

## Aniline

### SECTION 1: IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY/UNDERTAKING

#### 1.1 Product identifier

Chemical name:	Aniline
EC number:	200-539-3
CAS No.	62-53-3
Index No:	612-008-00-7
REACH registration number:	01-2119451454-41-0012
Chemical characterization:	Organic mono-constituent substance

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

##### Relevant Identified Uses:

Aniline is used as an intermediate product in the production of dyes, isocyanates, antioxidants, rubber chemicals, pharmaceuticals, photographic chemicals, herbicides and fungicides, among others. It is also used in products such as pH regulators, flocculants, precipitants and neutralisation agents. Industrial use of monomers for the production of thermoplastics.

For more information see the corresponding Exposure Scenario attached to this SDS.

Uses advised against: None

#### 1.3 Details of the supplier of the safety data sheet

Company:	BONDALTI CHEMICALS, SA Rua do Amoníaco Português, nº 10 Quinta da Indústria, Beduído 3860-680 Estarreja - Portugal
Telephone:	+351 234 810 300
Fax:	+351 234 810 361
Web page:	www.bondalti.com
Contact:	Maria José Alves
E-mail:	fds@bondalti.com

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### 1.4 Emergency telephone number

BONDALTI CHEMICALS, SA	
Telephone:	+351 234 810 300 (24 hours/day - 7 days/week)
Fax:	+351 234 810 361
National Emergency No.	112
SOS – Poisons Centre	In England and Wales: NHS 111 - dial 111 In Scotland: NHS 24 - dial 111 In North Ireland: Contact local GP or pharmacist during normal hours; In Republic of Ireland: 01 809 2166 United States of America: 1-800-222-1222.

## SECTION 2: HAZARDS IDENTIFICATION

### 2.1 Classification of the Substance or Mixture

#### Self-Classification of Aniline according to CLP regulation 1272/2008-criteria

Hazard Class	Hazard Category	Hazard Statements
Acute Toxicity - Oral	Acute Tox. 3	H301: Toxic if swallowed
Acute Toxicity - Dermal	Acute Tox. 3	H311: Toxic in contact with skin
Acute Toxicity - Inhalation	Acute Tox. 3	H331: Toxic by inhalation
Serious eye <b>damage</b> /eye irritation	Eye Dam. 1	H318: Causes serious eye damage
Skin <b>Sensitisation</b>	Skin Sens. <b>1B</b>	H317: May cause an allergic skin reaction
Germ cell mutagenicity	Muta 2	H341: Suspected of causing genetic defects Suspected of causing genetic defects
Carcinogenicity	Carc. 2	H351: Suspected of causing cancer
Specific target organ toxicity – Repeated Exposure	STOT RE 1	H372: Causes damage to the blood and hematopoietic system through prolonged or repeated exposure
Hazardous to the aquatic environment	Aquatic Acute 1	H400: Very toxic to aquatic life
<b>Hazardous to the aquatic environment (long-term)</b>	<b>Aquatic Chronic 1</b>	<b>H410: Very toxic to aquatic life with long lasting effects</b>

#### Justification for Self-Classification

The official classifications for skin sensitisation with Skin Sens. 1 was specified to Skin Sens. 1B (self classification) and for aquatic toxicity with acute toxic cat. 1 was complemented by chronic toxic cat. 1 (self classification) according to the criteria for classification in the 2nd ATP of the CLP regulation (EC) 1272/2008 (286/2011).

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### Additional information

Specific concentration limits:

Concentration in %	Classification
$C \geq 1 \%$	STOT RE 1
$0.2 \% \leq C < 1.0\%$	STOT RE 2
Factor M = 1	Acute and chronic through aquatic environment

### 2.2 Label elements

Regulation (EC) No 1272/2008

Hazard pictogram:



GHS05



GHS06



GHS08



GHS09

Signal word:

Danger

Hazard Statements:

H301: Toxic if swallowed  
H311: Toxic in contact with skin  
H317: May cause an allergic skin reaction  
H318: Causes serious eye damage  
H331: **Toxic if inhaled**  
H341: Suspected of causing genetic defects  
H351: Suspected of causing cancer  
H372: Causes damage to the blood and hematopoietic system through prolonged or repeated exposure  
H410: Very toxic to aquatic life with long lasting effects  
P273: Avoid release to the environment.  
P280: Wear protective gloves/protective clothing/eye protection/face protection  
P301+P310: IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician.  
P302+P352: IF ON SKIN: **Wash with plenty of soap and water**  
P304+P340: IF INHALED: Remove victim to fresh air and keep at rest in a position 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

Precautionary statements:

### 2.3 Other hazards

**The substance isn't classified as PBT and vPvB.**

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### SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS

#### 3.1 Substances

##### Hazardous substances

Chemical name	CAS No.	EC No.	REACH No.	Concentration [%]
Aniline	62 – 53 – 3	200 – 539 – 3	01-2119451454-41-0012	≥ 99.9% w/w

### SECTION 4: FIRST AID MEASURES

#### 4.1 Description of first aid measures

General advice:	Remove the victims from the danger zone without endangering your own safety. Remove contaminated or soaked clothing (including underwear and shoes) immediately.
If inhaled:	Bring accident victims out into the fresh air. If patient has difficulty in breathing, administer oxygen, keep the patient calm and warm. Call a physician immediately.
In case of skin contact:	After contact with the skin, wash immediately with plenty of soap and water. Apply protective bandage with sterilised gauze. Call a physician immediately.
In case of eye contact:	Hold the eyes open and rinse with preferably lukewarm water for asufficiently long period of time (at least 10 minutes). Contact an ophthalmologist
If swallowed:	If product is swallowed DO NOT induce the patient to vomit, medical advice is required. Make patient drink water and rinse out mouth several times (only if injured person is conscious).

#### First aider protection

Respiratory protection:	Protection mask with suitable filter (ABEK).
Hand protection:	- Wear protective gloves in accordance with EN 374-3 - Suitable material: Butyl rubber-IIR (≥ 0.5 mm); Fluorine rubber - FKM (≥ 0.4 mm)
Eye protection:	Wear chemical resistant goggles with side shields.

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

#### 4.2.1 Inhalation

Methaemoglobinaemia is the most relevant symptom resulting in cyanosis (bluish or purple colouration of the skin), after high acute exposure to aniline.

Dizziness, headaches, irregular heartbeat, convulsions, coma and death may also occur.

May cause asphyxia in enclosed, poorly ventilated or low altitude areas.

#### 4.2.2 Skin contact

It is easily absorbed through the skin and may cause systemic toxicity.

Skin irritation and redness.

#### 4.2.3. Eye contact

Severe irritation and permanent eye damage.

