions.
see section 5
Contact with strong alkalines liberates:
Ammonia

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity

Product:

Acute oral toxicity : Assessment: Harmful if swallowed.

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Acute inhalation toxicity : Assessment: Harmful if inhaled.

Components:

Guanidine hydrochloride:

Acute oral toxicity : LD50 (Rat, male): 907,1 mg/kg
Method: EPA Methode
Assessment: Harmful if swallowed.
Remarks: IUCLID

LD50 (rat, female): 773,6 mg/kg
Method: EPA Methode
Assessment: Harmful if swallowed.
Remarks: IUCLID

Acute inhalation toxicity : LC50 (Rat, male/female): 5,3 mg/l
Exposure time: 4 h
Method: OECD Test Guideline 403
Assessment: Harmful if inhaled.
Remarks: IUCLID

Skin corrosion/irritation

Product:

Assessment : Causes skin irritation.

Components:

Guanidine hydrochloride:

Species : Rabbit
Assessment : Causes skin irritation.
Method : US-EPA-method
Result : irritating
Remarks : IUCLID

Serious eye damage/eye irritation

Product:

Assessment : Causes serious eye irritation.

Components:

Guanidine hydrochloride:

Species : Rabbit
Assessment : Irritating to eyes.
Method : US-EPA-method
Result : irritating
Remarks : IUCLID

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Respiratory or skin sensitisation

Components:

Guanidine hydrochloride:

Test Type : Buehler Test
Species : guinea pig
Method : US-EPA-method
Result : not sensitizing
Remarks : IUCLID

Germ cell mutagenicity

Components:

Guanidine hydrochloride:

Genotoxicity in vitro : Test Type: Ames test
Test system: Salmonella typhimurium
Method: OECD Test Guideline 471
Result: negative
Remarks: IUCLID

Carcinogenicity

Components:

Guanidine hydrochloride:

Carcinogenicity - Assessment : no data available

Reproductive toxicity

Components:

Guanidine hydrochloride:

Effects on foetal development : Species: Rat
General Toxicity Maternal: NOAEL: 150 mg/kg body weight
Teratogenicity: NOAEL: 350 mg/kg body weight
Method: OECD Test Guideline 414
Remarks: IUCLID

STOT - single exposure

Components:

Guanidine hydrochloride:

Remarks : no data available

Repeated dose toxicity

Components:

Guanidine hydrochloride:

Species : Rat

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NOAEL : 100 mg/kg
Exposure time : 90-day
Subsequent observation period : 4 weeks
Method : OECD 408
Remarks : IUCLID

Aspiration toxicity

Components:

Guanidine hydrochloride:

No data available

Further information

Product:

||Remarks : No additional toxicological data are available.

SECTION 12: Ecological information

12.1 Toxicity

Components:

Guanidine hydrochloride:

Toxicity to fish : LC50 (Leuciscus idus): 1759 mg/l
Exposure time: 48 h
Method: DIN 38412 Teil 15
Remarks: IUCLID

Toxicity to microorganisms : EC 10 (Pseudomonas putida): ca. 7125 mg/l
Exposure time: 18 h
Remarks: IUCLID

12.2 Persistence and degradability

Components:

Guanidine hydrochloride:

Biodegradability : Method: OECD 301 C
Remarks: Not readily biodegradable.
Own study

12.3 Bioaccumulative potential

Product:

Bioaccumulation : Remarks: No bioaccumulation is to be expected (log Pow <= 4).

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Components:

Guanidine hydrochloride:

Partition coefficient: n-
octanol/water : log Pow: < -1,7 (20 °C)

12.4 Mobility in soil

no data available

12.5 Results of PBT and vPvB assessment

Product:

Assessment : Not a PBT, vPvB substance as per the criteria of the REACH Ordinance.

12.6 Other adverse effects

Product:

Additional ecological information : No further ecotoxicological data are available.

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product : Must be brought to an adequate waste treatment facility, in conformity with applicable waste disposal regulations.

Contaminated packaging : Packaging, that can not be reused after cleaning must be disposed or recycled in accordance with all federal, national and local regulations.

SECTION 14: Transport information

14.1 UN number

Not regulated as a dangerous good

14.2 UN proper shipping name

Not regulated as a dangerous good

14.3 Transport hazard class(es)

Not regulated as a dangerous good

14.4 Packing group

Remarks : Not classified as dangerous in the meaning of transport regulations.

ADR
Remarks : Not regulated as a dangerous good
: Not classified as dangerous in the meaning of transport regulations.

RID : Not regulated as a dangerous good

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Remarks : Not classified as dangerous in the meaning of transport regulations.

IMDG : Not regulated as a dangerous good
Remarks : Not classified as dangerous in the meaning of transport regulations.

IATA (Cargo) : Not regulated as a dangerous good
Remarks : Not classified as dangerous in the meaning of transport regulations.

IATA (Passenger) : Not regulated as a dangerous good

14.5 Environmental hazards

Not regulated as a dangerous good

14.6 Special precautions for user

Remarks : Not classified as dangerous in the meaning of transport regulations.

14.7 Transport in bulk according to Annex II of Marpol and the IBC Code

Not applicable for product as supplied.

SECTION 15: Regulatory information

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

15.2 Chemical safety assessment

A substance safety assessment was carried out for this product.

SECTION 16: Other information

Full text of other abbreviations

ADN - European Agreement concerning the International Carriage of Dangerous Goods by Inland Waterways; ADR - European Agreement concerning the International Carriage of Dangerous Goods by Road; AICS - Australian Inventory of Chemical Substances; ASTM - American Society for the Testing of Materials; bw - Body weight; CLP - Classification Labelling Packaging Regulation; Regulation (EC) No 1272/2008; CMR - Carcinogen, Mutagen or Reproductive Toxicant; DIN - Standard of the German Institute for Standardisation; DSL - Domestic Substances List (Canada); ECHA - European Chemicals Agency; EC-Number - European Community number; ECx - Concentration associated with x% response; ELx - Loading rate associated with x% response; EmS - Emergency Schedule; ENCS - Existing and New Chemical Substances (Japan); ErCx - Concentration associated with x% growth rate response; GHS - Globally Harmonized System; GLP - Good Laboratory Practice; IARC - International Agency for Research on Cancer; IATA - International Air Transport Association; IBC - International Code for the Construction and Equipment of Ships carrying Dangerous Chemicals in Bulk; IC50 - Half maximal inhibitory concentration; ICAO - International Civil Aviation Organization; IECSC - Inventory of Existing Chemical Substances in China; IMDG - International Maritime Dangerous Goods; IMO - International Maritime Organization; ISHL - Industrial Safety and Health Law (Japan); ISO - International Organisation for Standardization; KECI - Korea Existing Chemicals Inventory; LC50 - Lethal Concentration

