

Extended Safety Data Sheet ***According to Regulation (EC) No 1907/2006***

Adipic Acid

Issue date: 09/06/2014

Version 2.0

Revision date: 09/06/2014

eSDS Record Number: CSSS-TCO-010-114752

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

1.1 Product identifier:

Identification on the label/Trade name: Adipic Acid
Additional identification: Not available
Identification of the product: CAS# 124-04-9; EC# 204-673-3
Index Number: 607-144-00-9
REACH registration No.: 01-2119457561-38-xxxx

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

1.2.1 Identified uses:

Preparation and Uses of formulations
Use of adipic acid in the production of dish washing machine tablets
use of adipic acid as intermediate or monomer
Use of adipic acid in flue gas desulphurization
Use of adipic acid as Laboratory Chemicals
Use of dish washing machine tablets by consumers

1.2.2 Uses advised against:

Not available.

1.3 Details of the supplier of the safety data sheet:

Supplier(Only representative): Chemical Inspection & Regulation Service Limited
Supplier(Manufacturer): CHONGQING HUAFON CHEMICAL CO.,LTD.
Address: HUAFON INDUSTRY PARK OF BAITAO CHEMICAL INDUSTRY PARK, FULING DISTRICT, CHONGQING CHINA
Contact person(E-mail): CQHF@HUAFENG.COM
Telephone: +86-23-87800000
Fax: +86-23-85710725

1.4 Emergency telephone Number:

+353 41 980 6916

Available outside office hours?

YES

NO

Section 2 Hazards Identification

2.1 Classification of the substance/mixture

2.1.1 Classification:

The substance is classified as following according to 67/548/EEC and REGULATION (EC) No 1272/2008:

REGULATION (EC) No 1272/2008	
Hazard classes/Hazard categories	Hazard statement
Eye Irrit. 2	H319

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

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Hazards characteristics	R-Phrases
Xi	R36

For full text of R- phrases: see section 16.

2.2 label elements

Hazard Pictograms:



Signal Word(S):

Warning

Hazard Statement:

H319: Causes serious eye irritation.

Precautionary statement

P264: Wash... thoroughly after handling.

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

P305 + P351 + P338: IF IN EYES: Rinse cautiously with water for several minutes.

Remove contact lenses, if present and easy to do. Continue rinsing.

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

2.3 Other hazards

The substance is not considered a PBT/vPvB.

Section 3 Composition/information on ingredients

Substance/Mixture:

Substance

Ingredient(s):

Chemical Name	Registration No.	CAS No.	EC No.	Concentration
Adipic acid	01-2119457561-38-xxxx	124-04-9	204-673-3	99.9078%(w/w)

Section 4 First aid measures

4.1 Description of first aid measures:

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

4.1.1 In case of inhalation:

Provide fresh air. Seek medical aid in case of troubles.

4.1.2 In case of skin contact:

Wash immediately and thoroughly for a prolonged period (at least 15 minutes). Remove all contaminated clothing and footwear.

4.1.3 In case of eyes contact:

Immediately rinse with plenty of running water for a prolonged period, (at least 15 minutes) whilst keeping the eyes wide open.

4.1.4 In case of ingestion:

NEVER attempt to induce vomiting. Do not give anything to drink. Always obtain medical attention immediately.

4.2 Most important symptoms and effects, both acute and delayed

Causes serious eye irritation.

4.3 Indication of any immediate medical attention and special treatment needed

If skin irritation or rash occurs, get medical advice/attention.

Section 5 Fire-Fighting measures

5.1 Extinguishing media:

Suitable extinguishing media: Foam, Powders, Water spray.

Unsuitable extinguishing media: Not available.

5.2 Special hazards arising from the substance or mixture

Combustible.

5.3 Special fire fighting methods and special protective actions for fire-fighters:

Boots, gloves, goggles.

Section 6 Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures:

6.1.1 For non-emergency personnel: Avoid contact with skin and eyes. NO flames, NO sparks. Eliminate all sources of ignition.

6.1.2 For emergency responders: - appropriate gloves. - safety glasses. - water-proof boots.

6.2 Environmental Precautions:

Prevent the product from spreading into the environment.

6.3 Methods for Containment and Cleaning up:

-Recovery: Collect up the product and place it in a spare container suitably labelled. Then take the emergency containers to an area reserved for subsequent recycling or disposal.

- Cleaning/Decontamination: Sweep.

- Disposal: Dispose of solid materials at an authorized site.

6.4 Reference to other sections:

See Section 7 for information on safe handling.

See section 8 for information on personal protection equipment.

See Section 13 for information on disposal.

6.5 Additional information:

Not applicable.

Section 7 Handling and storage

7.1 Precautions for safe handling:

7.1.1 Protective measures: Technical measures: Dust extraction (suction). Earth the equipment. Inert atmosphere for pneumatic apparatus.

Measures: Avoid the formation of dust.

Safe handling advice : Ensure that there is a suitable ventilation system Handle and use in accordance with good occupational hygiene and safety

7.1.2 Advice on general occupational hygiene:

Do not eat, drink and smoke in work areas. Wash hands after use. Remove contaminated clothing and protective equipment before entering eating areas.

7.2 Conditions for safe storage, including any incompatibilities:

Technical measures : Storage tanks must be earthed and equipped with an adequate safety valve.

Storage conditions

- recommended: Store: - protected from humidity and bad weather conditions. - in a well-ventilated area - away from any source of heat. - away from any source of ignition. - away from incompatible materials.

Incompatible products: Oxidizing materials.

Packaging: - Flexible Intermediate Bulk Container (FIBC) . type B . Type C - Paper bags. Bulk product : consult the supplier.

Packaging materials

- recommended: Paper. Polyethylene. Polypropylene Stainless steel.

- not suitable: Steel. Aluminium and its alloys.

7.3 Specific end use(s):

Not applicable.

Section 8 Exposure Controls/Personal Protection

8.1 Control parameters:

8.1.1 Occupational exposure limits: Not available

8.1.2 Additional exposure limits under the conditions of use: Not available

8.1.3 DNEL/DMEL and PNEC-Values:

DN(M)ELs for workers

Route	Type of effect	Hazard conclusion	Most sensitive endpoint
Inhalation	Systemic effects - Long-term	DNEL (Derived No Effect Level): 264 mg/m ³	repeated dose toxicity
Inhalation	Systemic effects - Acute	DNEL (Derived No Effect Level): 264 mg/m ³	repeated dose toxicity
Inhalation	Local effects - Long-term	DNEL (Derived No Effect Level): 5 mg/m ³	irritation (respiratory tract)
Inhalation	Local effects - Acute	DNEL (Derived No Effect Level): 5 mg/m ³	irritation (respiratory tract)
Dermal	Systemic effects - Long-term	DNEL (Derived No Effect Level): 38 mg/kg bw/day	repeated dose toxicity
Dermal	Systemic effects - Acute	DNEL (Derived No Effect Level): 38 mg/kg bw/day	repeated dose toxicity
Dermal	Local effects - Long-term		skin irritation/corrosion
Dermal	Local effects - Acute		skin irritation/corrosion
Eyes	Local effects		

DN(M)ELs for the general population

Route	Type of effect	Hazard conclusion	Most sensitive endpoint
Inhalation	Systemic effects - Long-term	DNEL (Derived No Effect Level): 65 mg/m ³	repeated dose toxicity
Inhalation	Systemic effects - Acute	DNEL (Derived No Effect Level): 65 mg/m ³	repeated dose toxicity
Inhalation	Local effects - Long-term		skin irritation/corrosion
Inhalation	Local effects - Acute		skin irritation/corrosion
Dermal	Systemic effects - Long-term	DNEL (Derived No Effect Level): 19 mg/kg bw/day	repeated dose toxicity
Dermal	Systemic effects - Acute	DNEL (Derived No Effect Level): 19 mg/kg bw/day	repeated dose toxicity
Dermal	Local effects - Long-term		skin irritation/corrosion
Dermal	Local effects - Acute		skin irritation/corrosion
Oral	Systemic effects - Long-term	DNEL (Derived No Effect Level): 19 mg/kg bw/day	repeated dose toxicity
Oral	Systemic effects - Acute	DNEL (Derived No Effect Level): 19 mg/kg bw/day	repeated dose toxicity
Eyes	Local effects		

PNEC

PNEC	Value	Assessment factor	Remarks/Justification
PNEC _{aqua - freshwater} (mg/L)	0.126	50	Extrapolation method: assessment factor According to the Guidance Document R.10 (ECHA, 2008) an assessment factor of 50 applies to the lowest of two long-term results covering two trophic levels as the results have been

