



(according to Regulation (EC) No 1907/2006 (REACH), ANNEX II)

# CAPROLACTAM



AZOI	NITIFICATION OF THE OURSE AND THE	DE THE COMPANY
	NTIFICATION OF THE SUBSTANCE AND (	JE THE COMPANY
1.1 Product identifier		
Trade name:	ε-Caprolactam	
Other names:	2H-Azepin-2-one, hexahydro-	
Name IUPAC/ international chemical name	Azepan-2-one	
INDEX No. and name as listed in Annex VI of CLP:	613-069-00-2, ε-Caprolactam	
CAS No.:	105-60-2	
EINECS No.:	203-313-2	
REACH registration No.:	01-2119457029-36-0012	
Molecular formula:	C6H11NO	
1.2 Relevant identified uses of the subst	ance or mixture and uses advised agains	t
Relevant identified uses:	Manufacture/import of caprolactam (see ES Distribution of caprolactam (see ES 2) Industrial formulation of solid preparations Formulation of liquid preparations (industrial Use as intermediate (see ES 5) Use as monomer for polyamide, polymers, Use as monomer for resins (see ES 7) Use as monomer for thermo hardened residuse as plasticizer for polyamide (see ES 9) Use in leather tanning, finishing, impregnat Use as laboratory chemical (see ES 11) Use in coatings/paints (consumer) (see ES	(see ES 3) al/professional) (see ES 4) thermoplastics (see ES 6) ns (see ES 8) ) ion, coatings and paints (see ES 10)
Uses advised against:	None	
1.3 Details of the supplier of the safety of	lata sheet	
Only Representative:	Zangas Hoch-und Tiefbau GmbH Schwindgasse 5/1/4 1040 Vienna Austria Phone: +43 1 274 16 366 www.zangasgroup.com E-mail: info@zangasgroup.com	
Manufacturer:	PrJSC "AZOT" 72, Heroiv Kholodnoho Yaru Str., Cherkass Phone: +38 0472 39-63-03	sy, Ukraine
E-mail address of the person responsible for this Safety Data Sheet:	PrJSC "AZOT" REACH Department onr@azot.ck.ua	
National contact:	Not available	
1.4 Emergency telephone number		
Emergency phone number:	Phone: +43 1 274 16 366 Opening hours: 9-18 (CET) Languages of the phone service: German, Phone: + 38 (0472) 39 61 17 Opening hours: 0-24 Languages of the phone service: Ukrainian	
	SECTION 2: HAZARDS IDENTIFICATION	
2.1 Classification of the substance		
2.1.1 Clas	sification in accordance with Regulation 1272	2/2008 (CLP)
Hazard statement(s):	H302 H332 H315 H319 H335	Harmful if swallowed. Harmful if inhaled. Causes skin irritation. Causes serious eye irritation. May cause respiratory irritation





(according to Regulation (EC) No 1907/2006 (REACH), ANNEX II)

# CAPROLACTAM

Revision date: 01.10.2024 Version 4.4

AZOT

systems.

2.2 Label elements		
2.2.1 Labeli	ling in accordance with Regulation (EC) No 12	272/2008 [CLP]
Hazard pictogram(s):	<u>(!</u> )	
Signal word:	Warning	
Hazard statement(s):	H302 Harmful if swallowed H332 Harmful if inhaled H315 Causes skin irritation H319 Causes serious eye irritation H335 May cause respiratory irritation	Oral: Acute Tox. 4 Inhal: Acute Tox. 4 Skin Irrit. 2 Eye Irrit. 2 STOT Single Exp. 3
Precautionary Statements (Prevention):	P271 Use only outdoors or in a well-ventila P280 Wear protective gloves, eye and face P261 Avoid breathing dust, fume, gas, mist	ted area. e protection.
Precautionary Statements (Response):	P301+P312 If swallowed: Call a POISON C P305 + P351 + P338 IF IN EYES: Rinse ca Remove contact lenses, if present and eas P304 + P340 IF INHALED: Remove persor breathing. P302 + P352 IF ON SKIN: Wash with plent	autiously with water for several minutes. y to do. Continue rinsing. n to fresh air and keep comfortable for
Precautionary Statements (Storage):	P403 + P233 Store in a well-ventilated place	
Other hazards (GHS):	No specific dangers known, if the regulation considered. Assessment PBT / vPvB: According to Annex XIII of Regulation (EC) Evaluation, Authorisation and Restriction of Not fulfilling PBT (persistent/bioaccum Not fulfilling vPvB (very persistent/very	No.1907/2006 concerning the Registration, f Chemicals (REACH): nulative/toxic) criteria;
SECTIO	N 3: COMPOSITION/INFORMATION ON ING	
3.1 Substances		
Name	INDEX No. as listed in Annex VI of CLP	Weight % content (or range)
ε-Caprolactam	613-069-00-2	>99.0 % (w/w)
	SECTION 4: FIRST-AID MEASURES	
4.1 Description of first aid measures		
General notes:	clothing.	ng. Avoid contact with the skin, eyes and
Following eye contact:	held open, consult an eye specialist.	t 15 minutes under running water with eyelids
Following skin contact:	treatment.	ns caused by molten material require hospital
Following ingestion:	Rinse mouth immediately and then drink pl	enty of water, seek medical attention.
Following inhalation:	Keep victim calm, remove to fresh air, seek	medical attention.
Self-protection for the first aider:	None	
4.2 Most important symptoms and effect	=	
Acute effects/Delayed effects	labeling (see section 2) and/or in section 1	symptoms and effects are described in the 1.
	I attention and special treatment needed decontamination, vital functions), no known s	pecific antidote.
	SECTION 5: FIRE-FIGHTING MEASURES	
5.1 Extinguishing media		
Suitable extinguishing media:	Foam, carbon dioxide, water spray, water	
Not suitable extinguishing media:	None	
<ul> <li>5.2 Special hazards arising from the sull Hydrogen cyanide, nitrogen and carbon ox The substances/groups of substances mer</li> <li>5.3 Advice for firefighters</li> </ul>	ides.	
	ct contaminated extinguishing water separate	ly, do not allow reaching sewage or effluent





(according to Regulation (EC) No 1907/2006 (REACH), ANNEX II)

### CAPROLACTAM

Revision date: 01.10.2024 Version 4.4



#### **SECTION 6: ACCIDENTAL RELEASE MEASURES**

#### 6.1 Personal precautions, protective equipment and emergency procedures

#### 6.1.1 For non-emergency personnel

<u>Protective equipment:</u> Use breathing apparatus if exposed to vapours/dust/aerosol. Wear personal protective equipment. Unprotected persons must be kept away. Approach the release from upwind.