#### 4.2.4. Swallowing

Aniline is quickly absorbed from the gastrointestinal tract.

Swallowing can quickly lead to serious systemic toxicity; nausea and vomiting generally occur.

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

Antidote is Methylene Blue

## SECTION 5: FIREFIGHTING MEASURES

### 5.1 Extinguishing media:

Suitable extinguishing media:	Carbon dioxide (CO <sub>2</sub> ), foam, extinguishing powder; <b>in case of large fires, Water spray should be used.</b>
Unsuitable extinguishing media:	High volume water jet.

### 5.2 Special hazards arising from the substance or mixture

**Burning releases** carbon monoxide, carbon dioxide, oxides of nitrogen and traces of hydrogen cyanide. **In the event** of fire and/or explosion do not breathe **fumes**.

**Aniline****5.3 Advice for firefighters**

During fire-fighting use respirator with independent air-supply and airtight garment. Fight fire in early stages if safe to do so. Containers at risk from fire should be cooled with water and, if possible, removed from the danger area. Do not allow contaminated extinguishing water to enter the soil, ground-water or surface waters.

**SECTION 6: ACCIDENTAL RELEASE MEASURES****6.1 Personal precautions, protective equipment and emergency procedures****6.1.1 For non-emergency personnel**

- Use protective equipment.
- Keep away from sources of ignition.
- Ensure adequate ventilation/exhaust extraction.
- Keep unauthorized persons away.
- Move people to a safe area.

**6.1.2 For emergency responders**

- Wear suitable personal protective equipment (e.g.: chemical protective suit; goggles; protective footwear and gloves)
- Evacuate people to safety areas.
- Ventilate the area

**6.2 Environmental precautions**

- Do not flush into surface water or sanitary sewer system.
- If the product contaminates rivers, lakes or sewers, inform the authorities.

**6.3 Methods and material for containment and cleaning up**

- 6.3.1** - Contain the spill with protective barriers.
- Cover the sewer exits.

- 6.3.2** – Take up with absorbent for chemicals or, if necessary, with dry sand.
- Fill into labeled, sealable containers.
  - Also place used cleaning materials into closable receptacles.

- 6.3.3** - Never use water on spills of this product.

**Aniline****6.4 Reference to other sections**

- See sections 7 and 8 for protective measures.
- See section 13 on waste treatment.

**SECTION 7: HANDLING AND STORAGE**

The personal protective measures indicated below must be taken into consideration.

Contact with the skin and eyes and vapour inhalation must be avoided at all costs.

**7.1 Precautions for safe handling**

- Use the product in closed systems and with electrostatic discharge connection.
- Ensure proper ventilation and including at floor level.
- Make sure all pipelines, tanks and equipment are leakproof.
- Explosion protection required. Precautions should generally be taken against electrostatic charges according to the equipment used and the way the product is handled and packaged.
- Use only equipment and materials compatible with the product.
- Keep away from incompatible products.
- To avoid thermal decomposition, do not overheat.
- Preferably use a pump or gravity when transferring.

**7.2 Conditions for safe storage, including any incompatibilities**

- Keep container dry and tightly closed in a cool and well-ventilated place.
- Store the product in the original container.
- Keep the product in a well-ventilated place.
- Keep the product in a dry place.
- Keep the product in duly labelled containers.
- Keep containers closed.
- Keep the product away from incompatible products.
- Suitable materials: Iron and Steel

**7.3 Specific end use(s)**

See exposure scenario in this SDS.

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### SECTION 8: EXPOSURE CONTROL/PERSONAL PROTECTION

#### 8.1 Control parameters

##### 8.1.1 Components with workplace control parameters

Components	CAS-No.	Value	Control parameters	Legal basis
Aniline	62-53-3	2 ppm (7,6 mg/m <sup>3</sup> ) 1 ppm (4 mg/m <sup>3</sup> )	TWA TWA	ACGIH (US) EH40/2005 (UK)

##### 8.1.2 DNEL/PNEC value(s)

###### DNEL Values

Inhalation Systemic effects - Long-term: 7.7 mg/m<sup>3</sup>

Inhalation Systemic effects - Acute: 15.4 mg/m<sup>3</sup>

Dermal Systemic effects - Long-term: 2 mg/kg bw/day

Dermal Systemic effects - Acute: 4 mg/kg bw/day

###### PNEC value(s)

PNEC<sub>Aqua - freshwater</sub> = 1.2 µg/L

PNEC<sub>Aqua - Marinewater</sub> = 12 µg/L

PNEC<sub>Sediments(freshwater)</sub> = 0.153 mg/kg d.w.

PNEC<sub>Sediments(Marinewater)</sub> = 0.0153 mg/kg d.w.

PNEC<sub>microorganisms</sub> = 2 mg/L

PNEC<sub>plants</sub> = 6 µg/m<sup>3</sup>

PNEC<sub>soil</sub> = 33 µg/kg d.w.

#### 8.2 Exposure controls

##### 8.2.1 Appropriate engineering controls

- Ensure adequate ventilation.
- Apply the technical measures needed to meet to comply the occupational exposure limits.
- Organise work procedures so that workers are not exposed to the effects of the products.
- For technical protective measures to limit exposure see also "Handling and storage".

##### 8.2.2 Individual protection measures, such as personal protective equipment

Respiratory protection:	If vapors form, respirators must be used. Put on full-mask respirator with filter type ABEK. At higher concentrations or under uncertain conditions a respirator with independent air supply must be used.
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Hand protection:	<b>Suitable materials for safety gloves; DIN EN 374-3:</b> Butyl rubber - IIR: thickness $\geq 0.5$ mm; <b>breakthrough</b> time $\geq 480$ min. Fluorinated rubber - FKM: thickness $\geq 0.4$ mm; <b>breakthrough</b> time $\geq 480$ min. Recommendation: contaminated gloves <b>should</b> be disposed of. <b>Change gloves after every contact with aniline</b>
	<b>Unsuitable materials for safety gloves; DIN EN 374-3:</b> Natural rubber-NR: thickness $\geq 0.5$ mm Polychloroprene-CR: thickness $\geq 0.5$ mm Nitrile rubber-NBR ( $\geq 0.35$ mm) Polyvinyl chloride - PVC ( $\geq 0.5$ mm).
Eye protection:	Use eye/face protection.
Body and skin protection:	<b>Impervious protective clothing. On possible contact with the product (sampling, product leakage): full protection or chemical protection clothing.</b>
Hygiene measures:	<b>Careful attention to industrial and personal hygiene is essential. Keep away from foodstuffs, drinks and tobacco. Wash hands before breaks and at the end of workday. Keep working clothes separately. Change contaminated or soaked clothing immediately. If the suit becomes contaminated, first take a shower with the suit on.</b>
Protective measures:	Contact with the skin, the eyes and vapour inhalation must be avoided at all costs.