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			generated covering that level showing the lowest effective concentrations in the short-term tests. The PNECaqua(freshwater) is based on the 21-d NOEC of 6.3 mg/L as the reproduction of Daphnia magna was shown to be the most sensitive endpoint.
PNEC _{aqua -marine water} (mg /L)	0.0126	500	Extrapolation method: assessment factor In the absence of any data on saltwater species, the PNECaqua(marine water) was derived on the basis of effects towards freshwater species. According to the Guidance Document R.10 (ECHA, 2008), an assessment factor of 500 applies to the lowest of two long-term results covering two trophic levels as the results have been generated covering those trophic levels showing the lowest effective concentrations in the short-term tests with these species. The PNECaqua(marine water) is based on the 21-d NOEC of 6.3 mg/L as the reproduction of Daphnia magna was shown to be the most sensitive endpoint.
PNEC _{aqua - intermittent releases} (mg /L)	0.46	100	Extrapolation method: assessment factor According to the Guidance Document R.10, a default assessment factor of 100 applies to the most sensitive short-term test of three trophic levels. The calculation of PNEC _{aqua} (intermittent releases) is based on the EC50 (48 h) of 46 mg/L, as the toxicity to invertebrates (Daphnia magna) was shown to be the most sensitive endpoint.
PNEC _{fresh water sediment} (mg/kg sediment dw)	0.484		In the absence of any ecotoxicological data for sediment dwelling organisms, a provisional PNEC sediment is derived by calculations based on the equilibrium partitioning method in accordance to the Guidance Document R.10. A Koc of 2.4, a Henrys Law constant of 0.0616 Pa m ³ /mole, and the PNEC fresh water of 0.126 mg/l were used for calculation. A PNECsediment of 0.105 mg/kg ww is obtained. This value is converted from wet-weight to dry weight using a conversion factor for sediment concentrations of 4.6.
PNEC _{marine-sediment} (mg/kg sediment dw)	0.0484		In the absence of any ecotoxicological data for sediment dwelling organisms, a provisional PNEC sediment is derived by calculations based on the equilibrium partitioning method in accordance to the Guidance Document R.10. A Koc of 2.4, a Henrys Law constant of 0.0616 Pa m ³ /mole, and the PNEC marine water of 0.0126 mg/l were used for calculation. A PNECsediment of 0.0105 mg/kg ww is obtained. This value is converted from wet-weight to dry weight using a conversion factor for sediment concentrations of 4.6.
PNEC _{soil} (mg/kg soil dw)	0.0228		Extrapolation method: partition coefficient To establish a PNECsoil as apart of a quantitative assessment of risk to the soil compartment, the equilibrium partitioning method (EPM) is used. For PNEC derivation the physicochemical properties of adipic acid are taken into account. On the basis of the outcome of the aquatic toxicity data and the lowest calculated koc value of 2.4 is used for calculation. A PNECsoil of 0.02 mg/kg ww is obtained. This value is converted from wet-weight to dry weight

			using a conversion factor for soil concentrations of 1.13.
PNEC stp(mg/L)	59.1	10	Extrapolation method: assessment factor To identify substances which present a risk to the functioning of the activated sludge processes in wastewater treatment plants, the PNEC is determined using the specific assessment factors for test methods and results of toxicity tests on different micro organisms. The PNEC STP is derived from the most relevant test resulting in the lowest PNEC value (Test with Tetrahymena pyriformis: 40h-IC50 = 591 mg/l)
PNEC oral(mg/kg food)	N/A	N/A	The key step for the risk estimation of accumulation through the food chain is to consider whether there are indications for bioaccumulation potential. Adipic acid has no significant bioaccumulation potential. For this reason there is no risk for secondary poisoning. A PNECoral is not derived.

8.2 Exposure controls

8.2.1 Appropriate engineering controls: Ensure good ventilation of the work station.

8.2.2 Individual protection measures, such as personal protective equipment:

Eye/face protection: Safety spectacles.

Hand protection: Impermeable protective gloves.

Body protection: Protective clothing. Impermeable boots.

Respiratory protection: Respiratory protective device with a particle filter.

Thermal hazards: Wear suitable protective clothing to prevent heat.

8.2.3 Environmental exposure controls: Avoid discharge into the environment.
According to local regulations, Federal and official regulations.

Section 9 Physical and chemical properties

9.1 Information on basic physical and chemical properties

Appearance solid at 20°C and 101.3 kPa

Melting point/range (°C): 150.85 °C at 101.3 kPa

Boiling point/range (°C): 337.5 °C at 101.3 kPa

Flash point (°C): The flash point of adipic acid is 196°C. (Chemsafe, 2008)

Self-ignition temperature: Evaluating the self-ignition temperature, a test was conducted according to the EU Method A.16 (Relative Self-Ignition Temperature for Solids). Under test conditions, adipic acid not have a self ignition temperature. The self-ignition temperature is >400°C (Rhodia, 2008).

Vapour pressure (25°C): 9.7 Pa at 291.65 K

Relative Density: 1.36 at 20°C

Water solubility (g/l): 23000 mg/L at 25 °C

n-Octanol/Water (log Po/w): Log Kow (Pow): 0.09 at 20 °C

Viscosity: Not available

Surface tension: Not available

Dissociation constant in water(pKa): The dissociation constants of adipic acid are pK1 4.43 and pK2 5.42 at 20 °C (Beilstein, 2003).

9.2. Other information:

Flammability:	non flammable
Explosive properties :	non explosive
Oxidising properties :	no
Granulometry :	The particle size distribution of Adipic acid from several origin was measured by laser diffraction. The mass median diameters were in the range of about 60 to about 332 µm.
Stability in organic solvents and identity of relevant degradation products :	Adipic acid is not stable in alcohol. The corresponding ester is formed (Beyer, 2004).

Section 10 Stability and reactivity

10.1 Reactivity:	The substance is stable under normal storage and handling conditions.
10.2 Chemical stability:	Stable under normal temperatures and pressures. Dusts may form an explosion hazard.
10.3 Possibility of hazardous reactions:	Fire may produce irritating, corrosive and/or toxic gases.
10.4 Conditions to avoid:	Strong oxidizing agents. Fairly strong acid. Reacts with bases.
10.5 Incompatible materials:	Strong oxidizers. Corrosive to mild steel at room temperature.
10.6 Hazardous decomposition products:	Carbon monoxide, carbon dioxide, acrid smoke and fumes.

Section 11 Toxicological information

11.1 Toxicokinetics, metabolism and distribution

The OECD/ICCA high production volume chemicals program discussed data on adipic acid during SIAM 18, April 2004. This evaluation is published by UNEP. Overall it is concluded in the SIDS Initial Assessment Profile that: "The chemical is currently of low priority for further work."

The rationale for this recommendation was as follows: "The chemical possesses properties (eye and respiratory tract irritation) indicating a hazard for human health. Although these hazards do not warrant further work, they should nevertheless be noted by chemical safety professionals and users, especially at the workplace."

The IUCLID dataset and the present Human Health Hazard Assessment is based on the recent OECD/ICCA evaluation. For all endpoints the hazards identified and discussed in the OECD SIDS Initial Assessment Report for adipic acid in 2004 are cited and additional updated relevant information is given in a separate heading.

Non-human information:

Hazards identified by OECD/ICCA high production volume chemicals program in 2004:

"After oral administration by gavage of radioactive adipic acid to fasted rats up to 70 % of the dose was exhaled as CO₂. In the urine the parent compound adipic acid and metabolic products identified as urea, glutamic acid, lactic acid, beta-keto adipic acid and citric acid were found (percentages not specified). Adipic acid was metabolized by beta-oxidation in a similar fashion as fatty acids and acetate was a metabolite of adipic acid. Radioactive glycogen was isolated in experiments where glycogen formation in the liver was encouraged by oral administration of glucose together with radioactive adipic acid (Rusoff et al. 1960). When adipic acid or its sodium salt was administered to non fasted rats, rabbits and one dog 18 – 71 % of the doses were excreted in the urine. Breath was not analyzed in these studies (Mori 1918; Bernhard and Andreae 1937; Enders 1941). In an oral 28-day subacute study in rats excretion of adipic acid was similar from day 1 to 28, indicating that adipic acid did not accumulate during the treatment. Breath was not analyzed, (Enders 1941). It is unclear whether the methods of detection in these early studies were reliable. "

Updated relevant information:

None

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Human information

Hazards identified by OECD/ICCA high production volume chemicals program in 2004:

"Adipic acid was orally administered to humans to investigate compound excretion. The highest dose administered in one volunteer was 70 g over 10 days. 3 other persons took 19 to 23.4 g over up to 9 days. 15 - 75 % of the adipic acid dose was found unchanged in the urine after oral administration of up to 7 g of adipic acid over up to 10 days to 7 volunteers. Breath was not analyzed, and it is unclear whether the methods of detection used were reliable (Weitzel 1942 and 1947). "

Updated relevant information:

None

Conclusion:

In limited studies in animals and humans it was shown that adipic acid is absorbed after oral administration, partially metabolized to various metabolites and CO₂ which are excreted via urine and breath, resp.

11.2 Information on toxicological effects

Acute toxicity:

LD50(Oral, Rat): 5560 mg/kg bw

LD50(Dermal, Rabbit): 7940 mg/kg bw

LC50(Inhalation, Rat): 7700 mg/m³

Skin corrosion/Irritation: Slightly irritating

Serious eye damage/irritation: Moderately irritating

Respiratory or skin sensitization: Not sensitising

Germ cell mutagenicity: Negative

Carcinogenicity: Not classified

Reproductive toxicity: Not classified

STOT- single exposure: Not classified

STOT-repeated exposure: Not classified

Aspiration hazard: Not classified

Section 12 Ecological information

Toxicity:

Acute toxicity		Time	Species	Method	Remarks
LC50	> 100 test mat. (nominal) based on: mortality	96h	Fish	OECD Guideline 203 (Fish, Acute Toxicity Test)	2 (reliable with restrictions) supporting study experimental result
EC50	85.7 mg/L test mat. (nominal) based on: immobilization	48h	Daphnia	OECD Guideline 202 (Daphnia sp. Acute Immobilisation Test)	2 (reliable with restrictions) supporting study experimental result
EC50	59 mg/L test mat. (nominal) based on: growth rate	72h	Algae	OECD Guideline 201 (Alga, Growth Inhibition Test)	2 (reliable with restrictions) supporting study experimental result

Persistence and degradability: Readily and inherently biodegradable.

Bioaccumulative potential: Adipic acid has no potential on bioaccumulation in aquatic organisms

Mobility in soil: Not available
Results of PBT&vPvB assessment: The substance is not considered a PBT/vPvB.
Other adverse effects: Not available

Section 13 Disposal considerations

13.1 Waste treatment methods

RESIDUES FROM PRODUCT

Prohibition: Discharging waste into rivers and drains is forbidden.