<u>Emergency procedures:</u> Ensure adequate ventilation. Avoid contact with skin and eyes. Avoid generating dusty conditions. Do not touch or walk through spilt material. No flares, smoking or flames in hazard area. Wear appropriate respirator when ventilation is inadequate. No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas.

6.1.2 For emergency responders:

Use breathing apparatus/wear personal protective equipment. See also the information in "For non-emergency personnel".

Information regarding personal protective measures see, chapter 8.

#### 6.2 Environmental precautions

Do not empty into drains. Retain and dispose of contaminated wash water.

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

#### 6.3.1 For containment:

Move containers from spill area. Prevent entry into sewers, water courses, basements or confined areas.

6.3.2 For cleaning up:

Allow to solidify and sweep/shovel up. Collect into clean, dry, properly labeled container, supplied with the cover. It is necessary to prevent dust emission. Use spark-proof tools and explosion-proof equipment.

6.3.3 Other information

For residues: Rinse away with water.

#### 6.4 Reference to other sections

See section 8 for personal protective equipment and section 13 for waste disposal.

#### **SECTION 7: HANDLING AND STORAGE**

#### 7.1 Precautions for safe handling

<u>Protective measures:</u> Keep in the original container or an approved alternative made from a compatible material, kept tightly closed when not in use.

<u>Measures to prevent fire:</u> Vapours may form explosive mixture with air. Take precautionary measures against static discharges. Dust can form an explosive mixture with air.

Measures to prevent aerosol and dust generation: Ensure thorough ventilation of stores and work areas.

Measures to protect the environment: Do not allow material to be released to the environment.

Advice on general occupational hygiene: Do not eat, drink or smoke in work areas. Remove contaminated clothing and protective equipment before entering eating areas. Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Wash contaminated clothing before reusing.

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

<b>3</b> ,	
Technical measures/ Storage conditions:	Segregate from acids and bases. Segregate from oxidants.  Further information on storage conditions: Keep crystallized caprolactam in dry storage room, equipped with proper ventilation system.  Storage stability: Storage temperature: at ambient temperature (crystallized). The stated storage temperature should be noted.
Packing materials:	Stainless steel 1.4301 (V2), aluminum, Stainless steel 1.4401 and other suitable materials.
Requirements for storage rooms and	
vessels:	
Storage class:	13
Further information on storage conditions:	None
Incompatible products:	Strong oxidizing agents, alkali and mineral acids.
7.3 Specific end use(s):	None

#### **SECTION 8: EXPOSURE CONTROLS / PERSONAL PROTECTION**

The information in this section contains generic advice and guidance. The list of Identified Uses in Section 1 should be consulted for any available use-specific information provided in the Exposure Scenario(s).

#### 8.1 Control parameters

#### 8.1.1 National occupational exposure limit values: Not available

#### 8.1.2 National biological limit values: Not available

#### 8.1.3 PNEC (Predicted No Effect Concentration)

,	,
Environmental protection target	PNEC
Aqua – freshwater	2 mg/L
Aqua - marine water	0.2 mg/L
Aqua – intermittent releases	1 mg/L





(according to Regulation (EC) No 1907/2006 (REACH), ANNEX II)

# CAPROLACTAM

Revision date: 01.10.2024 Version 4.4

AZOT

AZOT				
Sediment	18.7 mg/kg sediment dw			
Soil	2.55 mg/kg soil dw			
Sewage treatment plant	1737 mg/L			
Food chain: oral (secondary poisoning)	Due to its low logPow of 0.12	, secondary poisoning is	of no concern for this substar	nce.
Air	Not listed in Annex I of Regul	ation (EC) 2037/2000 or	substances that deplete the	
	ozone layer.	ACUTE (Local effec	ts)	
	Route		ffect Level (DNEL)	
		Workers	General population	
	Oral Dermal	Not quantifiable*  Not quantifiable*	Not quantifiable*  Not quantifiable*	
	Inhalation	10 mg/m³	5 mg/m³	
		LONG TERM (Local ef		
	Route	Derived No E Workers	ffect Level (DNEL)	
	Oral	Not quantifiable*	General population  Not quantifiable*	
	Dermal	Not quantifiable*	Not quantifiable*	
8.1.4 DNEL:	Inhalation	5 mg/m³	2.5 mg/m³	
	were observed at the acute limit of exposure is misleading. In this consystemic toxicity on the dermal row.  Oral exposure: In an industrial population may, in the worst case.  Systemic effects — inhalation estigns of respiratory tract irritation of to irritating concentrations of capro	ose of 2000 mg/kg bw. The ntext, protection from irritation te of exposure.  setting, ingestion is not an a be exposed to traces of cap exposure: Both OEL-values (oserved in humans. Following lactam, neither from human inhalative uptake of even high	te effect and no signs of systemic trefore the derivation of DNELs for on is protecting from any kind of pointicipated route of exposure. The gorolactam only.  MAK and TLV) were based on trag single or repeated inhalation exposexperience nor in animal studies, so the concentrations is limited by the	dermal otential deneral ansient sure(s) igns of
8.1.5 Monitoring procedures: Not available		- carrette respensively conce		
8.2 Exposure controls				
8.2.1 Appropriate engineering controls:				
Substance/mixture related measures to pre	event exposure during identified	l uses: None required.		
Technical measures to prevent exposure: practice.	_Use of adequate ventilation a	and the high integrity of	closed systems is good indu	ustrial
8.2.2 Personal protection equipment				
8.2.2.1 Eye and face protection:	Use suitable protective equip	ment		
8.2.2.2 Skin protection: Hand protection: Other skin protection:	Use suitable protective equip Working clothes	ment		
8.2.2.3 Respiratory protection:	Use suitable protective equip	ment		
8.2.2.4 Thermal hazards:	None.			
8.2.3 Environmental exposure controls:	Dispose of rinse water in acc	ordance with local and n	ational regulations.	
-	TION 9: PHYSICAL AND CHE		-	
9.1 Information on basic physical and c	hemical properties			
Appearance:	Organic solid, white			
Odour:	Slight			
Odour threshold:	Not available			
рН	7 - 8.5 (333 g/l, 20 °C) (solid)			
Melting point/Freezing point:	69,3°C (solid)			
Initial boiling point and boiling range:	270.8°C at 1013.25 hPa (solid	d)		
Flash-point:	Not relevant. The substance i		)13 hPa.	
Evaporation rate:	Not available			
Flammability (solid, gas):	Non-flammable			
Auto-ignition temperature	395°C at 1013 mbar (solid)			
	1 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2			