### 8.2.3 Environmental exposure controls

Discard waste in compliance with applicable regulations:

- 2014/955/EU: Commission Decision of 18 December 2014 amending Decision 2000/532/EC on the list of waste pursuant to Directive 2008/98/EC of the European Parliament and of the Council;
- Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on waste and repealing certain Directives and other amendments;
- Commission Regulation (EU) No 1357/2014 of 18 December 2014 - replacing Annex III to Directive 2008/98/EC of the European Parliament and of the Council on waste and repealing certain Directives

In the event of an accidental leak, see Section 6 of this SDS.

## SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

### 9.1 Information on basic physical and chemical properties

a) Appearance:	Oily liquid
b) Odour:	Sweet

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c) Odour threshold:	No data (*)
d) pH:	7.6 estimated
e) Melting point/freezing point:	-6.2°C
f) Initial boiling point and boiling range:	184.4°C at 1013hPa
g) Flash point:	76°C at 1013 hPa
h) Evaporation rate:	No data (*)
i) Flammability (solid, gas):	In accordance with section 1 of REACH Annex XI, the flammability is deduced from flash point. Substance is a combustible liquid.
j) Upper/lower flammability or explosivity limits:	Not applicable to liquids
k) Vapour pressure:	0.4 hPa at 20°C
l) Vapour density:	>1 at 20°C
m) Relative density:	1.022 at 20°C
n) Solubility(ies):	35 g/l at 20°C in water
o) Partition coefficient n-octanol/water:	Log Kow 0.91 at 25°C at pH 7.5
p) Auto-ignition temperature:	630°C
q) Decomposition temperature:	No data (*)
r) Viscosity:	4.35 mPa.s at 20°C
s) Explosive properties:	Non explosive
t) Oxidising properties	Non oxidising

(\*) No reliable data source for this data

### 9.2 Other information

Dissociation constant	4.22 pKa at 25°C
Log Koc in water	< 3

## SECTION 10: STABILITY AND REACTIVITY

### 10.1 Reactivity

- No dangerous reaction in normal conditions of use.

### 10.2 Chemical stability

- Stable in recommended storage conditions.  
- See Handling and Storage, Section 7.

**Aniline****10.3 Possibility of hazardous reactions**

- No hazardous reactions when used suitably.
- High temperatures may cause dangerous polymerisation.
- Polymerisation may be catalysed by: Peroxides, Strong Acids and Strong Bases.

**10.4 Conditions to avoid**

- Exposure to high temperatures may cause the product to decompose.
- Avoid direct sunlight.

**10.5 Incompatible materials**

- Avoid contact with oxidising materials.
- Avoid contact with strong acids, strong bases and strong oxidants.
- Avoid accidental contact with peroxides.
- Keep away from acids and oxidising agents

**10.6 Hazardous decomposition products**

No hazardous decomposition product when handled and stored correctly.

The decomposition products depend on temperature, air supply and the presence of other materials. Processing may liberate fumes and other decomposition products. Polymer fragments may be liberated at fusion temperatures. Fumes may be irritants. Decomposition products may include carbon monoxide, carbon dioxide and nitrogen oxides.

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### SECTION 11: TOXICOLOGICAL INFORMATION

#### 11.1 Information on toxicological effects

Aniline is quickly and easily absorbed in animals after oral, dermal and inhalation exposure. Dermal absorption of aniline applied topically in humans was calculated up to 24%. Aniline caused only a slight topical reaction on rabbit skin in skin corrosion and irritation tests.

After absorption, aniline is distributed throughout the body. The highest concentration is found in the blood, especially in red blood cells, followed by the plasma, spleen, kidneys, lungs, heart, brain and adipose tissue. In mice, the half-life of Aniline clearance from the blood varied from 16 minutes to 3.5 hours, depending on the applied dose. Aniline can cross the placental barrier in mice, with similar blood concentrations and half-life (1.5 h) for clearance from the blood in the maternal and foetal blood plasma. Aniline metabolism is similar in humans and animals, with urinary excretion being the main elimination pathway. Various studies have shown that Aniline is metabolised prior to elimination. Aniline is metabolised in the liver by N-acetylation hydroxylation and N, as well as aromatic-ring hydroxylation.

Rapid MetHb formation as a response to oral exposure to Aniline was observed in human volunteers who received a single bolus dose. Maximum levels of MetHb were detected 2 hours after exposure, but normal levels at 3 hours. No statistically significant increase in MetHb formation (up to 1.8%) was observed after ingestion of 15 mg Aniline. After a single bolus dose of 35 mg Aniline, a 3.7% increase in MetHb concentration was observed.

<i><b>Hazard Class</b></i>	<i><b>Dose Descriptor</b></i>	<i><b>Method/Reference</b></i>
Acute toxicity oral:	Approx. LD <sub>50</sub> : 102 mg/kg bw (Cat male/female)	BASF AG (1970)
	LD <sub>50</sub> : 442 mg/kg bw Rat (Albino rats male)	Bio-Fax Industrial Bio-Teste Laboratorios, Inc. (1969a)
	NOAEL: 35 mg Anilinea/man Formation of Metahemoglobina (MetHb)	Jenkins FP, Robinson JA, Gellatly JB, Salmond GW. (1972)
Acute toxicity dermal:	LD <sub>50</sub> : 254 mg/kg bw (cat)	Kondrashow (1969)
	LD <sub>50</sub> : 670 mg/kg bw (rat)	Czajkowska, 1977, cited in Greim H (1992)
	NOAEL: 35 mg Anilinea/man Formation of Metahemoglobina (MetHb)	Jenkins FP, Robinson JA, Gellatly JB, Salmond GW. (1972)
Acute inhalation toxicity:	LC <sub>50</sub> (4 h): 839 ppm (839 ppm = 3.27 mg/L, head only exposure to vapour/ aerosol) (rat)	Du Pont de Nemours and Co. (1982)