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to 50 % of a test population; LD50 - Lethal Dose to 50% of a test population (Median Lethal Dose); MARPOL - International Convention for the Prevention of Pollution from Ships; n.o.s. - Not Otherwise Specified; NO(A)EC - No Observed (Adverse) Effect Concentration; NO(A)EL - No Observed (Adverse) Effect Level; NOELR - No Observable Effect Loading Rate; NZIoC - New Zealand Inventory of Chemicals; OECD - Organization for Economic Co-operation and Development; OPPTS - Office of Chemical Safety and Pollution Prevention; PBT - Persistent, Bioaccumulative and Toxic substance; PICCS - Philippines Inventory of Chemicals and Chemical Substances; (Q)SAR - (Quantitative) Structure Activity Relationship; REACH - Regulation (EC) No 1907/2006 of the European Parliament and of the Council concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals; RID - Regulations concerning the International Carriage of Dangerous Goods by Rail; SADT - Self-Accelerating Decomposition Temperature; SDS - Safety Data Sheet; SVHC - Substance of Very High Concern; TCSI - Taiwan Chemical Substance Inventory; TRGS - Technical Rule for Hazardous Substances; TSCA - Toxic Substances Control Act (United States); UN - United Nations; vPvB - Very Persistent and Very Bioaccumulative

Further information

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.

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Annex

Exposure Scenario

Number	Title
ES1	Worker (industrial) - manufacturing and processing
ES2	Worker (industrial) - Use as an Intermediate
ES3	Worker (industrial) - Formulation
ES4	Worker (industrial sites or sites with advanced health and safety standard) - Use as a processing aid
ES5	Worker (industrial) - Use as a reactive processing aid during electroplating processes

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ES1:

1.1. Title section

Structured Short Title	: Worker (industrial) - manufacturing and processing
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Environment		
CS1	Worker (industrial) - manufacturing and processing	ERC1
Worker		
CS2	Worker (industrial) - manufacturing and processing	PROC4
CS3	Worker (industrial) - manufacturing and processing	PROC8b
CS4	Worker (industrial) - manufacturing and processing	PROC9
CS5	Worker (industrial) - manufacturing and processing	PROC15

1.2. Conditions of use affecting exposure

1.2.1. Control of environmental exposure: Manufacture of substances (ERC1)

Product (article) characteristics	
Covers concentrations up to 100 %	
Physical form of product	: solid slightly dusty
Amount used, frequency and duration of use (or from service life)	
Annual site amount	: Trade secret
Daily amount per site	: Trade secret
Conditions and measures related to sewage treatment plant	
STP type	: Municipal STP
STP sludge treatment	: Controlled application of sewage sludge to agricultural soil
STP effluent	: 2000 m ³ /d
efficiency of sewage treatment plant	: 40,84 %
Conditions and measures related to treatment of waste (including article waste)	
Waste treatment	: See Section 13 of the Safety Data Sheet.

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Other conditions affecting environmental exposure

Receiving surface water flow : 18000 m³/d

Indoor or outdoor use : Indoor use

1.2.2. Control of worker exposure: Use in batch and other process (synthesis) where opportunity for exposure arises (PROC4)

Product (article) characteristics

Covers concentrations up to 100 %

Physical form of product : solid
slightly dusty

Amount used, frequency and duration of use (or from service life)

Annual site amount : Trade secret

Daily amount per site : Trade secret

Duration : duration of activity < 8 h

Technical and organisational conditions and measures

Local exhaust ventilation
Dermal - minimum efficiency of 0 %
Inhalation - minimum efficiency of 0 %

Conditions and measures related to personal protection, hygiene and health evaluation

Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.
Dermal - minimum efficiency of 90 %

For further specification, refer to section 8 of the SDS.

Other conditions affecting workers exposure

Body parts exposed : <= 480 cm²

Indoor or outdoor use : Indoor use.

Temperature : Covers use at ambient temperatures.

Ventilation rate per hour : 3

1.2.3. Control of worker exposure: Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at dedicated facilities (PROC8b)

Product (article) characteristics

Covers concentrations up to 100 %

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Physical form of product	: solid slightly dusty
Amount used, frequency and duration of use (or from service life)	
Annual site amount	: Trade secret
Daily amount per site	: Trade secret
Duration	: duration of activity < 8 h
Technical and organisational conditions and measures	
Local exhaust ventilation Dermal - minimum efficiency of 0 % Inhalation - minimum efficiency of 0 %	
Conditions and measures related to personal protection, hygiene and health evaluation	
Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training. Dermal - minimum efficiency of 95 % For further specification, refer to section 8 of the SDS.	
Other conditions affecting workers exposure	
Body parts exposed	: <= 960 cm ²
Indoor or outdoor use	: Indoor use.
Temperature	: Covers use at ambient temperatures.
Ventilation rate per hour	: 3
Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply	
Occupational Health and Safety Management System: Advanced	

1.2.4. Control of worker exposure: Transfer of substance or preparation into small containers (dedicated filling line, including weighing) (PROC9)

Product (article) characteristics	
Covers concentrations up to 100 %	
Physical form of product	: solid slightly dusty
Amount used, frequency and duration of use (or from service life)	
Annual site amount	: Trade secret
Daily amount per site	: Trade secret
Duration	: duration of activity < 8 h

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Technical and organisational conditions and measures	
Local exhaust ventilation Dermal - minimum efficiency of 0 % Inhalation - minimum efficiency of 0 %	
Conditions and measures related to personal protection, hygiene and health evaluation	
Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training. Dermal - minimum efficiency of 90 %	
Other conditions affecting workers exposure	
Body parts exposed	: <= 480 cm ²
Indoor or outdoor use	: Indoor use.
Temperature	: Covers use at ambient temperatures.
Ventilation rate per hour	: 3
Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply	
Occupational Health and Safety Management System: Advanced	

1.2.5. Control of worker exposure: Use as laboratory reagent (PROC15)

Product (article) characteristics	
Covers concentrations up to 100 %	
Physical form of product	: solid slightly dusty
Amount used, frequency and duration of use (or from service life)	
Annual site amount	: Trade secret
Daily amount per site	: Trade secret
Duration	: duration of activity < 8 h
Technical and organisational conditions and measures	
Local exhaust ventilation Dermal - minimum efficiency of 0 % Inhalation - minimum efficiency of 0 %	
Conditions and measures related to personal protection, hygiene and health evaluation	
Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training. Dermal - minimum efficiency of 80 % For further specification, refer to section 8 of the SDS.	