#### Page 5 of 47



#### **SAFETY DATA SHEET**

(according to Regulation (EC) No 1907/2006 (REACH), ANNEX II)

#### CAPROLACTAM

Revision date: 01.10.2024 Version 4.4



None
0.0013 hPa at 20°C. (solid)
Not available
1,105 g/cm <sup>3</sup> at 20°C (solid)
866,89 g/l at 22°C (solid)
0,12 at 25°C (solid)
Study technically not feasible. Substance is a solid at 20°C and 1013 hPa.
Non explosive. There are no chemical groups associated with explosive properties present in the molecule.
Not available

#### **SECTION 10: STABILITY AND REACTIVITY**

#### 10.1 Reactivity

Stable under recommended storage and handling conditions (see section 7, handling and storage).

#### 10.2 Chemical stability

Stable under recommended storage and handling conditions (see section 7, handling and storage).

#### 10.3 Possibility of hazardous reactions

Reacts with oxidizing agents. Polymerization coupled with heat formation.

# 10.4 Conditions to avoid

Temperature: > 100 °C

Avoid all sources of ignition: heat, sparks, open flame. Avoid formation of polymers in valves and pipes.

#### 10.5 Incompatible materials

Oxidizing agents, alkali and mineral acids.

#### 10.6 Hazardous decomposition products

Nitrogen and carbon oxides, hexane

Under normal conditions of storage and use, hazardous decomposition products should not be produced.

#### **SECTION 11: TOXICOLOGICAL INFORMATION**

### 11.1 Information on toxicological effects

#### 11.1.1 Acute toxicity

11.1.1 Acute toxicity	<b>′</b>				
Route of exposure	<u>Species</u>	<u>Method</u>	Effective dose	Exposure time	<u>Results</u>
oral	rat (Wistar) male/female	oral: gavage EU Method B.1 (Acute Toxicity (Oral)) (Cited as Directive 84/449/EEC, B.1)	_	_	LD <sub>50</sub> :1475 mg/kg bw (male) 1876 mg/kg bw (female)
dermal	rat (Wistar) male/female	Coverage: occlusive 84/449/EWG (Official Journal of EU, Nr. L251 from 19.09.1984, p 103)	-	-	LD <sub>50</sub> : >2000 mg/kg bw
inhalation	rat (Wistar) male/female	inhalation: aerosol (nose/head only) equivalent or similar to OECD Guideline 403 (Acute Inhalation Toxicity)	-	4 h	LC <sub>50</sub> : 8.16 mg/l
11.1.2 Skin corrosio	n/irritation:	Irritating			
11.1.3 Serious eye	damage/irritation:	Irritating			
11.1.4 Respiratory of	or skin sensitisation:	Not sensitizing			
11.1.5 Germ cell mu	ıtagenicity:	Negative			
11.1.6 Genetic toxici	ity:	No indication for a genotoxic potential was	found in vi	tro and in viv	/0
11.1.7 Reproductive	toxicity:	No indications of reproductive toxicity we developmental toxicity was identified in de Therefore no classification for toxicity to re	velopmenta	al toxicity stu	dies in rats and rabbits.
11.1.8 Carcinogenic	ity:	No indication for a carcinogenic potential rodents			
11.1.9 STOT-single	exposure:	3 (Hazard statement: H335: May cause re	spiratory irr	itation.)	
11.1.10 STOT-repea	nted exposure:	Not available			
11.1.11 Aspiration ha	azard	Negative			
		<b>SECTION 12: ECOLOGICAL INFORMATI</b>	ON		
12.1 Toxicity					
Fish (freshwater, she	ort-term):	LC50 (96h) >100 mg/l With high probability epsilon-Caprolactam is a	cutely not ha	rmful to fish.	



(according to Regulation (EC) No 1907/2006 (REACH), ANNEX II)

# CAPROLACTAM

Revision date: 01.10.2024 Version 4.4

CHERKABY	Revision date: 01.10.2024 Version 4.4
ÄZÖT	
Fish (long-term):	Not applicable
Freshwater invertebrates (short-term):	EC50 (48h) >1000 mg/l With high probability epsilon-Caprolactam is acutely not harmful to aquatic invertebrates.
Freshwater invertebrates (long-term):	21d-NOEC of 100 mg/l With high probability, epsilon-Caprolactam doesn't reveal negative long-term effects to aquatic invertebrates.
Freshwater algae:	EC50 (72h) >1000 mg/l EC10/LC10 or NOEC - 1000 mg/l With high probability, epsilon-Caprolactam is acutely not harmful to aquatic organisms.
Terrestrial plants:	Not applicable, the substance is not supposed to be directly applied to soil
Soil macro-organisms:	Not applicable, the substance is not supposed to be directly applied to soil
Birds:	Not available
12.2 Persistence and degradability	
Abiotic degradation:	
Phototransformation/photolysis Phototransformation in air: Phototransformation in water/soil:	Half-life in air: 1 d No information required under REACH legislation.
Biodegradation:	Readily biodegradable according to OECD criteria.
Hydrolysis:	Not considered to hydrolyze rapidly when released to water.
12.3 Bioaccumulative potential	
There is no evidence that epsilon-Caprolac	tam bioaccumulates in organisms.
12.4 Mobility in soil	
Known or predicted distribution to environmental compartments:	According to Mackay Level I modeling, epsilon-Caprolactam will distribute almost completely into water (100 %). Only very small amounts will partition to sediment (0.01 %) and soil (0.01 %).
Adsorption coefficient:	Koc at 20°C: 57.35
Surface tension:	Based on chemical structure, no surface activity is to be expected.
12.5 Results of PBT and vPvB assessme	ent
The substance is neither a PBT nor a vPvE	substance.
12.6 Other adverse effects: None	
12.7 Additional information:	
Chemical oxygen demand (COD): 1,960 m Biochemical oxygen demand (BOD): 1,110 Other ecotoxicological advice: Do not relea	mg/g
	SECTION 13: DISPOSAL CONSIDERATIONS
13.1 Waste treatment methods:	
13.1.1 Product / Packaging disposal:	Must not be disposed of together with household garbage.
Waste codes / waste designations according to LoW (Commission Decision 2001/118/EC):	07 01 99 Wastes not otherwise specified
13.1.2 Waste treatment-relevant information:	-
13.1.3 Sewage disposal-relevant information:	Do not allow product to reach sewage system.
13.1.4 Other disposal recommendations:	Disposal must be made according to official regulations.
	SECTION 14: TRANSPORT INFORMATION
Land transport  ADR  RID	Not classified as a dangerous good under transport regulations Not classified as a dangerous good under transport regulations
Inland waterway transport ADNR	Not classified as a dangerous good under transport regulations
Sea transport IMDG	Not classified as a dangerous good under transport regulations
Air transport IATA/ICAO	Not classified as a dangerous good under transport regulations
14.1 UN Number:	Not regulated
14.2 UN proper shipping name:	Not regulated
I I G G G.	· · · · · · · · · · · · · · · · · · ·