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Hazard Class	Dose Descriptor	Method/Reference
Skin irritation:	Rabbit (Vienna White) Erythema score: 1; animal #1; 24 h; totally reversible within: 5 days 1; animal #2; 24 h; totally reversible within: 2 days 1; animal #1; 48 h; totally reversible within: 5 days  Oedema score: 0; average; 24 h - 144 h	BASF (1972)
Skin corrosion:	Human data on local corrosivity are not available	Chemical Safety Report
Serious eye lesions/irritation	Rabbit (Vienna White) <u>Cornea score:</u> 2.3; animal #1 (mean); 24 - 72 h not reversible (observation period: 8 days) 2; animal #2 (mean); 24 - 72 h not reversible (observation period: 8 days) <u>Iris score:</u> 0; average; 24 h to 72 h <u>Conjunctivae score:</u> 1; animal #1; 24 - 72 h; not reversible (observation period: 8 days) 1; animal #2; 24 - 72 h; not reversible (observation period: 8 days) <u>Chemosis score:</u> 1.3; animal #1; 24 - 72 h; not reversible (observation period: 8 days) 1; animal #2; 24 - 72 h; not reversible (observation period: 8 days)	BASF (1972)
Skin sensitisation:	It appears probable on the available animal data that aniline is a weak allergen.	Chemical Safety Report
Germ cell mutagenicity <i>In vitro</i>	<i>S. typhimurium</i> (bacterial reverse mutation assay) (Ames test) (gene mutation): negative for <i>S. typhimurium</i> TA 98, TA 100, TA 1535, TA 1537, TA 1538, <i>E. coli</i> WP2 uvr A (all strains/cell types tested); met. act.: with and without; cytotoxicity: no (no cytotoxicity observed up to 333.3 µg/plate)	Dunkel VC, Zeiger E, Brusick D, McCoy E, McGregor D, Mortelmans K (1984)
<i>In vivo</i>	micronucleus assay (chromosome aberration) rat (PVG) male	CTL (2002) Bomhard EM (2003)

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<i>Hazard Class</i>	<i>Dose Descriptor</i>	<i>Method/Reference</i>
	Genotoxicity: positive in the sample after 24 h; <b>toxicity: yes</b>	
Carcinogenicity (Oral):	Oral dose <b>level</b> : (carcinogenicity): 72 mg Aniline/kg bw/d ( <b>Rat Fischer 344 male</b> ) ( <b>splenic</b> tumours, mainly stromal sarcomas and hemangiosarcomas);  LOAEL (toxicity): 7 mg Aniline/kg bw/d ( <b>Rat Fischer 344 male/female</b> )	CIIT (1982)
Carcinogenicity (Dermal):	No data available	Chemical Safety Report
Carcinogenicity (Inhalation):	No data available	Chemical Safety Report
Oral Reproductive toxicity  <b>Teratogenicity/Development</b>	LOAEL (maternal toxicity): 7 mg Aniline/kg bw/d ( <b>rat Fischer 344</b> ) ( <b>dose dependently increased spleen weight</b> )  NOAEL (foetal effects): 10 mg Aniline/kg bw/d ( <b>rat Fischer 344</b> ) ( <b>transient postnatal hematotoxic effects</b> )  NOAEL (teratogenicity): 72 mg Aniline/kg bw/d ( <b>rat Fischer 344</b> )	Price CJ, Tyl RW, Marks TA, Paschke LL, Ledoux TA, Reel JR (1985)
STO-SE	No data available	Chemical Safety Report
STO-RE	LOAEL: 4 mg aniline/kg bw/d acutal ingested (rat male) (erythrotoxicity, effects in the spleen (vascular congestion))  NOAEC: 9.2 mg/m <sup>3</sup> air (analytical) rat inhalation (Wistar) male	BASF (2001)  Pauluhn J (2004a)
Aspiration Hazard	No data available	Chemical Safety Report

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### SECTION 12: ECOLOGICAL INFORMATION

#### 12.1 Toxicity

##### Information on environmental effects

Aniline is very toxic to aquatic life with long lasting effects.

Hazard Class	Dose Descriptor	Method/Reference
Fish		
Acute (Short-term)	Harmful to fish <i>Oncorhynchus mykiss</i> : LC50 (96h) = 10.6 mg/L, (freshwater, flow-through)	Abram, F.S.H. and Sims, I.R. (1982)
Long-Term	<i>Pimephales promelas</i> : NOEC (32 d): 0.39 mg/L based on: wet weight and total length	Russom CL and Broderius SJ (1991)
Aquatic invertebrates/ <i>Daphnia magna</i>		
Acute (Short-term)	very toxic to aquatic invertebrates EC <sub>50</sub> (48h) = 0.16 mg/L test mat. (meas. (not specified)) based on: mobility	Pedersen F, Bjornestad E, Vulpius T and Rasmussen HB (1998)
Long-Term	NOEC (21d) = 0.016 mg/L test mat. (meas. (not specified)) based on: reproduction  NOEC (21 d): 24.6 µg/L test mat. (meas. (not specified)) based on: survival and reproduction  NOEC (21 d): 0.004 mg/L test mat. (meas. (not specified)) based on: mortality, reproduction rate, appearance of first offspring	Hutton (1989)  Gersich, F.M. & Milazzo, D.P. (1988)  Kuehn R, Pattard M, Pernak KD and Winter A (1989)
Algae and Aquatic Plants:	<i>Chlorella pyrenoidosa</i> (Algae): EC <sub>50</sub> (72h) = 175 mg/L test mat. (nominal) based on: growth rate	Ramos et al. (1999) OECD Guideline 201 (Alga, Growth Inhibition Test) 1984
Aquatic micro-organisms:	Activated sludge, industrial: NOEC (2h) = 2mg/L (nitrification inhibition)	Müller G. (2000)  ISO DIS 9509 (Method for Assessing the Inhibition of Nitrification of Activated Sludge Microorganisms by Chemicals and Waste Waters)

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Hazard Class	Dose Descriptor	Method/Reference
Terrestrial plants:	<i>Brassica pekinensis</i> NOEC (14d): 0.3 µg/m <sup>3</sup> based on: seedling emergence  <i>Lactuca sativa</i> EC <sub>50</sub> (14d): 33 mg/kg soil d.w. test mat. (nominal) based on: growth	BASF AG (2002)  Hulzebos EM, Adema DMM, Dirven-Van Breemen EM, Henzen L, van Dis WA (1993)
Sediment organisms	<i>Lumbriculus variegatus</i> : EC <sub>10</sub> = 15.3 mg/kg d.w. (survival, measured concentration)  NOEC (28 d): 46.5 mg/kg sediment d.w. test mat. (meas. (non-specified) based on: mortality	Egeler P and Nésa C (2002b)

### 12.2 Persistence and degradability

**Biodegradability:** Aniline is readily biodegradable (according to OECD criteria)

**Degradation (abiotic):** After evaporation or exposure to the air, the product will be rapidly degraded by photochemical processes.

Available studies show that Aniline is photolytically degraded within about 4 to 11 h under spring or summer conditions in the top layer of surface waters.

### 12.3 Bioaccumulative potential

Aniline has a bioconcentration factor in freshwater (BCF) fish of 2.6. This result complies with measured log K<sub>ow</sub> of 0.9. The result shows no indication of a potential bioaccumulation in organisms.