Destruction/Disposal: Incinerate at a licensed installation.

13.2 Product / Packaging disposal:

CONTAMINATED PACKAGING

Prohibition: Do not dispose of the product at a rubbish tip.

Decontamination/cleaning: Wash out general purpose tankers (rail-road) with water.

Recover the cleaning water and dispose of at a specialist site.

Destruction/Disposal: Incinerate bags and flexible containers.

NOTE: The user's attention is drawn to the possible existence of local regulations regarding disposal.

If empty container retains product residues, all label precautions must be observed. Return for reuse or dispose according to national or local regulations.

Section 14 Transport information

	Land transport(ADR/RID)	Sea transport (IMDG)	Air transport (ICAO/IATA)
UN-Number:	Not regulated	Not regulated	Not regulated
UN Proper shipping name:	Not regulated	Not regulated	Not regulated
Transport hazard Class:	Not regulated	Not regulated	Not regulated
Packaging group:	Not regulated	Not regulated	Not regulated
Environmental hazards:	Not regulated	Not regulated	Not regulated
Special precautions for user:	See section 2.2	See section 2.2	See section 2.2
Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code	Not regulated	Not regulated	Not regulated

Section 15 Regulation information

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

Relevant information regarding authorization: Not applicable.

Relevant information regarding restriction: Not applicable.

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

Other National regulations: Not applicable

Chemical Safety Assessment has been carried out? YES NO

Section 16 Other information

16.1 Indication of changes

Version 1.1 Amended by EU No 453/2010

Version 2.0 Placed exposure scenarios in the Annex (eSDS)

16.2 Relevant R- phrases (number and full text):

R36- Irritating to eyes.

16.3 Training instructions:

Not applicable.

16.4 Further information:

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

16.5 Notice to reader:

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

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Substance Name: Adipic acid

EC Number: 204-673-3

CAS Number: 124-04-9

Registration Number:

Date of Generation/Revision: 09/06/2014

Author: CHEMICAL INSPECTION & REGULATION SERVICE LIMITED

1. ES 1: Formulation; Preparation and Uses of formulations

1.1. Title section

Environment	
CS 1: Formulation	ERC 2
CS 2: Preparation and Uses of formulations	ERC 6b
Worker	
CS 3: Worker contributing scenario	PROC 1
CS 4: Worker contributing scenario	PROC 2
CS 5: Worker contributing scenario	PROC 3
CS 6: Worker contributing scenario	PROC 4
CS 7: Worker contributing scenario	PROC 5
CS 8: Worker contributing scenario	PROC 7
CS 9: Worker contributing scenario	PROC 8a
CS 10: Worker contributing scenario	PROC 8b
CS 11: Worker contributing scenario	PROC 9
CS 12: Worker contributing scenario	PROC 10
CS 13: Worker contributing scenario	PROC 13

1.2. Conditions of use affecting exposure

1.2.1. Control of environmental exposure: Formulation (ERC 2)

Amount used, frequency and duration of use (or from service life)
• Daily use at site: <= 0.27 tonnes/day
• Annual use at a site: <= 100 tonnes/year
• Percentage of tonnage used at regional scale: = 100 %
Conditions and measures related to sewage treatment plant
• Municipal STP: Yes [Effectiveness Water: 87.36%]
• Discharge rate of STP: >= 2E3 m3/d
• Application of the STP sludge on agricultural soil: Yes
Conditions and measures related to treatment of waste (including article waste)
• Particular considerations on the waste treatment operations: No (low risk) (ERC based assessment demonstrating control of risk with default conditions. Low risk assumed for waste life stage. Waste disposal according to national/local legislation is sufficient.)
Other conditions affecting environmental exposure
• Receiving surface water flow rate: >= 1.8E4 m3/d

1.2.2. Control of environmental exposure: Preparation and Uses of formulations (ERC 6b)

Amount used, frequency and duration of use (or from service life)
• Daily use at site: <= 0.27 tonnes/day
• Annual use at a site: <= 100 tonnes/year
• Percentage of tonnage used at regional scale: = 100 %

Conditions and measures related to sewage treatment plant
• Municipal STP: Yes [Effectiveness Water: 87.36%]
• Discharge rate of STP: $\geq 2E3$ m ³ /d
• Application of the STP sludge on agricultural soil: Yes
Conditions and measures related to treatment of waste (including article waste)
• Particular considerations on the waste treatment operations: No (low risk) (ERC based assessment demonstrating control of risk with default conditions. Low risk assumed for waste life stage. Waste disposal according to national/local legislation is sufficient.)
Other conditions affecting environmental exposure
• Receiving surface water flow rate: $\geq 1.8E4$ m ³ /d

1.2.3. Control of worker exposure: Worker contributing scenario (PROC 1)

Product (article) characteristics
Covers medium-dusty materials (e.g. talc, graphite).
<i>Covers percentage substance in the product up to 100 %.</i>
Amount used (or contained in articles), frequency and duration of use/exposure
<i>Covers daily exposures up to 8 hours.</i>
Technical and organisational conditions and measures
Provide a basic standard of general ventilation (1 to 3 air changes per hour) .
Use in closed process, no likelihood of exposure
<i>Advanced (industrial) exposure controls assumed.</i>
Other conditions affecting workers exposure
Indoor use
Covers use at ambient temperatures.

1.2.4. Control of worker exposure: Worker contributing scenario (PROC 2)

Product (article) characteristics
Covers medium-dusty materials (e.g. talc, graphite).
<i>Covers percentage substance in the product up to 100 %.</i>
Amount used (or contained in articles), frequency and duration of use/exposure
<i>Covers daily exposures up to 8 hours.</i>
Technical and organisational conditions and measures
Provide a basic standard of general ventilation (1 to 3 air changes per hour) .
Use in closed, continuous process with occasional controlled exposure
<i>Advanced (industrial) exposure controls assumed.</i>
Other conditions affecting workers exposure
Indoor use
Covers use at ambient temperatures.

1.2.5. Control of worker exposure: Worker contributing scenario (PROC 3)

Product (article) characteristics
Covers medium-dusty materials (e.g. talc, graphite).
<i>Covers percentage substance in the product up to 100 %.</i>

Amount used (or contained in articles), frequency and duration of use/exposure
<i>Covers daily exposures up to 8 hours.</i>
Technical and organisational conditions and measures
Provide a basic standard of general ventilation (1 to 3 air changes per hour) .
Use in closed batch process (synthesis or formulation)
<i>Advanced (industrial) exposure controls assumed.</i>
Other conditions affecting workers exposure
Indoor use
Covers use at ambient temperatures.

1.2.6. Control of worker exposure: Worker contributing scenario (PROC 4)

Product (article) characteristics
Covers medium-dusty materials (e.g. talc, graphite).
<i>Covers percentage substance in the product up to 100 %.</i>
Amount used (or contained in articles), frequency and duration of use/exposure
<i>Covers daily exposures up to 8 hours.</i>
Technical and organisational conditions and measures
Provide a basic standard of general ventilation (1 to 3 air changes per hour) .
Use in semi-closed process with opportunity for exposure
<i>Advanced (industrial) exposure controls assumed.</i>
Conditions and measures related to personal protection, hygiene and health evaluation
Wear a respirator providing a minimum efficiency of; For further specification, refer to section 8 of the SDS.
Other conditions affecting workers exposure
Indoor use
Covers use at ambient temperatures.

1.2.7. Control of worker exposure: Worker contributing scenario (PROC 5)

Product (article) characteristics
Covers medium-dusty materials (e.g. talc, graphite).
<i>Covers percentage substance in the product up to 100 %.</i>
Amount used (or contained in articles), frequency and duration of use/exposure
<i>Covers daily exposures up to 8 hours.</i>
Technical and organisational conditions and measures
Provide a basic standard of general ventilation (1 to 3 air changes per hour) .
<i>Advanced (industrial) exposure controls assumed.</i>
Conditions and measures related to personal protection, hygiene and health evaluation
Wear a respirator providing a minimum efficiency of; For further specification, refer to section 8 of the SDS.
Other conditions affecting workers exposure
Indoor use
Covers use at ambient temperatures.

1.2.8. Control of worker exposure: Worker contributing scenario (PROC 7)

Product (article) characteristics
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Covers medium-dusty materials (e.g. talc, graphite).
<i>Covers percentage substance in the product up to 100 %.</i>
Amount used (or contained in articles), frequency and duration of use/exposure
<i>Covers daily exposures up to 8 hours.</i>
Technical and organisational conditions and measures
Provide a basic standard of general ventilation (1 to 3 air changes per hour) .
Local exhaust ventilation - efficiency of at least
<i>Advanced (industrial) exposure controls assumed.</i>
Conditions and measures related to personal protection, hygiene and health evaluation
Wear suitable gloves tested to EN374.
Wear a respirator providing a minimum efficiency of; For further specification, refer to section 8 of the SDS.
Other conditions affecting workers exposure
Indoor use
Covers use at ambient temperatures.

1.2.9. Control of worker exposure: Worker contributing scenario (PROC 8a)

Product (article) characteristics
Covers medium-dusty materials (e.g. talc, graphite).
<i>Covers percentage substance in the product up to 100 %.</i>
Amount used (or contained in articles), frequency and duration of use/exposure
<i>Covers daily exposures up to 8 hours.</i>
Technical and organisational conditions and measures
Provide a basic standard of general ventilation (1 to 3 air changes per hour) .
<i>Advanced (industrial) exposure controls assumed.</i>
Conditions and measures related to personal protection, hygiene and health evaluation
Wear a respirator providing a minimum efficiency of; For further specification, refer to section 8 of the SDS.
Other conditions affecting workers exposure
Indoor use
Covers use at ambient temperatures.