Not regulated

14.3 Transport hazard classes:

#### Page 7 of 47



#### SAFETY DATA SHEET

(according to Regulation (EC) No 1907/2006 (REACH), ANNEX II)

### CAPROLACTAM

Revision date: 01.10.2024 Version 4.4

AZOT

AZOT	
14.4 Packaging group:	Not regulated
14.5 Environmental hazards:	No
14.6 Special precautions for user:	None
14.7 Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code	Not regulated
	SECTION 15: REGULATORY INFORMATION
15.1 Safety, health and environmental re	egulation/legislation specific for the substance
EU Regulations	
Authorisations and\or restrictions on	
use: Authorisation: EU Regulation (EC) No. 1907/2006	
(REACH) Annex XIV - List of substances subject to authorisation Substances of very high concern	None of the components are listed
Restrictions on use: Annex XVII - Restrictions on the manufacture, placing on the market and use of certain dangerous substances, mixtures and articles	Not applicable
National regulations (country):	Not available
15.2 Chemical safety assessment:	In accordance with REACH Article 14, a Chemical Safety Assessment has been carried out for this substance.
	SECTION 16: OTHER INFORMATION
information given is designed only as guidance	
16.1 Indication of changes:	v. 3.0: Changes were made to comply with the Guidance on the compilation of safety data sheets (version 1.1) v. 3.1: Changes were made to comply with Article 61 (CLP) v. 4.0: Changes were made taking into account 5 <sup>th</sup> and 8 <sup>th</sup> ATP to CLP
v. 3.0: Page header; 1.1; 1.2; 1.3; 1.4; 2.1; v. 3.1: Page header; 2.1.2; 2.2.2; 16.2 v. 4.0: Page header; 1.3; 2.2.1 v. 4.1: Page header; 1.3 v. 4.2: Page header; 1.3	3.1; 4.1; 5.1; 6.1; 6.3; 7.1; 7.2; 7.3; 8.1; 8.2; 9.1; 11.1; 12.2; 12.4; 13.1; 15.1

# 16.2 Abbreviations and acronyms:

- ADN European Agreement concerning the International Carriage of Dangerous Goods on Inland Waterway
- ADNR ADN Rhine

v. 4.3: Page header; 1.3, 1.4 v. 4.4: Page header; 1.4

- · ADR Agreement on Dangerous Goods by Road
- CAS Chemical Abstracts Service
- CLP Classification, Labelling and Packaging of chemicals
- EC European Commission
- EEC European Economic Community
- EINECS European Inventory of Existing Commercial Chemical Substances
- ES Exposure Scenario
- GHS Globally Harmonized System of Classification and Labelling of Chemicals
- IBC Code International Code for the Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk
- IUPAC International Union of Pure and Applied Chemistry
- LC50 Lethal Concentration
- LD50 Lethal Dose
- LoW List of Wastes
- MARPOL International Convention for the Prevention of Pollution From Ships
- NOEC No Observed Effect Concentration
- OECD Organization for Economic Co-operation and Development
- PBT Persistent, bioaccumulative, toxic chemical

#### Page 8 of 47

# **SAFETY DATA SHEET**

(according to Regulation (EC) No 1907/2006 (REACH), ANNEX II)

# CAPROLACTAM

Revision date: 01.10.2024 Version 4.4

# AZOT

- PJSC Public Joint-Stock Company
- REACH Registration, Evaluation, Authorisation and Restriction of Chemicals STOT Specific Target Organ Toxicity
- UN United Nations
- vPvB very persistent, very bioaccumulative

16.3 Key literature references and sources for data: CSR (Chemical Safety Report), Guidance on safe use etc.	
16.4 Training advice:	In accordance with the local regulations
16.5 Further information:	None
16.6 Full text of classifications [CLP/GHS]:	Acute Tox. 4, H302 Acute Toxicity: Oral - Category 4 Acute Tox. 4, H332 Acute Toxicity: Inhalation - Category 4 Eye Irrit. 2, H319 Serious Eye Damage/Eye Irritation - Category 2 Skin Irrit. 2, H315 Skin Corrosion/Irritation - Category 2 STOT Se 3, H335 Specific Target Organ Toxicity (Single Exposure) [Respiratory Tract Irritation] - Category 3



(according to Regulation (EC) No 1907/2006 (REACH), ANNEX II)