Aniline does not accumulate in aquatic/sediment organisms.

### 12.4 Mobility in soil

Adsorption measurements on soil and sewage sludge revealed moderate adsorption properties of aniline. Adsorption to solid soil phase is possible. The empirically determined K<sub>oc</sub>-value of 410 l/kg (log K<sub>oc</sub> of 2.6) is used, describing the adsorption potential of aniline.

### 12.5 Results of PBT and vPvB assessment

This substance does not meet the specific criteria detailed in Annex XIII for persistence and bioaccumulation.



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### 12.6 Other adverse effects

No data are available.

## SECTION 13: DISPOSAL CONSIDERATIONS

### 13.1 Waste treatment methods

#### Waste disposal procedures:

- Organic compound waste can be absorbed with specific absorbent material.
- EWC Code 07 01 99(\*) – Waste with no other specifications

#### Packaging treatment:

- Recycling of packaging is preferable to elimination.
- It is not advisable to discharge aniline waste through wastewater.
- EWC Code 15 01 10(\*) – Packaging containing / contaminated by waste from hazardous substances. The waste from this product must be treated as hazardous and in accordance with current legislation.

#### Applicable regulations:

- 2014/955/EU: Commission Decision of 18 December 2014 amending Decision 2000/532/EC on the list of waste pursuant to Directive 2008/98/EC of the European Parliament and of the Council;
- Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on waste and repealing certain Directives and other amendments;
- Commission Regulation (EU) No 1357/2014 of 18 December 2014 - replacing Annex III to Directive 2008/98/EC of the European Parliament and of the Council on waste and repealing certain Directives

## SECTION 14: TRANSPORT INFORMATION

	ADR	IATA	IMDG	RID
14.1 UN number:	1547	1547	1547	1547
14.2 UN proper shipping name:	Aniline	Aniline	Aniline	Aniline
14.3 Transport hazard class(es):	6.1	6.1	6.1	6.1
Labels:	6.1	Toxic	Toxic	6.1
Packing Instruction (cargo aircraft):	P001 IBC02		P001 IBC02	
Packing Instruction (cargo aircraft):		662/Max Liq Qty/Pkg: 60 L		

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Packing Instruction (cargo passenger):		654/Max Liq Qty/Pkg: 5 L		
Packing Instruction (LQ):		Y641/Max. Liq Qty/Pkg: 1 L (inner 100ml)		
Packing Instruction (EQ):				
14.4 Packing group:	II	II	II	II
14.5 Environmentally hazardous:	Yes	Yes	Yes	Yes
14.6 Special precautions for user:				
Tunnel restriction code:	(D/E)			
EmS:			F-A; S-A	
HI:	60			60
14.7 Transport in Bulk according to Annex II of Marpol and the IBC Code:				
Pollution Category:	Y			
Hazards:	S/P			
Ship Type:	2			

## SECTION 15: REGULATORY INFORMATION

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

This safety sheet was made taking into consideration the following legislation:

- Regulation (EC) No 1907/2006 of the European Parliament and of the Council of 18 December 2006 concerning the Registration, Evaluation, Authorization and Restriction of Chemicals (REACH), establishing a European Chemicals Agency, amending Directive 1999/45/EC and repealing Council Regulation (EEC) No 793/93 and Commission Regulation (EC) No 1488/94 as well as Council Directive 76/769/EEC and Commission Directives 91/155/EEC, 93/67/EEC, 93/105/EC and 2000/21/EC and other amendments;
- Regulation (EC) No. 1272/2008 of the European Parliament and of the Council of 16 December 2008 on classification, labelling and packaging of substances and mixtures, amending and repealing Directives 67/548/EEC and 1999/45/EC, and amending Regulation (EC) No 1907/2006 and other amendments;
- Council Directive 98/24/EC of 7 April 1998 on the protection of the health and safety of workers from the risks related to chemical agents at work (fourteenth individual Directive within the meaning of Article 16(1) of Directive 89/391/EEC) and other amendments;
- 2014/955/EU: Commission Decision of 18 December 2014 amending Decision 2000/532/EC on the list of waste pursuant to Directive 2008/98/EC of the European Parliament and of the Council;
- Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on waste and repealing certain Directives;

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- Commission Regulation (EU) No 1357/2014 of 18 December 2014 - replacing Annex III to Directive 2008/98/EC of the European Parliament and of the Council on waste and repealing certain Directives;
- Directive 2008/68/EC of the European Parliament and of the Council of 24 September 2008, on the inland transport of dangerous goods (ADR; RID and ADN) and other amendments;
- Directive 2012/18/EU of the European Parliament and of the Council of 4 July 2012 on the control of major-accident hazards involving dangerous substances, amending and subsequently repealing Council Directive 96/82/EC.
- [ACGIH 2005: Guide to Occupational Exposure Values;](#)

### 15.2 Chemical safety assessment

A chemical safety report was made.

## SECTION 16: OTHER INFORMATION

### General:

This information is to our best present knowledge, correct and complete and is given in good faith. The user shall ensure that the information is complete and appropriate for the uses given in the text. Other specific uses of the product not mentioned in the text remain the user's own responsibility.

### Recommendations for occupational training:

Provide the operators with suitable information, instruction and training on the product.

**Changes:** [Changes are in blue text.](#)

DATE	REVISION	CHANGES MADE	
30-04-2019	14	Section 1.2.	Section 9
		Section 2	Sections 10.3 and 10.6
		Section 4.1	Section 11
		Section 5	Section 12
		Section 6.1	Section 13
		Section 6.3.2	Section 14
		Sections 7.1 and 7.2	Section 15
		Section 8.1.2	Section 16
		Section 8.2	Exposure scenario

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### Abbreviations mentioned on the Sheet:

ACGIH – American Conference of Governmental Industrial Hygienists  
Acute Tox. 3 - Acute dermal toxicity, category 3  
Acute Tox. 3 - Acute oral toxicity, category 3  
Acute Tox. 3 - Acute toxicity when inhaled, category 3  
ADR – European Agreement concerning the International Carriage of Dangerous Goods by Road  
Aquatic Acute 1 - Acute toxicity in aquatic environment, category 1  
[Aquatic Chronic 1 – Chronic toxicity in aquatic environment, category 1](#)  
bw – body weight  
[BCF - Bioconcentration factor](#)  
Carc. 2 - Agents possibly carcinogenic to humans, category 2  
CAS No. – World authority for chemical information  
[d.w. – dry weight](#)  
DNEL – “Derived Non Effect Concentration”  
EC No. – European Community  
EC<sub>50</sub> – Half of maximum effective concentration  
[EQ – Excepted Quantities](#)  
ERC - Environmental Release Category  
ES - Exposure Scenario  
EWC - European Waste Catalogue  
Eye Dam. 1 - Irreversible eye damage, category 1  
IATA – “International Air Transport Association”  
IMDG – “International Maritime Dangerous Goods”  
LC<sub>50</sub> – Median Lethal Concentration  
[LD<sub>50</sub> – Lethal Dose 50%](#)  
LEV - Low exposure level  
[LOAEL – Lowest-observed-adverse-effect level](#)  
LQ – Limited Quantities  
m/m: - Mass concentration  
Muta 2 - Germ cell mutagenicity, category 2  
[NOAEC - No-observed-adverse-effect concentration](#)  
[NOAEL – No-observed-adverse-effect level](#)  
[NOEC - No-observed-effect concentration](#)  
PBT - Persistent, bioaccumulative and toxic.  
PC - Product Category  
PNEC – “Predicted Non Effect Concentration”  
PROC - Process Category  
REACH - Registration, Evaluation, Authorisation and Restriction of Chemicals  
RID – “International Rule for Transport of Dangerous Substances by Railway”  
[RMM – Risk Management Measures](#)  
SDS: - Safety Data Sheet  
Skin Sens. 1 - Skin Sensitivity, category 1  
STEL: - Short-term exposure limit

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STOT RE 1 - Specific target organ toxicity – Repeated Exposure, Category 1

STOT RE 2 - Specific target organ toxicity – Repeated Exposure, Category 2

SU - Sector of Use

TWA - Time Weighted Average (8 hours)

UNO: – United Nations Organisation

vPvB - Very persistent and very bioaccumulative

WWTP: - Wastewater Treatment Plant

### References:

CHEMICAL SAFETY REPORT - V4, 2016-01-27

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### Annex 1

#### Exposure Scenario 1 – Manufacturer or use of Aniline

Section 1	Title: Exposure scenario
Title	<b>Manufacturer or use of Aniline</b>
Sector of Application	SU3-Industrial uses: Uses of substances as such or in preparations at industrial sites SU8-Manufacture of bulk, large scale chemicals (including petroleum products) SU9 - Manufacture of fine chemicals
Process Categories	PROC1-Closed process with no likelihood of exposure PROC2-Closed, continuous process with occasional controlled exposure (e.g. sampling) PROC3-Closed batch process (synthesis or formulation) PROC4-Use in batch process (synthesis) where opportunity for exposure arises PROC8b-Transfer from or to vessels or large containers at dedicated facilities PROC9-Transfer of substance into small containers (dedicated filling line, including weighing) PROC15-Use as laboratory agent
Product category	PC19 - Intermediate PC20 - Products such as ph-regulators, flocculants, precipitants, neutralisation agents
Article Category	n/a
Environmental Release Category	ERC1-Manufacture of substances ERC6a-Industrial use resulting in manufacture of another substance (use of intermediates) ERC 6c -Industrial use of monomers for polymerization
Specific Environmental Release Category	n/a
Processes, tasks, activities covered	Covers the manufacture and use of Aniline in closed processes where exposure to Aniline is controlled or where exposure to Aniline may occur (inhalation or skin absorption): sampling, maintenance or equipment breakage. Covers other processes (uses) of Aniline to make a number of different products such as MDA, rubber chemicals, dyes and pesticides during which <u>Aniline is mainly contained</u> but in which exposure may occur during sampling, maintenance or equipment breakage. Covers the same process (use) of Aniline in batch or other processes where, due to the nature of the process, there is a chance of exposure to aniline, <u>but which is controlled by operating conditions or risk management measures.</u> Covers the transfer of Aniline through (loading/unloading) of/to small or large containers at dedicated facilities, with exposure to <u>Aniline controlled by operating conditions or risk management measures.</u> Covers the use of Aniline as a laboratory reagent in small-scale laboratories with quantities of 1 L or 1 kg of Aniline or less present in the work place, with <u>exposure to Aniline controlled by operating conditions or risk management measures.</u>

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	It is assumed that all processes are performed at room temperature	
Section 2	Operational conditions and risk management measures	
Section 2.1	Control of worker exposure	
Product characteristics	-	
Physical form of the product	Liquid	
Vapour pressure	Low volatility	
Substance concentration in the product	n/a	
Quantities used	Not relevant to this scenario	
Operating Conditions	-	
Frequency and duration of use	Covers daily exposures up to 8 hours (unless otherwise indicated) [OC1]	
Human factors not influenced by risk management	None identified for this scenario.	
Other Operating Conditions affecting worker exposure	<p>Aniline carries a high hazard warning due to its R68 classification. Accordingly, where procedures in manufacturing or using Aniline are not designed to contain emissions, workers exposure to Aniline must be prevented by means of local ventilation and good working practices.</p> <p>These may include:</p> <ul style="list-style-type: none"><li>• keeping equipment under negative pressure,</li><li>• controlling staff entry to the work zone</li><li>• ensuring that the equipment is well maintained.</li><li>• authorisation to work in the maintenance area,</li><li>• regular cleaning of the equipment and work area;</li><li>• systems in place to ensure the correct use of RMMs, so that OCs are followed and staff are trained in good practices,</li><li>• procedures and training for emergency decontamination and disposal,</li><li>• good standards of personal hygiene,</li><li>• record of ‘near miss’ situations,</li><li>• sensitisers – pre-employment selection and suitable health screening.</li></ul>	
Risk Management Measures		
Other scenarios	Process Categories	Risk Management Measures *
Manufacture or use in enclosed processes	PROC1 - Use in closed process, no likelihood of exposure.	<p>Handle the substance within a closed system [E47].</p> <p>Aniline carries a high hazard warning due to its R68 classification, therefore when exceptional procedures may result in exposure to Aniline:</p> <p>-- Use suitable eye protection and gloves [PPE14].</p> <p>-- Wear a full face respirator conforming to EN140 with</p>