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Other conditions affecting workers exposure	
Body parts exposed	: <= 240 cm ²
Indoor or outdoor use	: Indoor use.
Temperature	: Covers use at ambient temperatures.
Ventilation rate per hour	: 3
Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply	
Occupational Health and Safety Management System: Advanced	

1.3. Exposure estimation and reference to its source

1.3.1. Environmental release and exposure: Manufacture of substances (ERC1)

Compartment	Exposure level	RCR
Secondary Poisoning - inhalative	0,0004972 mg/m ³ (EUSES)	< 0,1
Secondary poisoning - dermal	0,165 mg/kg bw/day (EUSES)	0,329
Secondary poisoning - combined routes		0,33

1.3.2. Worker exposure: Use in batch and other process (synthesis) where opportunity for exposure arises (PROC4)

Exposure route	Health effect	Exposure indicator	Exposure level	RCR
inhalative	systemic	long-term	0,5 mg/m ³ (ECETOC TRA worker V3)	0,143
inhalative	systemic	short-term	2 mg/m ³ (ECETOC TRA worker V3)	0,19
inhalative	local	long-term	(Qualitative approach)	
inhalative	local	short-term	(Qualitative approach)	
dermal	systemic	long-term	0,686 mg/kg bw/day (ECETOC TRA worker V3)	0,686
dermal	local	long-term	(Qualitative approach)	
dermal	local	short-term	(Qualitative approach)	

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combined routes	systemic	long-term		0,829
combined routes	systemic	short-term		0,19

1.3.3. Worker exposure: Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at dedicated facilities (PROC8b)

Exposure route	Health effect	Exposure indicator	Exposure level	RCR
inhalative	systemic	long-term	0,1 mg/m ³ (ECETOC TRA worker V3)	0,029
inhalative	systemic	short-term	0,4 mg/m ³ (ECETOC TRA worker V3)	0,038
inhalative	local	long-term	(Qualitative approach)	
inhalative	local	short-term	(Qualitative approach)	
dermal	systemic	long-term	0,686 mg/kg bw/day (ECETOC TRA worker V3)	0,686
dermal	local	long-term	(Qualitative approach)	
dermal	local	short-term	(Qualitative approach)	
combined routes	systemic	long-term		0,714
combined routes	systemic	short-term		0,038

1.3.4. Worker exposure: Transfer of substance or preparation into small containers (dedicated filling line, including weighing) (PROC9)

Exposure route	Health effect	Exposure indicator	Exposure level	RCR
inhalative	systemic	long-term	0,1 mg/m ³ (ECETOC TRA worker V3)	0,029
inhalative	systemic	short-term	0,4 mg/m ³ (ECETOC TRA worker V3)	0,038
inhalative	local	long-term	(Qualitative approach)	
inhalative	local	short-term	(Qualitative approach)	
dermal	systemic	long-term	0,686 mg/kg bw/day (ECETOC TRA worker V3)	0,686

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dermal	local	long-term	(Qualitative approach)	
dermal	local	short-term	(Qualitative approach)	
combined routes	systemic	long-term		0,715
combined routes	systemic	short-term		0,038

1.3.5. Worker exposure: Use as laboratory reagent (PROC15)

Exposure route	Health effect	Exposure indicator	Exposure level	RCR
inhalative	systemic	long-term	0,1 mg/m ³ (ECETOC TRA worker V3)	0,029
inhalative	systemic	short-term	0,4 mg/m ³ (ECETOC TRA worker V3)	0,038
inhalative	local	long-term	(Qualitative approach)	
inhalative	local	short-term	(Qualitative approach)	
dermal	systemic	long-term	0,068 mg/kg bw/day (ECETOC TRA worker V3)	0,068
dermal	local	long-term	(Qualitative approach)	
dermal	local	short-term	(Qualitative approach)	
combined routes	systemic	long-term		0,097
combined routes	systemic	short-term		0,038

1.4. Guidance to DU to evaluate whether he works inside the boundaries set by the ES

In addition to the displayed PROC all PROC could be regarded as safe uses that could be deduced from "PROC Inclusion Hierarchy" (CEFIC, 2011-07-13)

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.

If scaling reveals a condition of unsafe use (i.e., RCRs > 1), additional RMMs or a site-specific chemical safety assessment is required.

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ES2:

2.1. Title section

Structured Short Title	: Worker (industrial) - Use as an Intermediate
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Environment		
CS1	Worker (industrial) - Use as an Intermediate	ERC6a
Worker		
CS2	Worker (industrial) - Use as an Intermediate	PROC4
CS3	Worker (industrial) - Use as an Intermediate	PROC8b
CS4	Worker (industrial) - Use as an Intermediate	PROC9
CS5	Worker (industrial) - Use as an Intermediate	PROC15

2.2. Conditions of use affecting exposure

2.2.1. Control of environmental exposure: Industrial use resulting in manufacture of another substance (use of intermediates) (ERC6a)

Product (article) characteristics	
Covers concentrations up to 100 %	
Physical form of product	: solid slightly dusty
Amount used, frequency and duration of use (or from service life)	
Annual amount per site	: Trade secret
Daily amount per site	: Trade secret
Conditions and measures related to sewage treatment plant	
STP type	: Municipal STP
STP sludge treatment	: Controlled application of sewage sludge to agricultural soil
STP effluent	: 2000 m ³ /d
efficiency of sewage treatment plant	: 40,84 %
Conditions and measures related to treatment of waste (including article waste)	
Waste treatment	: See Section 13 of the Safety Data Sheet.

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Other conditions affecting environmental exposure	
Receiving surface water flow	: 18000 m ³ /d
Indoor or outdoor use	: Indoor use

2.2.2. Control of worker exposure: Use in batch and other process (synthesis) where opportunity for exposure arises (PROC4)

Product (article) characteristics	
Covers concentrations up to 100 %	
Physical form of product	: solid slightly dusty
Amount used, frequency and duration of use (or from service life)	
Annual site amount	: Trade secret
Daily amount per site	: Trade secret
Duration	: duration of activity < 8 h
Technical and organisational conditions and measures	
Local exhaust ventilation Dermal - minimum efficiency of 0 % Inhalation - minimum efficiency of 0 %	
Conditions and measures related to personal protection, hygiene and health evaluation	
Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training. Dermal - minimum efficiency of 90 % For further specification, refer to section 8 of the SDS.	
Other conditions affecting workers exposure	
Body parts exposed	: <= 480 cm ²
Indoor or outdoor use	: Indoor use.
Ventilation rate per hour	: 3
Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply	
Occupational Health and Safety Management System: Advanced	