# CAPROLACTAM

Revision date: 01.10.2024 Version 4.4



# **ANNEXES**

# 1. Exposure Scenario 1: Manufacture/import of Caprolactam

Number of the ES	1	
Title of exposure scenario	Manufacture/import of Caprol	actam
List of all use descriptors related to the life cycle stage	SU3; PROC 1, 2, 8b and 9; E	RC 1
Name of contributing environmental scenario and corresponding ERC	Manufacture of substances (E	ERC1).
Name(s) of contributing worker scenarios and corresponding PROCs	PROC 1: Use in closed process, no likelihood of exposure PROC 2: Use in closed, continuous process with occasional controlled exposure PROC 8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities PROC 9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing)	
Contributing exposure scenario controlling w	orker exposure for PROC 1, 2	2, 8b and 9
Control of workers exposure for PROC 1		
Title information related to contributing scena	rio	
Workers related free short title	Use in closed process, no like	elihood of exposure
Use descriptor covered	PROC 1	
Processes, tasks, activities covered	Manufacture in closed system	n, 90 -150°C
Exposure Assessment Method	Tool used: ECETOC TRA Wo	orker (v2.0)
Product characteristic		
Physical state	liquid	Operation conditions: temperature 90 - 150°C
Concentration of substance	100	%
Fugacity	Low - Moderate	
Vapour pressure of the substance	1 - 30 (corresponds to 90- 150°C)	hPa
Amounts used		
Not relevant in ECETOC TRA		
Frequency and duration of use/exposure		
Duration of exposure	> 4	hours/day
Frequency of exposure	≤ 240	days/year
Other given operational conditions affecting v	orkers exposure	
Location	Indoors	
Domain	Industrial	
Technical conditions and measures at proces	s level (source) to prevent re	lease
Not applicable – closed system		
Technical conditions and measures to control	dispersion from source towa	ards the worker
Local exhaust ventilation required	No	
Organisational measures to prevent/limit release	ases, dispersion and exposur	re
Not relevant		
Conditions and measures related to personal	protection, hygiene and heal	th evaluation
Not relevant		
Control of workers exposure for PROC 2		
Title information related to contributing scena	rio	
Workers related free short title	Use in closed, continuous pro	ocess with occasional controlled exposure
Use descriptor covered	PROC 2	
Processes, tasks, activities covered		re the design philosophy is not specifically aimed at ional exposure will arise e.g. through maintenance, akages



# Page 10 of 47 SAFETY DATA SHEET

(according to Regulation (EC) No 1907/2006 (REACH), ANNEX II)