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		Type A/P2 filter or better [PPE32] -- Wear suitable coveralls to <b>prevent</b> exposure to the skin [PPE27].
Manufacture or use in continuous enclosed processes	PROC2 - Use in closed, continuous process with occasional controlled exposure (e.g. sampling)	Handle the substance <b>within</b> a closed <b>system</b> [E47] <b>Wear suitable</b> gloves <b>tested to</b> EN374 [PPE15] during material sampling  Aniline carries a high <b>hazard</b> warning due to its R68 classification, therefore when exceptional procedures may result in exposure to Aniline: -- <b>Use</b> suitable eye protection and gloves [PPE14]. -- Wear a full <b>face</b> respirator <b>conforming to</b> EN140 with Type A/P2 filter or better [PPE32] -- Wear suitable coveralls to <b>prevent</b> exposure to the skin [PPE27].
Further processing of Aniline in closed systems, batchwise, to form a number of different products.	PROC3 - Use in closed batch process (synthesis or formulation)	Handle the substance <b>within</b> a predominantly closed <b>system provided with extract ventilation</b> [E49]. <b>Ensure material transfers are under containment or extract ventilation</b> [E66]. <b>Ensure samples are obtained under containment or extract ventilation</b> [E76].  Aniline carries a high <b>hazard</b> warning due to its R68 classification, therefore when exceptional procedures may result in exposure to Aniline: -- <b>Use</b> suitable eye protection and gloves [PPE14]. -- Wear a full <b>face</b> respirator <b>conforming to</b> EN140 with Type A/P2 filter or better [PPE32] -- Wear suitable coveralls to <b>prevent</b> exposure to the skin [PPE27].
Manufacture or use of Aniline (synthesis) in processes that are not fully contained.	PROC4 – Use in batch and other processes (synthesis) where opportunity for exposure arises	<b>Provide extract ventilation to points where emissions occur</b> [E54]. <b>Ensure material transfers are under containment or extract ventilation</b> [E66]. <b>Ensure samples are obtained under containment or extract ventilation</b> [E76].  Aniline carries a high <b>hazard</b> warning due to its R68 classification, therefore when exceptional procedures may result in exposure to Aniline: -- <b>Use</b> suitable eye protection and gloves [PPE14]. -- Wear a full <b>face</b> respirator <b>conforming to</b> EN140 with Type A/P2 filter or better [PPE32] -- Wear suitable coveralls to <b>prevent</b> exposure to the skin [PPE27].



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Material transfers/large vessel	PROC8b – Transfer of chemicals from/to vessels/large containers at dedicated facilities	<p>Fill containers/cans at dedicated fill points supplied with local extract ventilation [E51]. Provide extract ventilation to material transfer points and other openings [E82].</p> <p>Aniline carries a high hazard warning due to its R68 classification, therefore when exceptional procedures may result in exposure to Aniline:</p> <ul style="list-style-type: none"> <li>-- Use suitable eye protection and gloves [PPE14].</li> <li>-- Wear a full face respirator conforming to EN140 with Type A/P2 filter or better [PPE32]</li> <li>-- Wear suitable coveralls to prevent exposure to the skin [PPE27].</li> </ul>
Material Transfers/small vessel	PROC9 - Transfer of substance into small containers (dedicated filling line, including weighing)	<p>Fill containers/cans at dedicated fill points supplied with local extract ventilation [E51]. Provide extract ventilation to material transfer points and other openings [E82].</p> <p>Aniline carries a high hazard warning due to its R68 classification, therefore when exceptional procedures may result in exposure to Aniline:</p> <ul style="list-style-type: none"> <li>-- Use suitable eye protection and gloves [PPE14].</li> <li>-- Wear a full face respirator conforming to EN140 with Type A/P2 filter or better [PPE32]</li> <li>-- Wear suitable coveralls to prevent exposure to the skin [PPE27].</li> </ul>
Quality control in a laboratory	PROC15 - Use of laboratory reagents in small scale laboratories	<p>Carry out in a vented booth or extracted enclosure [E57]. Ensure samples are obtained under containment or extract ventilation [E76].</p> <p>Aniline carries a high hazard warning due to its R68 classification, therefore when exceptional procedures may result in exposure to Aniline:</p> <ul style="list-style-type: none"> <li>-- Use suitable eye protection and gloves [PPE14].</li> <li>-- Wear a full face respirator conforming to EN140 with Type A/P2 filter or better [PPE32]</li> <li>-- Wear suitable coveralls to prevent exposure to the skin [PPE27].</li> </ul>

\* standard phrases and codes are extracted from GES Worker Chemical Safety Assessment (CSA)  
Template on the Cefic web-site <http://www.cefic.be/templates/shwPublications.asp?HID=750>

## Aniline

Section 2	Operational conditions and risk management measures
<b>Section 2.2</b>	<b>Control of environmental exposure</b>
Product characteristics	Substance is liquid of low volatility. Readily biodegradable.
Operating conditions	-
Quantities used	-
Amounts manufactured/ used in the EU (tonnes/year)	Manufacturing – 2,000,000 Monomer (including MDA/MDI production) – 1,710,000 Other intermediates – 185,000
Fraction of EU tonnage used in region	1
Fraction of main source to local environment	0.1
Maximum daily site tonnage (kg/day)	Data not required
Frequency and duration of use	-
Type of release	continuous
Emission days (days/year)	300
Environmental factors not influenced by risk management	-
Local freshwater dilution factor	10 (default, used in calculation of worst case scenarios)
Local marine water dilution factor	100 (default, used in calculation of worst case scenarios)
Other given operational conditions affecting environmental exposure	Vapour pressure 40 Pa Water solubility 35 g/L Partition coefficient octanol-water (kow) 8.1 (log Kow = 0.91) Partition coefficient organic carbon-water (koc) 4.10E+02
Release fraction to air from process	0
Release fraction to wastewater from process	13%
Release fraction to soil from process (regional only)	0
Fraction of emissions to the different environmental compartments	Fraction of emission directed to air – 0% Fraction of emission directed to water by STP (local) – 13% Fraction of emission directed to sludge by STP (local) – 0% Fraction of emission degraded in STP (local) 87% (Data defined in the European Union Risk Assessment Report, Volume 5.0)
<b>Risk Management Measures</b>	
Examples of technical conditions and measures at process level (source) to prevent release*	E12.02 - Wet scrubber - for gas removal – Recovery and abatement technique for VOCs - used to remove water soluble substances. E12.12 - Waste gas treatment - thermal oxidation - Abatement technique for VOCs. E13.19 – Waste-water stripping - Physicochemical treatment for soluble non-biodegradable or inhibitory contaminants. E13.21 - Biological treatment – Aerobic – For soluble biodegradable