2.2.3. Control of worker exposure: Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at dedicated facilities (PROC8b)

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Product (article) characteristics	
Covers concentrations up to 100 %	
Physical form of product	: solid slightly dusty
Amount used, frequency and duration of use (or from service life)	
Annual site amount	: Trade secret
Daily amount per site	: Trade secret
Duration	: duration of activity < 8 h
Technical and organisational conditions and measures	
Local exhaust ventilation Dermal - minimum efficiency of 0 % Inhalation - minimum efficiency of 0 %	
Conditions and measures related to personal protection, hygiene and health evaluation	
Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training. Dermal - minimum efficiency of 95 % For further specification, refer to section 8 of the SDS.	
Other conditions affecting workers exposure	
Body parts exposed	: <= 960 cm ²
Indoor or outdoor use	: Indoor use.
Temperature	: Covers use at ambient temperatures.
Ventilation rate per hour	: 3
Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply	
Occupational Health and Safety Management System: Advanced	

2.2.4. Control of worker exposure: Transfer of substance or preparation into small containers (dedicated filling line, including weighing) (PROC9)

Product (article) characteristics	
Covers concentrations up to 100 %	
Physical form of product	: solid slightly dusty
Amount used, frequency and duration of use (or from service life)	

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Annual site amount	:	Trade secret
Daily amount per site	:	Trade secret
Duration	:	duration of activity < 8 h
Technical and organisational conditions and measures		
Local exhaust ventilation Dermal - minimum efficiency of 0 %		
Conditions and measures related to personal protection, hygiene and health evaluation		
Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training. Dermal - minimum efficiency of 90 %		
Other conditions affecting workers exposure		
Body parts exposed	:	<= 480 cm ²
Indoor or outdoor use	:	Indoor use.
Ventilation rate per hour	:	3
Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply		
Occupational Health and Safety Management System: Advanced		

2.2.5. Control of worker exposure: Use as laboratory reagent (PROC15)

Product (article) characteristics		
Covers concentrations up to 100 %		
Physical form of product	:	solid slightly dusty
Amount used, frequency and duration of use (or from service life)		
Annual site amount	:	Trade secret
Daily amount per site	:	Trade secret
Duration	:	duration of activity < 8 h
Technical and organisational conditions and measures		
Local exhaust ventilation Dermal - minimum efficiency of 0 % Inhalation - minimum efficiency of 0 %		
Conditions and measures related to personal protection, hygiene and health evaluation		
Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training. Dermal - minimum efficiency of 80 %		

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Other conditions affecting workers exposure	
Body parts exposed	: <= 240 cm ²
Indoor or outdoor use	: Indoor use.
Temperature	: Covers use at ambient temperatures.
Ventilation rate per hour	: 3
Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply	
Occupational Health and Safety Management System: Advanced	

2.3. Exposure estimation and reference to its source

2.3.1. Environmental release and exposure: Industrial use resulting in manufacture of another substance (use of intermediates) (ERC6a)

Compartment	Exposure level	RCR
Secondary Poisoning - inhalative	0,0000110 mg/m ³ (EUSES)	< 0,01
Secondary poisoning - dermal	0,002 mg/kg bw/day (EUSES)	< 0,01
Secondary poisoning - combined routes		< 0,01

2.3.2. Worker exposure: Use in batch and other process (synthesis) where opportunity for exposure arises (PROC4)

Exposure route	Health effect	Exposure indicator	Exposure level	RCR
inhalative	systemic	long-term	0,5 mg/m ³ (ECETOC TRA worker V3)	0,143
inhalative	systemic	short-term	2 mg/m ³ (ECETOC TRA worker V3)	0,19
inhalative	local	long-term	(Qualitative approach)	
inhalative	local	short-term	(Qualitative approach)	
dermal	systemic	long-term	0,686 mg/kg bw/day (ECETOC TRA worker V3)	0,686
dermal	local	long-term	(Qualitative approach)	
dermal	local	short-term	(Qualitative approach)	

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combined routes	systemic	long-term		0,829
combined routes	systemic	short-term		0,19

2.3.3. Worker exposure: Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at dedicated facilities (PROC8b)

Exposure route	Health effect	Exposure indicator	Exposure level	RCR
inhalative	systemic	long-term	0,1 mg/m ³ (ECETOC TRA worker V3)	0,029
inhalative	systemic	short-term	0,4 mg/m ³ (ECETOC TRA worker V3)	0,038
inhalative	local	long-term	(Qualitative approach)	
inhalative	local	short-term	(Qualitative approach)	
dermal	systemic	long-term	0,686 mg/kg bw/day (ECETOC TRA worker V3)	0,686
dermal	local	long-term	(Qualitative approach)	
dermal	local	short-term	(Qualitative approach)	
combined routes	systemic	long-term		0,714
combined routes	systemic	short-term		0,038

2.3.4. Worker exposure: Transfer of substance or preparation into small containers (dedicated filling line, including weighing) (PROC9)

Exposure route	Health effect	Exposure indicator	Exposure level	RCR
inhalative	systemic	long-term	0,1 mg/m ³ (ECETOC TRA worker V3)	0,029
inhalative	systemic	short-term	0,4 mg/m ³ (ECETOC TRA worker V3)	0,038
inhalative	local	long-term	(Qualitative approach)	
inhalative	local	short-term	(Qualitative approach)	
dermal	systemic	long-term	0,686 mg/kg bw/day (ECETOC TRA worker V3)	0,686

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dermal	local	long-term	(Qualitative approach)	
dermal	local	short-term	(Qualitative approach)	
combined routes	systemic	long-term		0,715
combined routes	systemic	short-term		0,038

2.3.5. Worker exposure: Use as laboratory reagent (PROC15)

Exposure route	Health effect	Exposure indicator	Exposure level	RCR
inhalative	systemic	long-term	0,1 mg/m ³ (ECETOC TRA worker V3)	0,029
inhalative	systemic	short-term	0,4 mg/m ³ (ECETOC TRA worker V3)	0,038
inhalative	local	long-term	(Qualitative approach)	
inhalative	local	short-term	(Qualitative approach)	
dermal	systemic	long-term	0,068 mg/kg bw/day (ECETOC TRA worker V3)	0,068
dermal	local	long-term	(Qualitative approach)	
dermal	local	short-term	(Qualitative approach)	
combined routes	systemic	long-term		0,097
combined routes	systemic	short-term		0,038

2.4. Guidance to DU to evaluate whether he works inside the boundaries set by the ES

In addition to the displayed PROC all PROC could be regarded as safe uses that could be deduced from "PROC Inclusion Hierarchy" (CEFIC, 2011-07-13)

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.

If scaling reveals a condition of unsafe use (i.e., RCRs > 1), additional RMMs or a site-specific chemical safety assessment is required.