# CAPROLACTAM



Exposure Assessment Method	Tool used: ECETOC TRA Wo	orker (v2 0)
Product characteristic	1001 0000. 202100 110100	511.01 (V2.0)
Physical state	liquid	Operation conditions: temperature ca. 90°C
Concentration of substance	100	%
	low	70
Fugacity  Name of the publications		hDe
Vapour pressure of the substance  Amounts used	1.0 (corresponds to ca. 90°C	) hPa
Not relevant in ECETOC TRA		
Frequency and duration of use/exposure		
Duration of exposure	> 4 h hours per d	ay
Frequency of exposure	≤ 240 days/year	
Other given operational conditions affecting	<u>.</u>	
Location	Indoors	
Domain	Industrial	
Technical conditions and measures at proc	ess level (source) to prevent re	lease
Not relevant		
Technical conditions and measures to conf	rol dispersion from source tow	ards the worker
Appropriate local exhaust ventilation	No	
Organisational measures to prevent/limit re	leases, dispersion and exposu	e
Avoiding frequent and direct contact with subs Supervision in place to check that the RMMs in		ases. Regular cleaning of equipment and work area. nd OCs followed.
Conditions and measures related to person	al protection, hygiene and heal	th evaluation
	no	
Use of suitable respiratory protection	no	
Use of suitable respiratory protection Use of suitable chemical resistant gloves		a Evnosura Assassment
	no  Cross reference to Qualitative	e Exposure Assessment
Use of suitable chemical resistant gloves		e Exposure Assessment
Use of suitable chemical resistant gloves Use of suitable eye protection Best practice advise	Cross reference to Qualitative	e Exposure Assessment herwise appropriate risk reduction measures (e.g.
Use of suitable chemical resistant gloves Use of suitable eye protection  Best practice advise  Probing/sampling with considerable vapor rele	Cross reference to Qualitative ase should not exceed 1h/day. Of mmended.	herwise appropriate risk reduction measures (e.g.
Use of suitable chemical resistant gloves Use of suitable eye protection  Best practice advise  Probing/sampling with considerable vapor releoutside, LEV or breathing protection) are record	Cross reference to Qualitative ase should not exceed 1h/day. Of mmended.  A (with 100 % preparation and 2)	herwise appropriate risk reduction measures (e.g.
Use of suitable chemical resistant gloves Use of suitable eye protection  Best practice advise  Probing/sampling with considerable vapor releoutside, LEV or breathing protection) are recording to the control of workers exposure for PROC 8b:	ase should not exceed 1h/day. Of mmended.  A (with 100 % preparation and cenario  Transfer of substance or pre containers at dedicated facility	herwise appropriate risk reduction measures (e.g.  5 min-1 h exposure)  paration (charging/discharging) from/to vessels/large
Use of suitable chemical resistant gloves Use of suitable eye protection  Best practice advise  Probing/sampling with considerable vapor releoutside, LEV or breathing protection) are record control of workers exposure for PROC 8b:  Title information related to contributing scenarios.  Workers related free short title  Use descriptor covered	ase should not exceed 1h/day. Of mmended.  A (with 100 % preparation and cenario)  Transfer of substance or pre	herwise appropriate risk reduction measures (e.g.  5 min-1 h exposure)  paration (charging/discharging) from/to vessels/large
Use of suitable chemical resistant gloves Use of suitable eye protection  Best practice advise Probing/sampling with considerable vapor releoutside, LEV or breathing protection) are record control of workers exposure for PROC 8b: Title information related to contributing see Workers related free short title	ase should not exceed 1h/day. Of mmended.  A (with 100 % preparation and cenario  Transfer of substance or pre containers at dedicated facility	herwise appropriate risk reduction measures (e.g.  5 min-1 h exposure)  paration (charging/discharging) from/to vessels/large
Use of suitable chemical resistant gloves Use of suitable eye protection  Best practice advise  Probing/sampling with considerable vapor releoutside, LEV or breathing protection) are record control of workers exposure for PROC 8b:  Title information related to contributing scenarios.  Workers related free short title  Use descriptor covered	Cross reference to Qualitative ase should not exceed 1h/day. Of mmended.  A (with 100 % preparation and a enario  Transfer of substance or pre containers at dedicated facilit PROC 8b	herwise appropriate risk reduction measures (e.g.  5 min-1 h exposure)  paration (charging/discharging) from/to vessels/large ies
Use of suitable chemical resistant gloves Use of suitable eye protection  Best practice advise  Probing/sampling with considerable vapor releoutside, LEV or breathing protection) are recorded to the suitable of the suitabl	ase should not exceed 1h/day. Of mmended.  A (with 100 % preparation and a praction)  Transfer of substance or pre containers at dedicated facility PROC 8b  Sampling	herwise appropriate risk reduction measures (e.g.  5 min-1 h exposure)  paration (charging/discharging) from/to vessels/large ies
Use of suitable chemical resistant gloves Use of suitable eye protection  Best practice advise  Probing/sampling with considerable vapor rele outside, LEV or breathing protection) are recording of workers exposure for PROC 8b:  Title information related to contributing scenarios workers related free short title  Use descriptor covered  Processes, tasks, activities covered  Exposure Assessment Method	ase should not exceed 1h/day. Of mmended.  A (with 100 % preparation and a praction)  Transfer of substance or pre containers at dedicated facility PROC 8b  Sampling	herwise appropriate risk reduction measures (e.g.  5 min-1 h exposure)  paration (charging/discharging) from/to vessels/large ies
Use of suitable chemical resistant gloves Use of suitable eye protection  Best practice advise Probing/sampling with considerable vapor releoutside, LEV or breathing protection) are recorded to control of workers exposure for PROC 8b: Title information related to contributing scenarios workers related free short title Use descriptor covered Processes, tasks, activities covered Exposure Assessment Method Product characteristic	ase should not exceed 1h/day. Of mmended.  A (with 100 % preparation and fenario  Transfer of substance or pre containers at dedicated facility PROC 8b  Sampling  Tool used: ECETOC TRA Weight	herwise appropriate risk reduction measures (e.g.  5 min-1 h exposure)  paration (charging/discharging) from/to vessels/large ies  prker (v2.0)
Use of suitable chemical resistant gloves Use of suitable eye protection  Best practice advise Probing/sampling with considerable vapor releoutside, LEV or breathing protection) are recorded to control of workers exposure for PROC 8b: Title information related to contributing scenarios. Workers related free short title Use descriptor covered Processes, tasks, activities covered Exposure Assessment Method Product characteristic Physical state	ase should not exceed 1h/day. Of mmended.  A (with 100 % preparation and renario  Transfer of substance or precontainers at dedicated facility PROC 8b  Sampling  Tool used: ECETOC TRA Wood	herwise appropriate risk reduction measures (e.g.  5 min-1 h exposure)  paration (charging/discharging) from/to vessels/large ies  prker (v2.0)  Operation conditions: temperature ca. 90°C
Use of suitable chemical resistant gloves Use of suitable eye protection  Best practice advise  Probing/sampling with considerable vapor releoutside, LEV or breathing protection) are recorded to control of workers exposure for PROC 8b:  Title information related to contributing scenarios workers related free short title  Use descriptor covered  Processes, tasks, activities covered  Exposure Assessment Method  Product characteristic  Physical state  Concentration of substance	ase should not exceed 1h/day. Of mmended.  A (with 100 % preparation and renario  Transfer of substance or precontainers at dedicated facility PROC 8b  Sampling  Tool used: ECETOC TRA World Liquid  100	herwise appropriate risk reduction measures (e.g.  5 min-1 h exposure)  paration (charging/discharging) from/to vessels/large ies  prker (v2.0)  Operation conditions: temperature ca. 90°C
Use of suitable chemical resistant gloves Use of suitable eye protection  Best practice advise Probing/sampling with considerable vapor releoutside, LEV or breathing protection) are recorded to control of workers exposure for PROC 8b: Title information related to contributing scenarios. Workers related free short title Use descriptor covered Processes, tasks, activities covered Exposure Assessment Method Product characteristic Physical state Concentration of substance Fugacity	ase should not exceed 1h/day. Of mmended.  A (with 100 % preparation and renario  Transfer of substance or pre containers at dedicated facility PROC 8b  Sampling  Tool used: ECETOC TRA Wood Liquid  100  Low	herwise appropriate risk reduction measures (e.g.  5 min-1 h exposure)  paration (charging/discharging) from/to vessels/large ies  prker (v2.0)  Operation conditions: temperature ca. 90°C  %