1.2.10. Control of worker exposure: Worker contributing scenario (PROC 8b)

Product (article) characteristics
Covers medium-dusty materials (e.g. talc, graphite).
<i>Covers percentage substance in the product up to 100 %.</i>
Amount used (or contained in articles), frequency and duration of use/exposure
<i>Covers daily exposures up to 8 hours.</i>
Technical and organisational conditions and measures
Provide a basic standard of general ventilation (1 to 3 air changes per hour) .
Use in semi-closed process with opportunity for exposure
<i>Advanced (industrial) exposure controls assumed.</i>
Other conditions affecting workers exposure
Indoor use
Covers use at ambient temperatures.

1.2.11. Control of worker exposure: Worker contributing scenario (PROC 9)

Product (article) characteristics
Covers medium-dusty materials (e.g. talc, graphite).
<i>Covers percentage substance in the product up to 100 %.</i>
Amount used (or contained in articles), frequency and duration of use/exposure
<i>Covers daily exposures up to 8 hours.</i>
Technical and organisational conditions and measures
Provide a basic standard of general ventilation (1 to 3 air changes per hour) .
Use in semi-closed process with opportunity for exposure
<i>Advanced (industrial) exposure controls assumed.</i>
Conditions and measures related to personal protection, hygiene and health evaluation
Wear a respirator providing a minimum efficiency of; For further specification, refer to section 8 of the SDS.
Other conditions affecting workers exposure
Indoor use
Covers use at ambient temperatures.

1.2.12. Control of worker exposure: Worker contributing scenario (PROC 10)

Product (article) characteristics
Covers medium-dusty materials (e.g. talc, graphite).
<i>Covers percentage substance in the product up to 100 %.</i>
Amount used (or contained in articles), frequency and duration of use/exposure
<i>Covers daily exposures up to 8 hours.</i>
Technical and organisational conditions and measures
Provide a basic standard of general ventilation (1 to 3 air changes per hour) .
<i>Advanced (industrial) exposure controls assumed.</i>
Conditions and measures related to personal protection, hygiene and health evaluation
Wear a respirator providing a minimum efficiency of; For further specification, refer to section 8 of the SDS.
Other conditions affecting workers exposure
Indoor use
Covers use at ambient temperatures.

1.2.13. Control of worker exposure: Worker contributing scenario (PROC 13)

Product (article) characteristics
Covers medium-dusty materials (e.g. talc, graphite).
<i>Covers percentage substance in the product up to 100 %.</i>
Amount used (or contained in articles), frequency and duration of use/exposure
<i>Covers daily exposures up to 8 hours.</i>
Technical and organisational conditions and measures
Provide a basic standard of general ventilation (1 to 3 air changes per hour) .
<i>Advanced (industrial) exposure controls assumed.</i>
Other conditions affecting workers exposure
Indoor use
Covers use at ambient temperatures.

1.3. Exposure estimation and reference to its source

1.3.1. Environmental release and exposure: Formulation (ERC 2)

Release route	Release rate	Release estimation method
Water	1.35 kg/day	Release factor
Air	1.35 kg/day	Release factor
Soil	0.027 kg/day	Release factor

Protection target	Exposure estimate (based on: EUSES 2.1.2)	RCR
Freshwater	0.016 mg/L	0.126
Sediment (freshwater)	0.076 mg/kg dw	0.157
Marine water	0.002 mg/L	0.135
Sediment (marine water)	0.008 mg/kg dw	0.168
Sewage treatment plant	0.085 mg/L	< 0.01
Agricultural soil	0.02 mg/kg dw	0.881
Man via Environment - Inhalation	0.001 mg/m ³	< 0.01
Man via Environment - Oral	0.003 mg/kg bw/day	< 0.01

1.3.2. Environmental release and exposure: Preparation and Uses of formulations (ERC 6b)

Release route	Release rate	Release estimation method
Water	1.35 kg/day	Release factor
Air	1.35 kg/day	Release factor
Soil	0.068 kg/day	Release factor

Protection target	Exposure estimate (based on: EUSES 2.1.2)	RCR
Freshwater	0.016 mg/L	0.126
Sediment (freshwater)	0.076 mg/kg dw	0.157
Marine water	0.002 mg/L	0.135
Sediment (marine water)	0.008 mg/kg dw	0.168
Sewage treatment plant	0.085 mg/L	< 0.01
Agricultural soil	0.02 mg/kg dw	0.881
Man via Environment - Inhalation	0.001 mg/m ³	< 0.01
Man via Environment - Oral	0.003 mg/kg bw/day	< 0.01

1.3.3. Worker exposure: Worker contributing scenario (PROC 1)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long-term	0.01 mg/m ³ (TRA Worker v3)	< 0.01
Inhalation, systemic, acute	0.04 mg/m ³ (TRA Worker v3)	< 0.01
Inhalation, local, long-term	0.01 mg/m ³ (TRA Worker v3)	< 0.01
Inhalation, local, acute	0.04 mg/m ³ (TRA Worker v3)	< 0.01

Route of exposure and type of effects	Exposure estimate	RCR
Dermal, systemic, long-term	0.034 mg/kg bw/day (TRA Worker v3)	< 0.01
Combined routes, systemic, long-term		< 0.01
Combined routes, systemic, acute		< 0.01

1.3.4. Worker exposure: Worker contributing scenario (PROC 2)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long-term	0.5 mg/m ³ (TRA Worker v3)	< 0.01
Inhalation, systemic, acute	2 mg/m ³ (TRA Worker v3)	< 0.01
Inhalation, local, long-term	0.5 mg/m ³ (TRA Worker v3)	0.1
Inhalation, local, acute	2 mg/m ³ (TRA Worker v3)	0.4
Dermal, systemic, long-term	1.37 mg/kg bw/day (TRA Worker v3)	0.036
Combined routes, systemic, long-term		0.038
Combined routes, systemic, acute		< 0.01

1.3.5. Worker exposure: Worker contributing scenario (PROC 3)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long-term	1 mg/m ³ (TRA Worker v3)	< 0.01
Inhalation, systemic, acute	4 mg/m ³ (TRA Worker v3)	0.015
Inhalation, local, long-term	1 mg/m ³ (TRA Worker v3)	0.2
Inhalation, local, acute	4 mg/m ³ (TRA Worker v3)	0.8
Dermal, systemic, long-term	0.69 mg/kg bw/day (TRA Worker v3)	0.018
Combined routes, systemic, long-term		0.022
Combined routes, systemic, acute		0.015

1.3.6. Worker exposure: Worker contributing scenario (PROC 4)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long-term	0.5 mg/m ³ (TRA Worker v3)	< 0.01
Inhalation, systemic, acute	2 mg/m ³ (TRA Worker v3)	< 0.01
Inhalation, local, long-term	0.5 mg/m ³ (TRA Worker v3)	0.1
Inhalation, local, acute	2 mg/m ³ (TRA Worker v3)	0.4
Dermal, systemic, long-term	6.86 mg/kg bw/day (TRA Worker v3)	0.181
Combined routes, systemic, long-term		0.182
Combined routes, systemic, acute		< 0.01

1.3.7. Worker exposure: Worker contributing scenario (PROC 5)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long-term	0.5 mg/m ³ (TRA Worker v3)	< 0.01
Inhalation, systemic, acute	2 mg/m ³ (TRA Worker v3)	< 0.01
Inhalation, local, long-term	0.5 mg/m ³ (TRA Worker v3)	0.1
Inhalation, local, acute	2 mg/m ³ (TRA Worker v3)	0.4
Dermal, systemic, long-term	13.71 mg/kg bw/day (TRA Worker v3)	0.361
Combined routes, systemic, long-term		0.363

Route of exposure and type of effects	Exposure estimate	RCR
Combined routes, systemic, acute		< 0.01

1.3.8. Worker exposure: Worker contributing scenario (PROC 7)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long-term	0.1 mg/m ³ (TRA Worker v3)	< 0.01
Inhalation, systemic, acute	0.4 mg/m ³ (TRA Worker v3)	< 0.01
Inhalation, local, long-term	0.1 mg/m ³ (TRA Worker v3)	0.02
Inhalation, local, acute	0.4 mg/m ³ (TRA Worker v3)	0.08
Dermal, systemic, long-term	8.572 mg/kg bw/day (TRA Worker v3)	0.226
Combined routes, systemic, long-term		0.226
Combined routes, systemic, acute		< 0.01

1.3.9. Worker exposure: Worker contributing scenario (PROC 8a)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long-term	0.5 mg/m ³ (TRA Worker v3)	< 0.01
Inhalation, systemic, acute	2 mg/m ³ (TRA Worker v3)	< 0.01
Inhalation, local, long-term	0.5 mg/m ³ (TRA Worker v3)	0.1
Inhalation, local, acute	2 mg/m ³ (TRA Worker v3)	0.4
Dermal, systemic, long-term	13.71 mg/kg bw/day (TRA Worker v3)	0.361
Combined routes, systemic, long-term		0.363
Combined routes, systemic, acute		< 0.01

1.3.10. Worker exposure: Worker contributing scenario (PROC 8b)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long-term	1 mg/m ³ (TRA Worker v3)	< 0.01
Inhalation, systemic, acute	4 mg/m ³ (TRA Worker v3)	0.015
Inhalation, local, long-term	1 mg/m ³ (TRA Worker v3)	0.2
Inhalation, local, acute	4 mg/m ³ (TRA Worker v3)	0.8
Dermal, systemic, long-term	13.71 mg/kg bw/day (TRA Worker v3)	0.361
Combined routes, systemic, long-term		0.365
Combined routes, systemic, acute		0.015