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ES3:

3.1. Title section

Structured Short Title	: Worker (industrial) - Formulation
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Environment		
CS1	Worker (industrial) - Formulation	ERC2
Worker		
CS2	Worker (industrial) - Formulation	PROC5
CS3	Worker (industrial) - Formulation	PROC8b
CS4	Worker (industrial) - Formulation	PROC14
CS5	Worker (industrial) - Formulation	PROC15

3.2. Conditions of use affecting exposure

3.2.1. Control of environmental exposure: Formulation of preparations (ERC2)

Product (article) characteristics	
Covers concentrations up to 100 %	
Physical form of product	: solid slightly dusty
Amount used, frequency and duration of use (or from service life)	
Annual amount per site	: Trade secret
Daily amount per site	: Trade secret
Conditions and measures related to sewage treatment plant	
STP type	: Municipal STP
STP sludge treatment	: Controlled application of sewage sludge to agricultural soil
STP effluent	: 2000 m ³ /d
efficiency of sewage treatment plant	: 100 %
Conditions and measures related to treatment of waste (including article waste)	
Waste treatment	: See Section 13 of the Safety Data Sheet.

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Other conditions affecting environmental exposure

Receiving surface water flow : 18000 m³/d

Indoor or outdoor use : Indoor use

3.2.2. Control of worker exposure: Mixing or blending in batch processes for formulation of preparations and articles (multistage and/ or significant contact) (PROC5)

Product (article) characteristics

Covers concentrations up to 100 %

Physical form of product : solid
slightly dusty

Amount used, frequency and duration of use (or from service life)

Annual site amount : Trade secret

Daily amount per site : Trade secret

Duration : duration of activity < 8 h

Technical and organisational conditions and measures

Local exhaust ventilation
Dermal - minimum efficiency of 0 %
Inhalation - minimum efficiency of 0 %

Conditions and measures related to personal protection, hygiene and health evaluation

Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.
Dermal - minimum efficiency of 95 %

For further specification, refer to section 8 of the SDS.

Other conditions affecting workers exposure

Body parts exposed : <= 480 cm²

Indoor or outdoor use : Indoor use.

Temperature : Covers use at ambient temperatures.

Ventilation rate per hour : 3

Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply

Occupational Health and Safety Management System: Advanced

3.2.3. Control of worker exposure: Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at dedicated facilities (PROC8b)

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Product (article) characteristics	
Covers concentrations up to 100 %	
Physical form of product	: solid slightly dusty
Amount used, frequency and duration of use (or from service life)	
Annual site amount	: Trade secret
Daily amount per site	: Trade secret
Duration	: duration of activity < 8 h
Technical and organisational conditions and measures	
Local exhaust ventilation Dermal - minimum efficiency of 0 % Inhalation - minimum efficiency of 0 %	
Conditions and measures related to personal protection, hygiene and health evaluation	
Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training. Dermal - minimum efficiency of 95 % For further specification, refer to section 8 of the SDS.	
Other conditions affecting workers exposure	
Body parts exposed	: <= 960 cm ²
Indoor or outdoor use	: Indoor use.
Ventilation rate per hour	: 3
Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply	
Occupational Health and Safety Management System: Advanced	

3.2.4. Control of worker exposure: Production of preparations or articles by tableting, compression, extrusion, pelletisation (PROC14)

Product (article) characteristics	
Covers concentrations up to 100 %	
Amount used, frequency and duration of use (or from service life)	
Annual site amount	: Trade secret
Daily amount per site	: Trade secret
Duration	: duration of activity < 8 h

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Technical and organisational conditions and measures
Local exhaust ventilation Dermal - minimum efficiency of 0 % Inhalation - minimum efficiency of 0 %
Conditions and measures related to personal protection, hygiene and health evaluation
Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training. Dermal - minimum efficiency of 80 % For further specification, refer to section 8 of the SDS.
Other conditions affecting workers exposure
Body parts exposed : <= 480 cm ²
Indoor or outdoor use : Indoor use.
Ventilation rate per hour : 3
Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply
Occupational Health and Safety Management System: Advanced

3.2.5. Control of worker exposure: Use as laboratory reagent (PROC15)

Product (article) characteristics
Covers concentrations up to 100 %
Physical form of product : solid slightly dusty
Amount used, frequency and duration of use (or from service life)
Annual site amount : Trade secret
Daily amount per site : Trade secret
Duration : duration of activity < 8 h
Technical and organisational conditions and measures
Local exhaust ventilation Dermal - minimum efficiency of 0 % Inhalation - minimum efficiency of 0 %
Conditions and measures related to personal protection, hygiene and health evaluation
Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training. Dermal - minimum efficiency of 80 %
Other conditions affecting workers exposure

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Body parts exposed	: <= 240 cm ²
Indoor or outdoor use	: Indoor use.
Ventilation rate per hour	: 3
Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply	
Occupational Health and Safety Management System: Advanced	

3.3. Exposure estimation and reference to its source

3.3.1. Environmental release and exposure: Formulation of preparations (ERC2)

Compartment	Exposure level	RCR
Secondary Poisoning - inhalative	0,002 mg/m ³ (EUSES)	< 0,01
Secondary poisoning - dermal	0,266 mg/kg bw/day (EUSES)	0,531
Secondary poisoning - combined routes		0,534

3.3.2. Worker exposure: Mixing or blending in batch processes for formulation of preparations and articles (multistage and/ or significant contact) (PROC5)

Exposure route	Health effect	Exposure indicator	Exposure level	RCR
inhalative	systemic	long-term	0,5 mg/m ³ (ECETOC TRA worker V3)	0,143
inhalative	systemic	short-term	2 mg/m ³ (ECETOC TRA worker V3)	0,19
inhalative	local	long-term	(Qualitative approach)	
inhalative	local	short-term	(Qualitative approach)	
dermal	systemic	long-term	0,686 mg/kg bw/day (ECETOC TRA worker V3)	0,686
dermal	local	long-term	(Qualitative approach)	
dermal	local	short-term	(Qualitative approach)	
combined routes	systemic	long-term		0,828
combined routes	systemic	short-term		0,19

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3.3.3. Worker exposure: Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at dedicated facilities (PROC8b)

Exposure route	Health effect	Exposure indicator	Exposure level	RCR
inhalative	systemic	long-term	0,1 mg/m ³ (ECETOC TRA worker V3)	0,029
inhalative	systemic	short-term	0,4 mg/m ³ (ECETOC TRA worker V3)	0,038
inhalative	local	long-term	(Qualitative approach)	
inhalative	local	short-term	(Qualitative approach)	
dermal	systemic	long-term	0,686 mg/kg bw/day (ECETOC TRA worker V3)	0,686
dermal	local	long-term	(Qualitative approach)	
dermal	local	short-term	(Qualitative approach)	
combined routes	systemic	long-term		0,714
combined routes	systemic	short-term		0,038

3.3.4. Worker exposure: Production of preparations or articles by tableting, compression, extrusion, pelletisation (PROC14)