Use of suitable chemical resistant gloves Use of suitable eye protection  Best practice advise Probing/sampling with considerable vapor releoutside, LEV or breathing protection) are recorded to control of workers exposure for PROC 8b: Title information related to contributing scenarios workers related free short title Use descriptor covered Processes, tasks, activities covered Exposure Assessment Method Product characteristic Physical state Concentration of substance Fugacity Vapour pressure of the substance	ase should not exceed 1h/day. Of mmended.  A (with 100 % preparation and renario  Transfer of substance or pre containers at dedicated facility PROC 8b  Sampling  Tool used: ECETOC TRA Wood Liquid  100  Low	herwise appropriate risk reduction measures (e.g.  5 min-1 h exposure)  paration (charging/discharging) from/to vessels/large ies  prker (v2.0)  Operation conditions: temperature ca. 90°C  %
Use of suitable chemical resistant gloves Use of suitable eye protection  Best practice advise Probing/sampling with considerable vapor releoutside, LEV or breathing protection) are recorded to control of workers exposure for PROC 8b: Title information related to contributing scenarios. Workers related free short title Use descriptor covered Processes, tasks, activities covered Exposure Assessment Method Product characteristic Physical state Concentration of substance Fugacity Vapour pressure of the substance Amounts used	ase should not exceed 1h/day. Of mmended.  A (with 100 % preparation and renario  Transfer of substance or pre containers at dedicated facility PROC 8b  Sampling  Tool used: ECETOC TRA Wood Liquid  100  Low	herwise appropriate risk reduction measures (e.g.  5 min-1 h exposure)  paration (charging/discharging) from/to vessels/large ies  prker (v2.0)  Operation conditions: temperature ca. 90°C  %
Use of suitable chemical resistant gloves Use of suitable eye protection  Best practice advise Probing/sampling with considerable vapor releoutside, LEV or breathing protection) are recorded to control of workers exposure for PROC 8b: Title information related to contributing scenarios. Workers related free short title Use descriptor covered Processes, tasks, activities covered Exposure Assessment Method Product characteristic Physical state Concentration of substance Fugacity Vapour pressure of the substance Amounts used Not relevant in ECETOC TRA	ase should not exceed 1h/day. Of mmended.  A (with 100 % preparation and renario  Transfer of substance or pre containers at dedicated facility PROC 8b  Sampling  Tool used: ECETOC TRA Wood Liquid  100  Low	herwise appropriate risk reduction measures (e.g.  5 min-1 h exposure)  paration (charging/discharging) from/to vessels/large ies  prker (v2.0)  Operation conditions: temperature ca. 90°C  %
Use of suitable chemical resistant gloves Use of suitable eye protection  Best practice advise Probing/sampling with considerable vapor releoutside, LEV or breathing protection) are recorded to control of workers exposure for PROC 8b: Title information related to contributing scenarios. Workers related free short title Use descriptor covered Processes, tasks, activities covered Exposure Assessment Method Product characteristic Physical state Concentration of substance Fugacity Vapour pressure of the substance Amounts used Not relevant in ECETOC TRA Frequency and duration of use/exposure Duration of exposure	ase should not exceed 1h/day. Of mmended.  A (with 100 % preparation and renario  Transfer of substance or precontainers at dedicated facility PROC 8b  Sampling  Tool used: ECETOC TRA World 100  Low  1 (corresponds to ca. 90°C)	herwise appropriate risk reduction measures (e.g.  5 min-1 h exposure)  paration (charging/discharging) from/to vessels/large ies  prker (v2.0)  Operation conditions: temperature ca. 90°C  %  hPa  per day
Use of suitable chemical resistant gloves Use of suitable eye protection  Best practice advise Probing/sampling with considerable vapor releoutside, LEV or breathing protection) are recorded to control of workers exposure for PROC 8b: Title information related to contributing scenarios workers related free short title Use descriptor covered Processes, tasks, activities covered Exposure Assessment Method Product characteristic Physical state Concentration of substance Fugacity Vapour pressure of the substance Amounts used Not relevant in ECETOC TRA Frequency and duration of use/exposure Duration of exposure Frequency of exposure	Cross reference to Qualitative  ase should not exceed 1h/day. Of mmended.  A (with 100 % preparation and renario  Transfer of substance or precontainers at dedicated facility PROC 8b  Sampling  Tool used: ECETOC TRA Wo	herwise appropriate risk reduction measures (e.g.  5 min-1 h exposure)  paration (charging/discharging) from/to vessels/large ies  prker (v2.0)  Operation conditions: temperature ca. 90°C  %  hPa
Use of suitable chemical resistant gloves Use of suitable eye protection  Best practice advise Probing/sampling with considerable vapor releoutside, LEV or breathing protection) are recording of workers exposure for PROC 8b: Title information related to contributing scenarios. Workers related free short title Use descriptor covered Processes, tasks, activities covered Exposure Assessment Method Product characteristic Physical state Concentration of substance Fugacity Vapour pressure of the substance Amounts used Not relevant in ECETOC TRA Frequency and duration of use/exposure Duration of exposure Frequency of exposure Other given operational conditions affecting	ase should not exceed 1h/day. Of mmended.  A (with 100 % preparation and renario  Transfer of substance or precontainers at dedicated facility PROC 8b  Sampling  Tool used: ECETOC TRA Work  Liquid  100  Low  1 (corresponds to ca. 90°C)  15 min-1 h  ≤ 240  g workers exposure	herwise appropriate risk reduction measures (e.g.  5 min-1 h exposure)  paration (charging/discharging) from/to vessels/large ies  prker (v2.0)  Operation conditions: temperature ca. 90°C  %  hPa  per day
Use of suitable chemical resistant gloves Use of suitable eye protection  Best practice advise Probing/sampling with considerable vapor releoutside, LEV or breathing protection) are recording of workers exposure for PROC 8b: Title information related to contributing scenarios workers related free short title Use descriptor covered Processes, tasks, activities covered Exposure Assessment Method Product characteristic Physical state Concentration of substance Fugacity Vapour pressure of the substance Amounts used Not relevant in ECETOC TRA Frequency and duration of use/exposure Duration of exposure Frequency of exposure Other given operational conditions affectin Location	Cross reference to Qualitative  ase should not exceed 1h/day. Or mmended.  A (with 100 % preparation and renario  Transfer of substance or precontainers at dedicated facility PROC 8b  Sampling  Tool used: ECETOC TRA Wo	herwise appropriate risk reduction measures (e.g.  5 min-1 h exposure)  paration (charging/discharging) from/to vessels/large ies  prker (v2.0)  Operation conditions: temperature ca. 90°C  %  hPa  per day
Use of suitable chemical resistant gloves Use of suitable eye protection  Best practice advise Probing/sampling with considerable vapor releoutside, LEV or breathing protection) are recording of workers exposure for PROC 8b: Title information related to contributing scenarios. Workers related free short title Use descriptor covered Processes, tasks, activities covered Exposure Assessment Method Product characteristic Physical state Concentration of substance Fugacity Vapour pressure of the substance Amounts used Not relevant in ECETOC TRA Frequency and duration of use/exposure Duration of exposure Frequency of exposure Other given operational conditions affecting	Cross reference to Qualitative  ase should not exceed 1h/day. Of mmended.  A (with 100 % preparation and denario)  Transfer of substance or precontainers at dedicated facility PROC 8b  Sampling  Tool used: ECETOC TRA Welliam  Liquid  100  Low  1 (corresponds to ca. 90°C)  15 min-1 h  ≤ 240  g workers exposure  Indoors  Industrial	herwise appropriate risk reduction measures (e.g.    5 min-1 h exposure     6 min-1 h exposure     7 min-1 h exposure     8 min-1 h exposure     9 min-1 h expos