1.3.11. Worker exposure: Worker contributing scenario (PROC 9)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long-term	0.5 mg/m ³ (TRA Worker v3)	< 0.01
Inhalation, systemic, acute	2 mg/m ³ (TRA Worker v3)	< 0.01
Inhalation, local, long-term	0.5 mg/m ³ (TRA Worker v3)	0.1
Inhalation, local, acute	2 mg/m ³ (TRA Worker v3)	0.4
Dermal, systemic, long-term	6.86 mg/kg bw/day (TRA Worker v3)	0.181
Combined routes, systemic, long-term		0.182
Combined routes, systemic, acute		< 0.01

1.3.12. Worker exposure: Worker contributing scenario (PROC 10)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long-term	0.5 mg/m ³ (TRA Worker v3)	< 0.01
Inhalation, systemic, acute	2 mg/m ³ (TRA Worker v3)	< 0.01
Inhalation, local, long-term	0.5 mg/m ³ (TRA Worker v3)	0.1
Inhalation, local, acute	2 mg/m ³ (TRA Worker v3)	0.4
Dermal, systemic, long-term	27.43 mg/kg bw/day (TRA Worker v3)	0.722
Combined routes, systemic, long-term		0.724
Combined routes, systemic, acute		< 0.01

1.3.13. Worker exposure: Worker contributing scenario (PROC 13)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long-term	1 mg/m ³ (TRA Worker v3)	< 0.01
Inhalation, systemic, acute	4 mg/m ³ (TRA Worker v3)	0.015
Inhalation, local, long-term	1 mg/m ³ (TRA Worker v3)	0.2
Inhalation, local, acute	4 mg/m ³ (TRA Worker v3)	0.8
Dermal, systemic, long-term	13.71 mg/kg bw/day (TRA Worker v3)	0.361
Combined routes, systemic, long-term		0.365
Combined routes, systemic, acute		0.015

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

The DU works inside the boundaries set by the ES if either the proposed risk management measures as described above are met or the downstream user can demonstrate on his own that his operational conditions and implemented risk management measures are adequate. This has to be done by showing that they limit the inhalation exposure to a level below the DNEL (given that the processes and activities in question are covered by the PROCs listed above) as given below. If measured data are not available, the DU may make use of an appropriate scaling tool such as MEASE (www.ebrc.de/mease.html) to estimate the associated exposure. The dustiness of the substance used can be determined according to the MEASE glossary.

2. ES 2: Use by professional worker; Use of adipic acid as Laboratory Chemicals

2.1. Title section

Environment	
CS 1: Use of adipic acid as Laboratory Chemicals	ERC 8a
CS 2: Use of adipic acid as Laboratory Chemicals	ERC 8b

2.2. Conditions of use affecting exposure

2.2.1. Control of environmental exposure: Use of adipic acid as Laboratory Chemicals (ERC 8a)

Amount used, frequency and duration of use (or from service life)
• Daily wide dispersive use: ≤ 0.025 tonnes/day
• Percentage of tonnage used at regional scale: = 10 %
Conditions and measures related to sewage treatment plant
• Municipal STP: Yes [Effectiveness Water: 87.36%]
• Discharge rate of STP: $\geq 2E3$ m ³ /d
• Application of the STP sludge on agricultural soil: Yes
Conditions and measures related to treatment of waste (including article waste)
• Particular considerations on the waste treatment operations: No (low risk) (ERC based assessment demonstrating control of risk with default conditions. Low risk assumed for waste life stage. Waste disposal according to national/local legislation is sufficient.)
Other conditions affecting environmental exposure
• Receiving surface water flow rate: $\geq 1.8E4$ m ³ /d

2.2.2. Control of environmental exposure: Use of adipic acid as Laboratory Chemicals (ERC 8b)

Amount used, frequency and duration of use (or from service life)
• Daily wide dispersive use: ≤ 0.025 tonnes/day
• Percentage of tonnage used at regional scale: = 10 %
Conditions and measures related to sewage treatment plant
• Municipal STP: Yes [Effectiveness Water: 87.36%]
• Discharge rate of STP: $\geq 2E3$ m ³ /d
• Application of the STP sludge on agricultural soil: Yes
Conditions and measures related to treatment of waste (including article waste)
• Particular considerations on the waste treatment operations: No (low risk) (ERC based assessment demonstrating control of risk with default conditions. Low risk assumed for waste life stage. Waste disposal according to national/local legislation is sufficient.)
Other conditions affecting environmental exposure
• Receiving surface water flow rate: $\geq 1.8E4$ m ³ /d

2.2.3. Control of worker exposure: Worker contributing scenario [edit] (PROC 15)

Product (article) characteristics
Covers medium-dusty materials (e.g. talc, graphite).
<i>Covers percentage substance in the product up to 100 %.</i>
Amount used (or contained in articles), frequency and duration of use/exposure
<i>Covers daily exposures up to 8 hours.</i>
Technical and organisational conditions and measures
Provide a basic standard of general ventilation (1 to 3 air changes per hour) .
<i>Basic (professional) exposure controls assumed.</i>
Other conditions affecting workers exposure
Indoor use
Covers use at ambient temperatures.

2.3. Exposure estimation and reference to its source

2.3.1. Environmental release and exposure: Use of adipic acid as Laboratory Chemicals (ERC 8a)

Release route	Release rate	Release estimation method
Water	0.124 kg/day	Release factor
Air	0.124 kg/day	Release factor
Soil	0 kg/day	Release factor

Protection target	Exposure estimate (based on: EUSES 2.1.2)	RCR
Freshwater	0.008 mg/L	0.065
Sediment (freshwater)	0.039 mg/kg dw	0.081
Marine water	9.273E-4 mg/L	0.074
Sediment (marine water)	0.004 mg/kg dw	0.091
Sewage treatment plant	0.008 mg/L	< 0.01
Agricultural soil	0.018 mg/kg dw	0.798
Man via Environment - Inhalation	8.295E-4 mg/m ³	< 0.01
Man via Environment - Oral	0.002 mg/kg bw/day	< 0.01

2.3.2. Environmental release and exposure: Use of adipic acid as Laboratory Chemicals (ERC 8b)

Release route	Release rate	Release estimation method
Water	0.495 kg/day	ERC based
Air	0.025 kg/day	ERC based
Soil	0 kg/day	ERC based

Protection target	Exposure estimate (based on: EUSES 2.1.2)	RCR
Freshwater	0.011 mg/L	0.084
Sediment (freshwater)	0.05 mg/kg dw	0.104
Marine water	0.001 mg/L	0.092
Sediment (marine water)	0.006 mg/kg dw	0.114
Sewage treatment plant	0.031 mg/L	< 0.01

Protection target	Exposure estimate (based on: EUSES 2.1.2)	RCR
Agricultural soil	0.019 mg/kg dw	0.822
Man via Environment - Inhalation	8.296E-4 mg/m ³	< 0.01
Man via Environment - Oral	0.002 mg/kg bw/day	< 0.01

2.3.3. Worker exposure: Worker contributing scenario [edit] (PROC 15)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long-term	0.5 mg/m ³ (TRA Worker v3)	< 0.01
Inhalation, systemic, acute	2 mg/m ³ (TRA Worker v3)	< 0.01
Inhalation, local, long-term	0.5 mg/m ³ (TRA Worker v3)	0.1
Inhalation, local, acute	2 mg/m ³ (TRA Worker v3)	0.4
Dermal, systemic, long-term	0.34 mg/kg bw/day (TRA Worker v3)	< 0.01
Combined routes, systemic, long-term		0.011
Combined routes, systemic, acute		< 0.01

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

The DU works inside the boundaries set by the ES if either the proposed risk management measures as described above are met or the downstream user can demonstrate on his own that his operational conditions and implemented risk management measures are adequate. This has to be done by showing that they limit the inhalation exposure to a level below the DNEL (given that the processes and activities in question are covered by the PROCs listed above) as given below. If measured data are not available, the DU may make use of an appropriate scaling tool such as MEASE (www.ebrc.de/mease.html) to estimate the associated exposure. The dustiness of the substance used can be determined according to the MEASE glossary.

3. ES 3: Formulation; Use of adipic acid in the production of dish washing machine tablets

3.1. Title section

Environment	
CS 1: Use of adipic acid in the production of dish washing machine tablets	ERC 2
Worker	
CS 2: Worker contributing scenario	PROC 2
CS 3: Worker contributing scenario [edit]	PROC 5
CS 4: Worker contributing scenario [edit]	PROC 8a
CS 5: Worker contributing scenario [edit]	PROC 13
CS 6: Worker contributing scenario [edit]	PROC 14

3.2. Conditions of use affecting exposure

3.2.1. Control of environmental exposure: Use of adipic acid in the production of dish washing machine tablets (ERC 2)

Amount used, frequency and duration of use (or from service life)
• Daily use at site: ≤ 0.27 tonnes/day
• Annual use at a site: ≤ 100 tonnes/year
• Percentage of tonnage used at regional scale: = 100 %
Conditions and measures related to sewage treatment plant
• Municipal STP: Yes [Effectiveness Water: 87.36%]
• Discharge rate of STP: $\geq 2E3$ m ³ /d
• Application of the STP sludge on agricultural soil: Yes
Conditions and measures related to treatment of waste (including article waste)
• Particular considerations on the waste treatment operations: No (low risk) (ERC based assessment demonstrating control of risk with default conditions. Low risk assumed for waste life stage. Waste disposal according to national/local legislation is sufficient.)
Other conditions affecting environmental exposure
• Receiving surface water flow rate: $\geq 1.8E4$ m ³ /d

3.2.2. Control of worker exposure: Worker contributing scenario (PROC 2)

Product (article) characteristics
Covers medium-dusty materials (e.g. talc, graphite).
<i>Covers percentage substance in the product up to 100 %.</i>
Amount used (or contained in articles), frequency and duration of use/exposure
<i>Covers daily exposures up to 8 hours.</i>
Technical and organisational conditions and measures
Provide a basic standard of general ventilation (1 to 3 air changes per hour) .
Use in closed, continuous process with occasional controlled exposure
<i>Advanced (industrial) exposure controls assumed.</i>
Other conditions affecting workers exposure

Indoor use
Covers use at ambient temperatures.