Exposure route	Health effect	Exposure indicator	Exposure level	RCR
inhalative	systemic	long-term	0,1 mg/m ³ (ECETOC TRA worker V3)	0,029
inhalative	systemic	short-term	0,4 mg/m ³ (ECETOC TRA worker V3)	0,038
inhalative	local	long-term	(Qualitative approach)	
inhalative	local	short-term	(Qualitative approach)	
dermal	systemic	long-term	0,686 mg/kg bw/day (ECETOC TRA worker V3)	0,686
dermal	local	long-term	(Qualitative approach)	
dermal	local	short-term	(Qualitative approach)	

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combined routes	systemic	long-term		0,715
combined routes	systemic	short-term		0,038

3.3.5. Worker exposure: Use as laboratory reagent (PROC15)

Exposure route	Health effect	Exposure indicator	Exposure level	RCR
inhalative	systemic	long-term	0,1 mg/m ³ (ECETOC TRA worker V3)	0,029
inhalative	systemic	short-term	0,4 mg/m ³ (ECETOC TRA worker V3)	0,038
inhalative	local	long-term	(Qualitative approach)	
inhalative	local	short-term	(Qualitative approach)	
dermal	systemic	long-term	0,068 mg/kg bw/day (ECETOC TRA worker V3)	0,068
dermal	local	long-term	(Qualitative approach)	
dermal	local	short-term	(Qualitative approach)	
combined routes	systemic	long-term		0,097
combined routes	systemic	short-term		0,038

3.4. Guidance to DU to evaluate whether he works inside the boundaries set by the ES

In addition to the displayed PROC all PROC could be regarded as safe uses that could be deduced from "PROC Inclusion Hierarchy" (CEFIC, 2011-07-13)

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.

If scaling reveals a condition of unsafe use (i.e., RCRs > 1), additional RMMs or a site-specific chemical safety assessment is required.

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ES4:

4.1. Title section

Structured Short Title	: Worker (industrial sites or sites with advanced health and safety standard) - Use as a processing aid
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Environment

CS1	Worker (industrial sites or sites with advanced health and safety standard) - Use as a processing aid	ERC4
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Worker

CS2	Worker (industrial sites or sites with advanced health and safety standard) - Use as a processing aid	PROC3
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CS3	Worker (industrial sites or sites with advanced health and safety standard) - Use as a processing aid	PROC4
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CS4	Worker (industrial sites or sites with advanced health and safety standard) - Use as a processing aid	PROC8b
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CS5	Worker (industrial sites or sites with advanced health and safety standard) - Use as a processing aid	PROC9
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CS6	Worker (industrial sites or sites with advanced health and safety standard) - Use as a processing aid	PROC15
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4.2. Conditions of use affecting exposure

4.2.1. Control of environmental exposure: Industrial use of processing aids in processes and products, not becoming part of articles (ERC4)

Product (article) characteristics

Covers concentrations up to 100 %

Physical form of product : solid
slightly dusty

Amount used, frequency and duration of use (or from service life)

Annual amount per site : Trade secret

Daily amount per site : Trade secret

Conditions and measures related to sewage treatment plant

STP type : Municipal STP

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STP sludge treatment	:	Controlled application of sewage sludge to agricultural soil
STP effluent	:	2000 m ³ /d
efficiency of sewage treatment plant	:	40,84 %

Conditions and measures related to treatment of waste (including article waste)

Waste treatment	:	See Section 13 of the Safety Data Sheet.
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Other conditions affecting environmental exposure

Receiving surface water flow	:	18000 m ³ /d
Indoor or outdoor use	:	Indoor use

4.2.2. Control of worker exposure: Use in closed batch process (synthesis or formulation) (PROC3)

Product (article) characteristics	
Covers concentrations up to 100 %	
Physical form of product	: solid slightly dusty
Amount used, frequency and duration of use (or from service life)	
Annual site amount	: Trade secret
Daily amount per site	: Trade secret
Duration	: duration of activity < 8 h
Technical and organisational conditions and measures	
Local exhaust ventilation Dermal - minimum efficiency of 0 % Inhalation - minimum efficiency of 0 %	
Conditions and measures related to personal protection, hygiene and health evaluation	
Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training. Dermal - minimum efficiency of 80 % For further specification, refer to section 8 of the SDS.	
Other conditions affecting workers exposure	
Body parts exposed	: <= 240 cm ²
Indoor or outdoor use	: Indoor use.
Ventilation rate per hour	: 3

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Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply

Occupational Health and Safety Management System: Advanced

4.2.3. Control of worker exposure: Use in batch and other process (synthesis) where opportunity for exposure arises (PROC4)

Product (article) characteristics	
Covers concentrations up to 100 %	
Physical form of product	: solid slightly dusty
Amount used, frequency and duration of use (or from service life)	
Annual site amount	: Trade secret
Daily amount per site	: Trade secret
Duration	: duration of activity < 8 h
Technical and organisational conditions and measures	
Local exhaust ventilation Dermal - minimum efficiency of 0 % Inhalation - minimum efficiency of 0 %	
Conditions and measures related to personal protection, hygiene and health evaluation	
Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training. Dermal - minimum efficiency of 90 %	
For further specification, refer to section 8 of the SDS.	
Other conditions affecting workers exposure	
Body parts exposed	: <= 480 cm ²
Indoor or outdoor use	: Indoor use.
Temperature	: Covers use at ambient temperatures.
Ventilation rate per hour	: 3
Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply	
Occupational Health and Safety Management System: Advanced	

4.2.4. Control of worker exposure: Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at dedicated facilities (PROC8b)

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Product (article) characteristics	
Covers concentrations up to 100 %	
Physical form of product	: solid slightly dusty
Amount used, frequency and duration of use (or from service life)	
Annual site amount	: Trade secret
Daily amount per site	: Trade secret
Duration	: duration of activity < 8 h
Technical and organisational conditions and measures	
Local exhaust ventilation Dermal - minimum efficiency of 0 % Inhalation - minimum efficiency of 0 %	
Conditions and measures related to personal protection, hygiene and health evaluation	
Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training. Dermal - minimum efficiency of 95 %	
Other conditions affecting workers exposure	
Body parts exposed	: <= 960 cm ²
Indoor or outdoor use	: Indoor use.
Ventilation rate per hour	: 3
Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply	
Occupational Health and Safety Management System: Advanced	

4.2.5. Control of worker exposure: Transfer of substance or preparation into small containers (dedicated filling line, including weighing) (PROC9)

Product (article) characteristics	
Covers concentrations up to 100 %	
Physical form of product	: solid slightly dusty
Amount used, frequency and duration of use (or from service life)	
Annual site amount	: Trade secret
Daily amount per site	: Trade secret