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	<p>contaminants.</p> <p>E13.23 - Biological treatment - Central Biological Waste Water Treatment - For soluble biodegradable contaminants.</p> <p>E13.24 - Biological treatment - <a href="#">Sludge treatment e.g. thermal sludge reduction - Industrial or municipal waste water treatment plant.</a></p> <p>E14.02 (Offsite <a href="#">waste</a> treatment may <a href="#">employ this RMM</a>) - Disposal - Hazardous Waste Incineration - Incineration for hazardous waste and waste containing PCBs, halogens, sulfur or heavy metals.</p>
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	<p>If discharging to domestic sewage treatment plant, no onsite wastewater treatment required. Waste emission from <a href="#">plant entering an</a> STP must not exceed <b>0.092 mg/L</b> assuming an <a href="#">external</a> STP with a <a href="#">default</a> discharge rate of 2000 m<sup>3</sup>/d.</p> <p>If not discharging to a wastewater treatment plant, concentration of aniline in wastewater must be limited as shown below.</p> <p>Soil <a href="#">emission controls are</a> not applicable <a href="#">as</a> there is no direct release <a href="#">to</a> soil.</p> <p>Air emission abatement is required.</p>
Treat air emissions to provide a typical removal efficiency of (%)	<p>99%</p> <p>A worst case scenario of emission <a href="#">to the atmosphere</a> was assessed, using the equations from the EU TGD Environmental Risk Assessment, Part I (2003). <a href="#">As a worst case an emission value</a> of 2.00E-02 mg/l aniline (20.0 mg/m<sup>3</sup>) to the atmosphere has been assumed and an emission rate of 5000 m<sup>3</sup>/h. The Aniline REACH consortium <a href="#">advised</a> that <a href="#">all sites incinerate the waste gas reducing the emissions by</a> &gt;99%. As a worst case a 99% reduction <a href="#">has been used</a> in the following calculations.</p> <p>Emission = 20.0 mg/m<sup>3</sup> * 5000 m<sup>3</sup>/h * 24 h = 2.4 kg/d</p> <p><b>Clocal<sub>air</sub> = max (Elocal<sub>air</sub>, Estp<sub>air</sub>) * Cstd<sub>air</sub></b> (Equation 40)</p> <p>Clocal<sub>air</sub> = (2.4 kg/d + 0 kg/d) * 2.78E-04</p> <p>Clocal<sub>air</sub> = 6.67E-04 mg/m<sup>3</sup></p> <p><b>Clocal<sub>air,ann</sub> = Clocal<sub>air</sub> * T<sub>emission</sub>/365</b> (Equation 41)</p> <p>Clocal<sub>air,ann</sub> = 6.67E-04 mg/m<sup>3</sup> * 300/365</p> <p>Clocal<sub>air,ann</sub> = 5.48E-04 mg/m<sup>3</sup></p> <p>The EU Risk Assessment, Chapter 3 (page 51) <a href="#">states that</a> the PNEC <a href="#">plant</a> for the risk assessment of the atmosphere is 6 µg/m<sup>3</sup>. Using this PNEC the RCR for the atmospheric compartment (worst case) can be calculated to be <b>9.13E-02</b> (5.48E-04 mg/m<sup>3</sup> ÷ 6.00E-03 mg/m<sup>3</sup>).</p>

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	The maximum air emission that will result in an acceptable RCR has been calculated to be <b>25.899 mg/m<sup>3</sup></b> .
Treat wastewater (prior to discharge to receiving water) to provide a concentration limit as shown	<p>Emissions in either waste water entering a river with a default flow rate of 1.8E+07 l/d (equivalent to dilution rate 10) or the sea (dilution rate 100) should not exceed <b>0.012 mg/L</b></p> <p>Algorithm fresh water emissions:-  <math display="block">C_{local\ fresh\ water} = C_{local\ eff} / (1 + K_{p\ susp} * SUSP_{water} * 10^{-6}) * DILUTION</math> <math display="block">C_{local\ water} = \chi / (1 + 41 * 15 * 10^{-6}) * 10</math> Where <math>\chi = C_{local\ eff}</math>  <u>C<sub>local effluent</sub> must not exceed 0.012 mg/l</u></p> <p>Algorithm marine water emissions:-  <math display="block">C_{local\ seawater} = C_{local\ eff} / (1 + K_{p\ susp} * SUSP_{water} * 10^{-6}) * DILUTION</math> <math display="block">C_{local\ water} = \chi / (1 + 41 * 15 * 10^{-6}) * 100</math> Where <math>\chi = C_{local\ eff}</math>  <u>C<sub>local effluent</sub> must not exceed 0.012 mg/l</u></p>
Typical onsite wastewater treatment technology provides removal efficiency of (%)	87% (As defined in the European Union Risk Assessment Report Volume 5.0)
Organizational measures to prevent/limit release from site	<p>Site should have a spill plan to ensure that adequate safeguards are in place to minimize the impact of episodic releases.</p> <p>A leak prevention plan is needed to prevent low level continual releases.</p> <p>A storm water management plan is needed to ensure that the wastewater treatment plant is not overloaded with uncontaminated water.</p> <p>Dispose of waste and used containers according to local regulations.</p> <p>Use bunds or dikes around storage facilities to prevent soil and water pollution in the event of a spill.</p> <p>Sludge should be incinerated, contained or reclaimed for incineration.</p>
Conditions and measures related to WWTP	<p>Waste emission from plant entering an WWTP must not exceed <b>0.092 mg/L</b> assuming an external WWTP with a default discharge rate of 2000 m<sup>3</sup>/d.</p> <p>In order to make the terrestrial assessment safe, <b>STP and WWTP waste must not be spread on agricultural land.</b></p>
Estimated substance removal from wastewater via WWTP (%)	87% (As defined in the European Union Risk Assessment Report Volume 5.0)
Total efficiency of removal from wastewater after onsite and offsite RMMs (%)	Not required. Emissions in waste water entering either a river with a default flow rate of 1.8E+07 l/d (equivalent to dilution rate 10) or sea water (dilution rate 100) should not exceed <b>0.012 mg/L</b> .
The maximum allowable site tonnage (M <sub>Safe</sub> ) based on removal from WWTP (kg/d)	Not required, see maximum concentration data for emissions to river or to WWTP documented above.
Assumed WWTP flow (m <sup>3</sup> /d)	2000

# Safety Data Sheet

according to EU Regulations 1907/2006 and other amendments  
 Integrated Management System

Processed by computer  
 FS-84-025

Revision: 30-04-2019  
 Version: 14  
 (Replace: Version 13 from 30-05-2018)

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Conditions and measures <b>related to external</b> treatment of waste for disposal	Do not <b>apply</b> industrial sludge <b>to</b> natural soils.
Conditions and measures <b>related to external</b> recovery of waste	Adequate closed storage facilities (e.g., bulk storage tanks, intermediate bulk containers, drums) are required. Ensure all waste water is collected and treated <b>via</b> a WWTP. Incinerate, absorb, or adsorb vapours stripped from solution whenever necessary. Dispose of waste and used containers according to local regulations.
Other environmental control measures <b>additional to above</b>	-

\* codes **are extracted** from the RMM library on the Cefic website  
<http://cefic.org/Templates/shwStory.asp?NID=719&HID=718>