3.2.3. Control of worker exposure: Worker contributing scenario [edit] (PROC 5)

Product (article) characteristics
Covers medium-dusty materials (e.g. talc, graphite).
<i>Covers percentage substance in the product up to 100 %.</i>
Amount used (or contained in articles), frequency and duration of use/exposure
<i>Covers daily exposures up to 8 hours.</i>
Technical and organisational conditions and measures
Provide a basic standard of general ventilation (1 to 3 air changes per hour) .
<i>Advanced (industrial) exposure controls assumed.</i>
Conditions and measures related to personal protection, hygiene and health evaluation
Wear a respirator providing a minimum efficiency of; For further specification, refer to section 8 of the SDS.
Other conditions affecting workers exposure
Indoor use
Covers use at ambient temperatures.

3.2.4. Control of worker exposure: Worker contributing scenario [edit] (PROC 8a)

Product (article) characteristics
Covers medium-dusty materials (e.g. talc, graphite).
<i>Covers percentage substance in the product up to 100 %.</i>
Amount used (or contained in articles), frequency and duration of use/exposure
<i>Covers daily exposures up to 8 hours.</i>
Technical and organisational conditions and measures
Provide a basic standard of general ventilation (1 to 3 air changes per hour) .
<i>Advanced (industrial) exposure controls assumed.</i>
Conditions and measures related to personal protection, hygiene and health evaluation
Wear a respirator providing a minimum efficiency of; For further specification, refer to section 8 of the SDS.
Other conditions affecting workers exposure
Indoor use
Covers use at ambient temperatures.

3.2.5. Control of worker exposure: Worker contributing scenario [edit] (PROC 13)

Product (article) characteristics
Covers medium-dusty materials (e.g. talc, graphite).
<i>Covers percentage substance in the product up to 100 %.</i>
Amount used (or contained in articles), frequency and duration of use/exposure
<i>Covers daily exposures up to 8 hours.</i>
Technical and organisational conditions and measures
Provide a basic standard of general ventilation (1 to 3 air changes per hour) .
<i>Advanced (industrial) exposure controls assumed.</i>
Other conditions affecting workers exposure

Indoor use
Covers use at ambient temperatures.

3.2.6. Control of worker exposure: Worker contributing scenario [edit] (PROC 14)

Product (article) characteristics
Covers medium-dusty materials (e.g. talc, graphite).
<i>Covers percentage substance in the product up to 100 %.</i>
Amount used (or contained in articles), frequency and duration of use/exposure
<i>Covers daily exposures up to 8 hours.</i>
Technical and organisational conditions and measures
Provide a basic standard of general ventilation (1 to 3 air changes per hour) .
<i>Advanced (industrial) exposure controls assumed.</i>
Other conditions affecting workers exposure
Indoor use
Covers use at ambient temperatures.

3.3. Exposure estimation and reference to its source

3.3.1. Environmental release and exposure: Use of adipic acid in the production of dish washing machine tablets (ERC 2)

Release route	Release rate	Release estimation method
Water	1.35 kg/day	Release factor
Air	1.35 kg/day	Release factor
Soil	0.027 kg/day	Release factor

Protection target	Exposure estimate (based on: EUSES 2.1.2)	RCR
Freshwater	0.016 mg/L	0.126
Sediment (freshwater)	0.076 mg/kg dw	0.157
Marine water	0.002 mg/L	0.135
Sediment (marine water)	0.008 mg/kg dw	0.168
Sewage treatment plant	0.085 mg/L	< 0.01
Agricultural soil	0.02 mg/kg dw	0.881
Man via Environment - Inhalation	0.001 mg/m ³	< 0.01
Man via Environment - Oral	0.003 mg/kg bw/day	< 0.01

3.3.2. Worker exposure: Worker contributing scenario (PROC 2)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long-term	0.5 mg/m ³ (TRA Worker v3)	< 0.01
Inhalation, systemic, acute	2 mg/m ³ (TRA Worker v3)	< 0.01
Inhalation, local, long-term	0.5 mg/m ³ (TRA Worker v3)	0.1
Inhalation, local, acute	2 mg/m ³ (TRA Worker v3)	0.4
Dermal, systemic, long-term	1.37 mg/kg bw/day (TRA Worker v3)	0.036
Combined routes, systemic, long-term		0.038
Combined routes, systemic, acute		< 0.01

3.3.3. Worker exposure: Worker contributing scenario [edit] (PROC 5)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long-term	0.5 mg/m ³ (TRA Worker v3)	< 0.01
Inhalation, systemic, acute	2 mg/m ³ (TRA Worker v3)	< 0.01
Inhalation, local, long-term	0.5 mg/m ³ (TRA Worker v3)	0.1
Inhalation, local, acute	2 mg/m ³ (TRA Worker v3)	0.4
Dermal, systemic, long-term	13.71 mg/kg bw/day (TRA Worker v3)	0.361
Combined routes, systemic, long-term		0.363
Combined routes, systemic, acute		< 0.01

3.3.4. Worker exposure: Worker contributing scenario [edit] (PROC 8a)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long-term	0.5 mg/m ³ (TRA Worker v3)	< 0.01
Inhalation, systemic, acute	2 mg/m ³ (TRA Worker v3)	< 0.01
Inhalation, local, long-term	0.5 mg/m ³ (TRA Worker v3)	0.1
Inhalation, local, acute	2 mg/m ³ (TRA Worker v3)	0.4
Dermal, systemic, long-term	13.71 mg/kg bw/day (TRA Worker v3)	0.361
Combined routes, systemic, long-term		0.363
Combined routes, systemic, acute		< 0.01

3.3.5. Worker exposure: Worker contributing scenario [edit] (PROC 13)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long-term	1 mg/m ³ (TRA Worker v3)	< 0.01
Inhalation, systemic, acute	4 mg/m ³ (TRA Worker v3)	0.015
Inhalation, local, long-term	1 mg/m ³ (TRA Worker v3)	0.2
Inhalation, local, acute	4 mg/m ³ (TRA Worker v3)	0.8
Dermal, systemic, long-term	13.71 mg/kg bw/day (TRA Worker v3)	0.361
Combined routes, systemic, long-term		0.365
Combined routes, systemic, acute		0.015

3.3.6. Worker exposure: Worker contributing scenario [edit] (PROC 14)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long-term	1 mg/m ³ (TRA Worker v3)	< 0.01
Inhalation, systemic, acute	4 mg/m ³ (TRA Worker v3)	0.015
Inhalation, local, long-term	1 mg/m ³ (TRA Worker v3)	0.2
Inhalation, local, acute	4 mg/m ³ (TRA Worker v3)	0.8
Dermal, systemic, long-term	3.43 mg/kg bw/day (TRA Worker v3)	0.09
Combined routes, systemic, long-term		0.094
Combined routes, systemic, acute		0.015

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

The DU works inside the boundaries set by the ES if either the proposed risk management measures as described above are met or the downstream user can demonstrate on his own that his operational conditions and

implemented risk management measures are adequate. This has to be done by showing that they limit the inhalation exposure to a level below the DNEL (given that the processes and activities in question are covered by the PROCs listed above) as given below. If measured data are not available, the DU may make use of an appropriate scaling tool such as MEASE (www.ebrc.de/mease.html) to estimate the associated exposure. The dustiness of the substance used can be determined according to the MEASE glossary.

4. ES 4: Use at industrial site; Use of adipic acid as intermediate or monomer; SU 8; SU 9; SU 12

4.1. Title section

Manufacture of bulk, large scale chemicals (including petroleum products) (SU 8)	
Manufacture of fine chemicals (SU 9)	
Manufacture of plastics products, including compounding and conversion (SU 12)	
Environment	
CS 1: Use of adipic acid as intermediate or monomer	ERC 6a
CS 2: Use of adipic acid as intermediate or monomer	ERC 6c
CS 3: Use of adipic acid as intermediate or monomer	ERC 6d
Worker	
CS 4: Worker contributing scenario	PROC 1
CS 5: Worker contributing scenario	PROC 2
CS 6: Worker contributing scenario	PROC 3
CS 7: Worker contributing scenario	PROC 4
CS 8: Worker contributing scenario	PROC 8a
CS 9: Worker contributing scenario	PROC 8b
CS 10: Worker contributing scenario	PROC 9

4.2. Conditions of use affecting exposure

4.2.1. Control of environmental exposure: Use of adipic acid as intermediate or monomer (ERC 6a)

Amount used, frequency and duration of use (or from service life)
• Daily use at site: ≤ 0.27 tonnes/day
• Annual use at a site: ≤ 100 tonnes/year
• Percentage of tonnage used at regional scale: = 100 %
Conditions and measures related to sewage treatment plant
• Municipal STP: Yes [Effectiveness Water: 87.36%]
• Discharge rate of STP: $\geq 2E3$ m ³ /d
• Application of the STP sludge on agricultural soil: Yes
Conditions and measures related to treatment of waste (including article waste)
• Particular considerations on the waste treatment operations: No (low risk) (ERC based assessment demonstrating control of risk with default conditions. Low risk assumed for waste life stage. Waste disposal according to national/local legislation is sufficient.)
Other conditions affecting environmental exposure
• Receiving surface water flow rate: $\geq 1.8E4$ m ³ /d

4.2.2. Control of environmental exposure: use of adipic acid as intermediate or monomer (ERC 6c)

Amount used, frequency and duration of use (or from service life)
• Daily use at site: ≤ 0.27 tonnes/day
• Annual use at a site: ≤ 100 tonnes/year
• Percentage of tonnage used at regional scale: = 100 %