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Duration	: duration of activity < 8 h
Technical and organisational conditions and measures	
Local exhaust ventilation Dermal - minimum efficiency of 0 % Inhalation - minimum efficiency of 0 %	
Conditions and measures related to personal protection, hygiene and health evaluation	
Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training. Dermal - minimum efficiency of 90 % For further specification, refer to section 8 of the SDS.	
Other conditions affecting workers exposure	
Body parts exposed	: <= 480 cm ²
Indoor or outdoor use	: Indoor use.
Ventilation rate per hour	: 3
Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply	
Occupational Health and Safety Management System: Advanced	

4.2.6. Control of worker exposure: Use as laboratory reagent (PROC15)

Product (article) characteristics	
Covers concentrations up to 100 %	
Physical form of product	: solid slightly dusty
Amount used, frequency and duration of use (or from service life)	
Annual site amount	: Trade secret
Daily amount per site	: Trade secret
Duration	: duration of activity < 8 h
Technical and organisational conditions and measures	
Local exhaust ventilation Dermal - minimum efficiency of 0 % Inhalation - minimum efficiency of 0 %	
Conditions and measures related to personal protection, hygiene and health evaluation	
Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training. Dermal - minimum efficiency of 80 % Inhalation - minimum efficiency of 0 %	

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Other conditions affecting workers exposure	
Body parts exposed	: <= 240 cm ²
Indoor or outdoor use	: Indoor use.
Ventilation rate per hour	: 3
Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply	
Occupational Health and Safety Management System: Advanced	

4.3. Exposure estimation and reference to its source

4.3.1. Environmental release and exposure: Industrial use of processing aids in processes and products, not becoming part of articles (ERC4)

Compartment	Exposure level	RCR
Secondary Poisoning - inhalative	0,000468 mg/m ³ (EUSES)	< 0,1
Secondary poisoning - dermal	0,05 mg/kg bw/day (EUSES)	0,1
Secondary poisoning - combined routes		0,101

4.3.2. Worker exposure: Use in closed batch process (synthesis or formulation) (PROC3)

Exposure route	Health effect	Exposure indicator	Exposure level	RCR
inhalative	systemic	long-term	0,1 mg/m ³ (ECETOC TRA worker V3)	0,029
inhalative	systemic	short-term	0,4 mg/m ³ (ECETOC TRA worker V3)	0,038
inhalative	local	long-term	(Qualitative approach)	
inhalative	local	short-term	(Qualitative approach)	
dermal	systemic	long-term	0,138 mg/kg bw/day (ECETOC TRA worker V3)	0,138
dermal	local	long-term	(Qualitative approach)	
dermal	local	short-term	(Qualitative approach)	
combined routes	systemic	long-term		0,167

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combined routes	systemic	short-term		0,038
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4.3.3. Worker exposure: Use in batch and other process (synthesis) where opportunity for exposure arises (PROC4)

Exposure route	Health effect	Exposure indicator	Exposure level	RCR
inhalative	systemic	long-term	0,5 mg/m ³ (ECETOC TRA worker V3)	0,143
inhalative	systemic	short-term	2 mg/m ³ (ECETOC TRA worker V3)	0,19
inhalative	local	long-term	(Qualitative approach)	
inhalative	local	short-term	(Qualitative approach)	
dermal	systemic	long-term	0,686 mg/kg bw/day (ECETOC TRA worker V3)	0,686
dermal	local	long-term	(Qualitative approach)	
dermal	local	short-term	(Qualitative approach)	
combined routes	systemic	long-term		0,829
combined routes	systemic	short-term		0,19

4.3.4. Worker exposure: Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at dedicated facilities (PROC8b)

Exposure route	Health effect	Exposure indicator	Exposure level	RCR
inhalative	systemic	long-term	0,1 mg/m ³ (ECETOC TRA worker V3)	0,029
inhalative	systemic	short-term	0,4 mg/m ³ (ECETOC TRA worker V3)	0,038
inhalative	local	long-term	(Qualitative approach)	
inhalative	local	short-term	(Qualitative approach)	
dermal	systemic	long-term	0,686 mg/kg bw/day (ECETOC TRA worker V3)	0,686
dermal	local	long-term	(Qualitative approach)	

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dermal	local	short-term	(Qualitative approach)	
combined routes	systemic	long-term		0,714
combined routes	systemic	short-term		0,038

4.3.5. Worker exposure: Transfer of substance or preparation into small containers (dedicated filling line, including weighing) (PROC9)

Exposure route	Health effect	Exposure indicator	Exposure level	RCR
inhalative	systemic	long-term	0,1 mg/m ³ (ECETOC TRA worker V3)	0,029
inhalative	systemic	short-term	0,4 mg/m ³ (ECETOC TRA worker V3)	0,038
inhalative	local	long-term	(Qualitative approach)	
inhalative	local	short-term	(Qualitative approach)	
dermal	systemic	long-term	0,686 mg/kg bw/day (ECETOC TRA worker V3)	0,686
dermal	local	long-term	(Qualitative approach)	
dermal	local	short-term	(Qualitative approach)	
combined routes	systemic	long-term		0,715
combined routes	systemic	short-term		0,038

4.3.6. Worker exposure: Use as laboratory reagent (PROC15)

Exposure route	Health effect	Exposure indicator	Exposure level	RCR
inhalative	systemic	long-term	0,1 mg/m ³ (ECETOC TRA worker V3)	0,029
inhalative	systemic	short-term	0,4 mg/m ³ (ECETOC TRA worker V3)	0,038
inhalative	local	long-term	(Qualitative approach)	
inhalative	local	short-term	(Qualitative approach)	
dermal	systemic	long-term	0,068 mg/kg	0,068

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			bw/day (ECETOC TRA worker V3)	
dermal	local	long-term	(Qualitative approach)	
dermal	local	short-term	(Qualitative approach)	
combined routes	systemic	long-term		0,097
combined routes	systemic	short-term		0,038

4.4. Guidance to DU to evaluate whether he works inside the boundaries set by the ES

In addition to the displayed PROC all PROC could be regarded as safe uses that could be deduced from "PROC Inclusion Hierarchy" (CEFIC, 2011-07-13)

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.

If scaling reveals a condition of unsafe use (i.e., RCRs > 1), additional RMMs or a site-specific chemical safety assessment is required.

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ES5:

5.1. Title section

Structured Short Title	: Worker (industrial) - Use as a reactive processing aid during electroplating processes
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Environment

CS1	Worker (industrial) - Use as a reactive processing aid during electroplating processes	ERC6b
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Worker

CS2	Worker (industrial) - Use as a reactive processing aid during electroplating processes	PROC13
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CS3	Worker (industrial) - Use as a reactive processing aid during electroplating processes	PROC8b
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CS4	Worker (industrial) - Use as a reactive processing aid during electroplating processes	PROC9
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5.2. Conditions of use affecting exposure

5.2.1. Control of environmental exposure: Industrial use of reactive processing aids (ERC6b)

Product (article) characteristics

Covers concentrations up to 100 %

Physical form of product : solid
slightly dusty

Amount used, frequency and duration of use (or from service life)

Annual amount per site : Trade secret

Daily amount per site : Trade secret

Conditions and measures related to sewage treatment plant

STP type : Municipal STP

STP sludge treatment : Controlled application of sewage sludge to agricultural soil

STP effluent : 2000 m³/d

efficiency of sewage treatment plant : 40,84 %

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Conditions and measures related to treatment of waste (including article waste)	
Waste treatment	: See Section 13 of the Safety Data Sheet.
Other conditions affecting environmental exposure	
Receiving surface water flow	: 18000 m ³ /d
Indoor or outdoor use	: Indoor use

5.2.2. Control of worker exposure: Treatment of articles by dipping and pouring (PROC13)

Product (article) characteristics	
Covers concentrations up to 100 %	
Physical form of product	: solid slightly dusty
Amount used, frequency and duration of use (or from service life)	
Annual site amount	: Trade secret
Daily amount per site	: Trade secret
Duration	: duration of activity < 8 h
Technical and organisational conditions and measures	
Local exhaust ventilation Dermal - minimum efficiency of 0 % Inhalation - minimum efficiency of 0 %	
Conditions and measures related to personal protection, hygiene and health evaluation	
Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training. Dermal - minimum efficiency of 95 %	
Other conditions affecting workers exposure	
Body parts exposed	: <= 480 cm ²
Indoor or outdoor use	: Indoor use.
Temperature	: Covers use at ambient temperatures.
Ventilation rate per hour	: 3
Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply	
Occupational Health and Safety Management System: Advanced	

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5.2.3. Control of worker exposure: Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at dedicated facilities (PROC8b)

Product (article) characteristics	
Covers concentrations up to 100 %	
Physical form of product	: solid slightly dusty
Amount used, frequency and duration of use (or from service life)	
Annual site amount	: Trade secret
Daily amount per site	: Trade secret
Duration	: duration of activity < 8 h
Technical and organisational conditions and measures	
Local exhaust ventilation Dermal - minimum efficiency of 0 % Inhalation - minimum efficiency of 0 %	
Conditions and measures related to personal protection, hygiene and health evaluation	
Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training. Dermal - minimum efficiency of 95 % For further specification, refer to section 8 of the SDS.	
Other conditions affecting workers exposure	
Body parts exposed	: <= 960 cm ²
Indoor or outdoor use	: Indoor use.
Temperature	: Covers use at ambient temperatures.
Ventilation rate per hour	: 3
Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply	
Occupational Health and Safety Management System: Advanced	

5.2.4. Control of worker exposure: Transfer of substance or preparation into small containers (dedicated filling line, including weighing) (PROC9)

Product (article) characteristics	
Covers concentrations up to 100 %	
Physical form of product	: solid slightly dusty

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Amount used, frequency and duration of use (or from service life)	
Annual site amount	: Trade secret
Daily amount per site	: Trade secret
Duration	: duration of activity < 8 h
Technical and organisational conditions and measures	
Local exhaust ventilation Dermal - minimum efficiency of 0 % Inhalation - minimum efficiency of 0 %	
Conditions and measures related to personal protection, hygiene and health evaluation	
Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training. Dermal - minimum efficiency of 90 % For further specification, refer to section 8 of the SDS.	
Other conditions affecting workers exposure	
Body parts exposed	: <= 480 cm ²
Indoor or outdoor use	: Indoor use.
Ventilation rate per hour	: 3
Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply	
Occupational Health and Safety Management System: Advanced	

5.3. Exposure estimation and reference to its source

5.3.1. Environmental release and exposure: Industrial use of reactive processing aids (ERC6b)

Compartment	Exposure level	RCR
Secondary Poisoning - inhalative	0,0000142 mg/m ³ (EUSES)	< 0,1
Secondary poisoning - dermal	0,003 mg/kg bw/day (EUSES)	< 0,1
Secondary poisoning - combined routes		< 0,1

5.3.2. Worker exposure: Treatment of articles by dipping and pouring (PROC13)

Exposure route	Health effect	Exposure indicator	Exposure level	RCR
inhalative	systemic	long-term	0,1 mg/m ³ (ECETOC TRA worker V3)	0,029

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inhalative	systemic	short-term	0,4 mg/m ³ (ECETOC TRA worker V3)	0,038
inhalative	local	long-term	(Qualitative ap- proach)	
inhalative	local	short-term	(Qualitative ap- proach)	
dermal	systemic	long-term	0,686 mg/kg bw/day (ECETOC TRA worker V3)	0,686
dermal	local	long-term	(Qualitative ap- proach)	
dermal	local	short-term	(Qualitative ap- proach)	
combined routes	systemic	long-term		0,714
combined routes	systemic	short-term		0,038

5.3.3. Worker exposure: Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at dedicated facilities (PROC8b)

Exposure route	Health effect	Exposure indica- tor	Exposure level	RCR
inhalative	systemic	long-term	0,1 mg/m ³ (ECETOC TRA worker V3)	0,029
inhalative	systemic	short-term	0,4 mg/m ³ (ECETOC TRA worker V3)	0,038
inhalative	local	long-term	(Qualitative ap- proach)	
inhalative	local	short-term	(Qualitative ap- proach)	
dermal	systemic	long-term	0,686 mg/kg bw/day (ECETOC TRA worker V3)	0,686
dermal	local	long-term	(Qualitative ap- proach)	
dermal	local	short-term	(Qualitative ap- proach)	
combined routes	systemic	long-term		0,714
combined routes	systemic	short-term		0,038

5.3.4. Worker exposure: Transfer of substance or preparation into small containers (dedicated filling line, including weighing) (PROC9)

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Exposure route	Health effect	Exposure indicator	Exposure level	RCR
inhalative	systemic	long-term	0,1 mg/m ³ (ECETOC TRA worker V3)	0,029
inhalative	systemic	short-term	0,4 mg/m ³ (ECETOC TRA worker V3)	0,038
inhalative	local	long-term	(Qualitative approach)	
inhalative	local	short-term	(Qualitative approach)	
dermal	systemic	long-term	0,686 mg/kg bw/day (ECETOC TRA worker V3)	0,686
dermal	local	long-term	(Qualitative approach)	
dermal	local	short-term	(Qualitative approach)	
combined routes	systemic	long-term		0,715
combined routes	systemic	short-term		0,038

5.4. Guidance to DU to evaluate whether he works inside the boundaries set by the ES

In addition to the displayed PROC all PROC could be regarded as safe uses that could be deduced from "PROC Inclusion Hierarchy" (CEFIC, 2011-07-13)

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. If scaling reveals a condition of unsafe use (i.e., RCRs > 1), additional RMMs or a site-specific chemical safety assessment is required.