Conditions and measures related to sewage treatment plant
• Municipal STP: Yes [Effectiveness Water: 87.36%]
• Discharge rate of STP: $\geq 2E3$ m ³ /d
• Application of the STP sludge on agricultural soil: Yes
Conditions and measures related to treatment of waste (including article waste)
• Particular considerations on the waste treatment operations: No (low risk) (ERC based assessment demonstrating control of risk with default conditions. Low risk assumed for waste life stage. Waste disposal according to national/local legislation is sufficient.)
Other conditions affecting environmental exposure
• Receiving surface water flow rate: $\geq 1.8E4$ m ³ /d

4.2.3. Control of environmental exposure: use of adipic acid as intermediate or monomer (ERC 6d)

Amount used, frequency and duration of use (or from service life)
• Daily use at site: ≤ 0.27 tonnes/day
• Annual use at a site: ≤ 100 tonnes/year
• Percentage of tonnage used at regional scale: = 100 %
Conditions and measures related to sewage treatment plant
• Municipal STP: Yes [Effectiveness Water: 87.36%]
• Discharge rate of STP: $\geq 2E3$ m ³ /d
• Application of the STP sludge on agricultural soil: Yes
Conditions and measures related to treatment of waste (including article waste)
• Particular considerations on the waste treatment operations: No (low risk) (ERC based assessment demonstrating control of risk with default conditions. Low risk assumed for waste life stage. Waste disposal according to national/local legislation is sufficient.)
Other conditions affecting environmental exposure
• Receiving surface water flow rate: $\geq 1.8E4$ m ³ /d

4.2.4. Control of worker exposure: Worker contributing scenario (PROC 1)

Product (article) characteristics
Covers medium-dusty materials (e.g. talc, graphite).
<i>Covers percentage substance in the product up to 100 %.</i>
Amount used (or contained in articles), frequency and duration of use/exposure
<i>Covers daily exposures up to 8 hours.</i>
Technical and organisational conditions and measures
Provide a basic standard of general ventilation (1 to 3 air changes per hour) .
Use in closed process, no likelihood of exposure
<i>Advanced (industrial) exposure controls assumed.</i>
Other conditions affecting workers exposure
Indoor use
Covers use at ambient temperatures.

4.2.5. Control of worker exposure: Worker contributing scenario (PROC 2)

Product (article) characteristics
Covers medium-dusty materials (e.g. talc, graphite).

<i>Covers percentage substance in the product up to 100 %.</i>
Amount used (or contained in articles), frequency and duration of use/exposure
<i>Covers daily exposures up to 8 hours.</i>
Technical and organisational conditions and measures
Provide a basic standard of general ventilation (1 to 3 air changes per hour) .
Use in closed, continuous process with occasional controlled exposure
<i>Advanced (industrial) exposure controls assumed.</i>
Other conditions affecting workers exposure
Indoor use
Covers use at ambient temperatures.

4.2.6. Control of worker exposure: Worker contributing scenario (PROC 3)

Product (article) characteristics
Covers medium-dusty materials (e.g. talc, graphite).
<i>Covers percentage substance in the product up to 100 %.</i>
Amount used (or contained in articles), frequency and duration of use/exposure
<i>Covers daily exposures up to 8 hours.</i>
Technical and organisational conditions and measures
Provide a basic standard of general ventilation (1 to 3 air changes per hour) .
Use in closed batch process (synthesis or formulation)
<i>Advanced (industrial) exposure controls assumed.</i>
Other conditions affecting workers exposure
Indoor use
Covers use at ambient temperatures.

4.2.7. Control of worker exposure: Worker contributing scenario (PROC 4)

Product (article) characteristics
Covers medium-dusty materials (e.g. talc, graphite).
<i>Covers percentage substance in the product up to 100 %.</i>
Amount used (or contained in articles), frequency and duration of use/exposure
<i>Covers daily exposures up to 8 hours.</i>
Technical and organisational conditions and measures
Provide a basic standard of general ventilation (1 to 3 air changes per hour) .
Use in semi-closed process with opportunity for exposure
<i>Advanced (industrial) exposure controls assumed.</i>
Conditions and measures related to personal protection, hygiene and health evaluation
Wear a respirator providing a minimum efficiency of; For further specification, refer to section 8 of the SDS.
Other conditions affecting workers exposure
Indoor use
Covers use at ambient temperatures.

4.2.8. Control of worker exposure: Worker contributing scenario (PROC 8a)

Product (article) characteristics
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Covers medium-dusty materials (e.g. talc, graphite).
<i>Covers percentage substance in the product up to 100 %.</i>
Amount used (or contained in articles), frequency and duration of use/exposure
<i>Covers daily exposures up to 8 hours.</i>
Technical and organisational conditions and measures
Provide a basic standard of general ventilation (1 to 3 air changes per hour) .
<i>Advanced (industrial) exposure controls assumed.</i>
Conditions and measures related to personal protection, hygiene and health evaluation
Wear a respirator providing a minimum efficiency of; For further specification, refer to section 8 of the SDS.
Other conditions affecting workers exposure
Indoor use
Covers use at ambient temperatures.

4.2.9. Control of worker exposure: Worker contributing scenario (PROC 8b)

Product (article) characteristics
Covers medium-dusty materials (e.g. talc, graphite).
<i>Covers percentage substance in the product up to 100 %.</i>
Amount used (or contained in articles), frequency and duration of use/exposure
<i>Covers daily exposures up to 8 hours.</i>
Technical and organisational conditions and measures
Provide a basic standard of general ventilation (1 to 3 air changes per hour) .
Use in semi-closed process with opportunity for exposure
Local exhaust ventilation - efficiency of at least
<i>Advanced (industrial) exposure controls assumed.</i>
Conditions and measures related to personal protection, hygiene and health evaluation
Wear a respirator providing a minimum efficiency of; For further specification, refer to section 8 of the SDS.
Other conditions affecting workers exposure
Indoor use
Covers use at ambient temperatures.

4.2.10. Control of worker exposure: Worker contributing scenario (PROC 9)

Product (article) characteristics
Covers medium-dusty materials (e.g. talc, graphite).
<i>Covers percentage substance in the product up to 100 %.</i>
Amount used (or contained in articles), frequency and duration of use/exposure
<i>Covers daily exposures up to 8 hours.</i>
Technical and organisational conditions and measures
Provide a basic standard of general ventilation (1 to 3 air changes per hour) .
Use in semi-closed process with opportunity for exposure
Local exhaust ventilation - efficiency of at least
<i>Advanced (industrial) exposure controls assumed.</i>
Conditions and measures related to personal protection, hygiene and health evaluation
Wear a respirator providing a minimum efficiency of; For further specification, refer to section 8 of the SDS.
Other conditions affecting workers exposure

Indoor use
Covers use at ambient temperatures.

4.3. Exposure estimation and reference to its source

4.3.1. Environmental release and exposure: Use of adipic acid as intermediate or monomer (ERC 6a)

Release route	Release rate	Release estimation method
Water	0.014 kg/day	Release factor
Air	13.5 kg/day	ERC based
Soil	0.27 kg/day	ERC based

Protection target	Exposure estimate (based on: EUSES 2.1.2)	RCR
Freshwater	0.007 mg/L	0.059
Sediment (freshwater)	0.036 mg/kg dw	0.074
Marine water	8.576E-4 mg/L	0.068
Sediment (marine water)	0.004 mg/kg dw	0.084
Sewage treatment plant	8.531E-4 mg/L	< 0.01
Agricultural soil	0.019 mg/kg dw	0.816
Man via Environment - Inhalation	0.005 mg/m ³	< 0.01
Man via Environment - Oral	0.006 mg/kg bw/day	< 0.01

4.3.2. Environmental release and exposure: use of adipic acid as intermediate or monomer (ERC 6c)

Release route	Release rate	Release estimation method
Water	1.35 kg/day	Release factor
Air	1.35 kg/day	Release factor
Soil	0 kg/day	Release factor

Protection target	Exposure estimate (based on: EUSES 2.1.2)	RCR
Freshwater	0.016 mg/L	0.126
Sediment (freshwater)	0.076 mg/kg dw	0.157
Marine water	0.002 mg/L	0.135
Sediment (marine water)	0.008 mg/kg dw	0.168
Sewage treatment plant	0.085 mg/L	< 0.01
Agricultural soil	0.02 mg/kg dw	0.881
Man via Environment - Inhalation	0.001 mg/m ³	< 0.01
Man via Environment - Oral	0.003 mg/kg bw/day	< 0.01

4.3.3. Environmental release and exposure: use of adipic acid as intermediate or monomer (ERC 6d)

Release route	Release rate	Release estimation method
Water	0.014 kg/day	ERC based

Release route	Release rate	Release estimation method
Air	94.5 kg/day	ERC based
Soil	0.068 kg/day	ERC based

Protection target	Exposure estimate (based on: EUSES 2.1.2)	RCR
Freshwater	0.007 mg/L	0.059
Sediment (freshwater)	0.036 mg/kg dw	0.074
Marine water	8.576E-4 mg/L	0.068
Sediment (marine water)	0.004 mg/kg dw	0.084
Sewage treatment plant	8.531E-4 mg/L	< 0.01
Agricultural soil	0.022 mg/kg dw	0.967
Man via Environment - Inhalation	0.027 mg/m ³	< 0.01
Man via Environment - Oral	0.025 mg/kg bw/day	< 0.01

4.3.4. Worker exposure: Worker contributing scenario (PROC 1)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long-term	0.01 mg/m ³ (TRA Worker v3)	< 0.01
Inhalation, systemic, acute	0.04 mg/m ³ (TRA Worker v3)	< 0.01
Inhalation, local, long-term	0.01 mg/m ³ (TRA Worker v3)	< 0.01
Inhalation, local, acute	0.04 mg/m ³ (TRA Worker v3)	< 0.01
Dermal, systemic, long-term	0.034 mg/kg bw/day (TRA Worker v3)	< 0.01
Combined routes, systemic, long-term		< 0.01
Combined routes, systemic, acute		< 0.01

4.3.5. Worker exposure: Worker contributing scenario (PROC 2)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long-term	0.5 mg/m ³ (TRA Worker v3)	< 0.01
Inhalation, systemic, acute	2 mg/m ³ (TRA Worker v3)	< 0.01
Inhalation, local, long-term	0.5 mg/m ³ (TRA Worker v3)	0.1
Inhalation, local, acute	2 mg/m ³ (TRA Worker v3)	0.4
Dermal, systemic, long-term	1.37 mg/kg bw/day (TRA Worker v3)	0.036
Combined routes, systemic, long-term		0.038
Combined routes, systemic, acute		< 0.01

4.3.6. Worker exposure: Worker contributing scenario (PROC 3)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long-term	1 mg/m ³ (TRA Worker v3)	< 0.01
Inhalation, systemic, acute	4 mg/m ³ (TRA Worker v3)	0.015
Inhalation, local, long-term	1 mg/m ³ (TRA Worker v3)	0.2
Inhalation, local, acute	4 mg/m ³ (TRA Worker v3)	0.8
Dermal, systemic, long-term	0.69 mg/kg bw/day (TRA Worker v3)	0.018
Combined routes, systemic, long-term		0.022
Combined routes, systemic, acute		0.015

4.3.7. Worker exposure: Worker contributing scenario (PROC 4)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long-term	0.5 mg/m ³ (TRA Worker v3)	< 0.01
Inhalation, systemic, acute	2 mg/m ³ (TRA Worker v3)	< 0.01
Inhalation, local, long-term	0.5 mg/m ³ (TRA Worker v3)	0.1
Inhalation, local, acute	2 mg/m ³ (TRA Worker v3)	0.4
Dermal, systemic, long-term	6.86 mg/kg bw/day (TRA Worker v3)	0.181
Combined routes, systemic, long-term		0.182
Combined routes, systemic, acute		< 0.01

4.3.8. Worker exposure: Worker contributing scenario (PROC 8a)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long-term	0.5 mg/m ³ (TRA Worker v3)	< 0.01
Inhalation, systemic, acute	2 mg/m ³ (TRA Worker v3)	< 0.01
Inhalation, local, long-term	0.5 mg/m ³ (TRA Worker v3)	0.1
Inhalation, local, acute	2 mg/m ³ (TRA Worker v3)	0.4
Dermal, systemic, long-term	13.71 mg/kg bw/day (TRA Worker v3)	0.361
Combined routes, systemic, long-term		0.363
Combined routes, systemic, acute		< 0.01

4.3.9. Worker exposure: Worker contributing scenario (PROC 8b)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long-term	0.005 mg/m ³ (TRA Worker v3)	< 0.01
Inhalation, systemic, acute	0.02 mg/m ³ (TRA Worker v3)	< 0.01
Inhalation, local, long-term	0.005 mg/m ³ (TRA Worker v3)	< 0.01
Inhalation, local, acute	0.02 mg/m ³ (TRA Worker v3)	< 0.01
Dermal, systemic, long-term	13.71 mg/kg bw/day (TRA Worker v3)	0.361
Combined routes, systemic, long-term		0.361
Combined routes, systemic, acute		< 0.01

4.3.10. Worker exposure: Worker contributing scenario (PROC 9)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long-term	0.05 mg/m ³ (TRA Worker v3)	< 0.01
Inhalation, systemic, acute	0.2 mg/m ³ (TRA Worker v3)	< 0.01
Inhalation, local, long-term	0.05 mg/m ³ (TRA Worker v3)	0.01
Inhalation, local, acute	0.2 mg/m ³ (TRA Worker v3)	0.04
Dermal, systemic, long-term	6.86 mg/kg bw/day (TRA Worker v3)	0.181
Combined routes, systemic, long-term		0.181
Combined routes, systemic, acute		< 0.01

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

The DU works inside the boundaries set by the ES if either the proposed risk management measures as described above are met or the downstream user can demonstrate on his own that his operational conditions and

implemented risk management measures are adequate. This has to be done by showing that they limit the inhalation exposure to a level below the DNEL (given that the processes and activities in question are covered by the PROCs listed above) as given below. If measured data are not available, the DU may make use of an appropriate scaling tool such as MEASE (www.ebrc.de/mease.html) to estimate the associated exposure. The dustiness of the substance used can be determined according to the MEASE glossary.

5. ES 5: Consumer Use; Use of adipic acid in flue gas desulphurisation

5.1. Title section

Environment	
CS 1: Use of adipic acid in flue gas desulphurisation	ERC 8e

5.2. Conditions of use affecting exposure

5.2.1. Control of environmental exposure: Use of adipic acid in flue gas desulphurisation (ERC 8e)

Amount used, frequency and duration of use (or from service life)
• Daily wide dispersive use: $\leq 5.5E-4$ tonnes/day
• Percentage of tonnage used at regional scale: = 10 %
Conditions and measures related to treatment of waste (including article waste)
• Particular considerations on the waste treatment operations: No (low risk) (ERC based assessment demonstrating control of risk with default conditions. Low risk assumed for waste life stage. Waste disposal according to national/local legislation is sufficient.)
Other conditions affecting environmental exposure
• Municipal STP: Yes [Effectiveness Water: 87.36%]
• Discharge rate of STP: $\geq 2E3$ m ³ /d
• Application of the STP sludge on agricultural soil: Yes
• Receiving surface water flow rate: $\geq 1.8E4$ m ³ /d

5.3. Exposure estimation and reference to its source

5.3.1. Environmental release and exposure: Use of adipic acid in flue gas desulphurisation (ERC 8e)

Release route	Release rate	Release estimation method
Water	0.011 kg/day	ERC based
Air	5.5E-4 kg/day	ERC based
Soil	0.006 kg/day	ERC based

Protection target	Exposure estimate (based on: EUSES 2.1.2)	RCR
Freshwater	0.007 mg/L	0.059
Sediment (freshwater)	0.036 mg/kg dw	0.074
Marine water	8.56E-4 mg/L	0.068
Sediment (marine water)	0.004 mg/kg dw	0.084
Sewage treatment plant	6.951E-4 mg/L	< 0.01
Agricultural soil	0.018 mg/kg dw	0.79
Man via Environment - Inhalation	8.295E-4 mg/m ³	< 0.01
Man via Environment - Oral	0.002 mg/kg bw/day	< 0.01

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

set by the ES

The DU works inside the boundaries set by the ES if either the proposed risk management measures as described above are met or the downstream user can demonstrate on his own that his operational conditions and implemented risk management measures are adequate. This has to be done by showing that they limit the inhalation exposure to a level below the DNEL (given that the processes and activities in question are covered by the PROCs listed above) as given below. If measured data are not available, the DU may make use of an appropriate scaling tool such as MEASE (www.ebrc.de/mease.html) to estimate the associated exposure. The dustiness of the substance used can be determined according to the MEASE glossary.

6. ES 6: Consumer Use; Consumer Use

6.1. Title section

Environment	
CS 1: Use of dish washing machine tablets by consumers	ERC 8a

6.2. Conditions of use affecting exposure

6.2.1. Control of environmental exposure: Use of dish washing machine tablets by consumers (ERC 8a)

Amount used, frequency and duration of use (or from service life)
• Daily wide dispersive use: $\leq 5.5E-4$ tonnes/day
• Percentage of tonnage used at regional scale: = 10 %
Conditions and measures related to treatment of waste (including article waste)
• Particular considerations on the waste treatment operations: No (low risk) (ERC based assessment demonstrating control of risk with default conditions. Low risk assumed for waste life stage. Waste disposal according to national/local legislation is sufficient.)
Other conditions affecting environmental exposure
• Municipal STP: Yes [Effectiveness Water: 87.36%]
• Discharge rate of STP: $\geq 2E3$ m ³ /d
• Application of the STP sludge on agricultural soil: Yes
• Receiving surface water flow rate: $\geq 1.8E4$ m ³ /d

6.3. Exposure estimation and reference to its source

6.3.1. Environmental release and exposure: Consumer Use (ERC 8a)

Release route	Release rate	Release estimation method
Water	0.55 kg/day	ERC based
Air	0.55 kg/day	ERC based
Soil	0 kg/day	ERC based

Protection target	Exposure estimate (based on: EUSES 2.1.2)	RCR
Freshwater	0.011 mg/L	0.086
Sediment (freshwater)	0.052 mg/kg dw	0.107
Marine water	0.001 mg/L	0.095
Sediment (marine water)	0.006 mg/kg dw	0.118
Sewage treatment plant	0.035 mg/L	< 0.01
Agricultural soil	0.019 mg/kg dw	0.826
Man via Environment - Inhalation	8.296E-4 mg/m ³	< 0.01
Man via Environment - Oral	0.002 mg/kg bw/day	< 0.01

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

The DU works inside the boundaries set by the ES if either the proposed risk management measures as

described above are met or the downstream user can demonstrate on his own that his operational conditions and implemented risk management measures are adequate. This has to be done by showing that they limit the inhalation exposure to a level below the DNEL (given that the processes and activities in question are covered by the PROCs listed above) as given below. If measured data are not available, the DU may make use of an appropriate scaling tool such as MEASE (www.ebrc.de/mease.html) to estimate the associated exposure. The dustiness of the substance used can be determined according to the MEASE glossary.