# Page 11 of 47

# **SAFETY DATA SHEET**

(according to Regulation (EC) No 1907/2006 (REACH), ANNEX II)

# CAPROLACTAM



Technical conditions and measures to contro	I dispersion from source toward	ls the worker			
Appropriate local exhaust ventilation	No				
Organisational measures to prevent/limit releases, dispersion and exposure					
Supervision in place to check that the RMMs in p	place are being used correctly and				
Conditions and measures related to personal	protection, hygiene and health	evaluation			
Use of suitable respiratory protection	No				
Use of suitable chemical resistant gloves	Cross reference to Qualitative E	ynosure Assessment			
Use of suitable eye protection	Oross reference to Quantative E	Aposure 7 losessment			
Control of workers exposure for PROC 8b: B	(with 1-5 % preparation and 1-4	h exposure)			
Title information related to contributing scena					
Workers related free short title	containers at dedicated facilities	ration (charging/discharging) from/to vessels/large			
Use descriptor covered	PROC 8b				
Processes, tasks, activities covered	Maintenance, clean down				
Exposure Assessment Method	Tool used: ECETOC TRA Worke	er (v2.0)			
Product characteristic					
Physical state	Liquid	Operation conditions: temperature ca. 90°C			
Concentration of substance	TRA 1-5	%			
Fugacity	Low				
Vapour pressure of the substance	1 (corresponds to ca. 90°C)	hPa			
Amounts used					
Not relevant in ECETOC TRA					
Frequency and duration of use/exposure					
Duration of exposure	1-4 hours	per day			
Frequency of exposure	≤ 240	days/year			
Other given operational conditions affecting	workers exposure				
Location	Indoors				
Domain	Industrial				
Technical conditions and measures at proces	ss level (source) to prevent relea	se			
Not relevant					
Technical conditions and measures to contro	l dispersion from source toward	Is the worker			
Appropriate local exhaust ventilation	No				
Organisational measures to prevent/limit rele	ases, dispersion and exposure				
Supervision in place to check that the RMMs in p	place are being used correctly and				
Conditions and measures related to personal	protection, hygiene and health	evaluation			
Use of suitable respiratory protection	No				
Use of suitable chemical resistant gloves	Cross reference to Qualitative E	xnosure Assessment			
Use of suitable eye protection	5.000 Total office to Quantative E				
Control of workers exposure for PROC 9					
Title information related to contributing scena	ario				
Workers related free short title	Transfer of substance or preparation into small containers (dedicated filling line, including weighing)				
Use descriptor covered	PROC 9				
Processes, tasks, activities covered	Maintenance, clean down				
Exposure Assessment Method	Tool used: ECETOC TRA Worke	er (v2.0)			
Product characteristic					
Dhysical state	Liquid	Operation conditions: temperature ca. 90°C			
Physical state	Liquid	%			



# Page 12 of 47

# **SAFETY DATA SHEET**

(according to Regulation (EC) No 1907/2006 (REACH), ANNEX II)

# CAPROLACTAM

Revision date: 01.10.2024 Version 4.4

AZOT

Fugacity	Low							
Vapour pressure of the substance	1 (corresponds to ca. 90°C) hPa							
Amounts used								
Not relevant in ECETOC TRA								
Frequency and duration of use/exposure	Frequency and duration of use/exposure							
Duration of exposure	1-4 hours	per day						
Frequency of exposure	≤ 240	days/year						
Other given operational conditions affecting workers exposure								
Location	Indoors							
Domain	Industrial							
Technical conditions and measures at process level (source) to prevent release								
Not relevant								
Technical conditions and measures to control dispersion from source towards the worker								
Appropriate local exhaust ventilation	Appropriate local exhaust ventilation No							
Organisational measures to prevent/limit release	ases, dispersion and exposure							
Avoiding frequent and direct contact with substar Supervision in place to check that the RMMs in place		s. Regular cleaning of equipment and work area.  OCs followed.						
Conditions and measures related to personal	protection, hygiene and health e	evaluation						
Use of suitable respiratory protection	No							
Use of suitable chemical resistant gloves	On the state of th							
Use of suitable eye protection	Cross reference to Qualitative Exposure Assessment							

#### **Exposure Estimation**

Estimated exposure for workers

Route of exposure	Conce	entratio	าร	Justification
	Va	lue	Unit	
Long-term exposure, local, inhalative – PROC1	0.0	047	mg/m³	
Long-term exposure, local, inhalative – PROC2	4.72		mg/m³	
Long-term exposure, local, inhalative –	Α	В	ma/m³	
PROC8b: A (100%) and B (1-5%)	4.72	2.83	mg/m³	
Long-term exposure, local, inhalative – PROC9	2.	83	mg/m³	





(according to Regulation (EC) No 1907/2006 (REACH), ANNEX II)

# CAPROLACTAM

Revision date: 01.10.2024 Version 4.4

# AZOT

# 2. Exposure Scenario 2: Distribution of Caprolactam

Number of the ES	2				
Title of exposure scenario	Distribution of Caprolactam				
List of all use descriptors related to the life cycle stage	SU3; PROC 2, 8b and 9; ERC 2				
Name of contributing environmental scenario and corresponding ERC	Formulation of preparations (ERC2)				
Name(s) of contributing worker scenarios and corresponding PROCs	PROC 8b: Transfer of substant vessels/large containers at dedic	PROC 2: Use in closed, continuous process with occasional controlled exposure PROC 8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities PROC 9: Transfer of substance or preparation into small containers (dedicated filling line including weighing)			
Contributing exposure scenario controlling w		nd 9			
Control of workers exposure for PROC 2	•				
Title information related to contributing scena	rio				
Workers related free short title		ss with occasional controlled exposure			
Use descriptor covered	PROC 2	with coddiction controlled expectate			
Processes, tasks, activities covered		er) and loading (closed system) with occasional			
Exposure Assessment Method	Tool used: ECETOC TRA Worke	er (v2.0)			
Product characteristic					
Physical state	Liquid	Operation conditions: temperature ca. 90°C			
Concentration of substance	100	<b>%</b>			
Fugacity	Low				
Vapour pressure of the substance	1.0 (corresponds to ca. 90°C)	hPa			
Amounts used					
Not relevant in ECETOC TRA					
Frequency and duration of use/exposure					
Duration of exposure	> 4	hours/day			
Frequency of exposure	≤ 240	days/year			
Other given operational conditions affecting workers exposure					
Location	Indoors				
Domain	Industrial				
Technical conditions and measures at proces	and measures at process level (source) to prevent release				
Not relevant					
Technical conditions and measures to control	dispersion from source toward	s the worker			
Local exhaust ventilation required	No				
Organisational measures to prevent/limit release					
Avoiding frequent and direct contact with substar Supervision in place to check that the RMMs in p	lace are being used correctly and (	OCs followed.			
Conditions and measures related to personal	protection, hygiene and health e	evaluation			
Use of suitable respiratory protection	No				
Use of suitable chemical resistant gloves	Cross reference to Qualitative Ex	cposure Assessment			
Use of suitable eye protection  Best practice advise  Probing/sampling with considerable vapor release outside, LEV or breathing protection) are recommendated and the suitable suitabl	se should not exceed 1h/day. Other				
Control of workers exposure for PROC 8b (liq					
Title information related to contributing scena					
Workers related free short title	Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities				
Use descriptor covered	PROC 8b				
Processes, tasks, activities covered	Transfer, filling dedicated (sampling and connection/disconnection of pipes before and after filling)				
Exposure Assessment Method	Tool used: ECETOC TRA Worke	er (v2.0)			
Product characteristic					
Physical state	Liquid	Operation conditions: temperature ca.90°C			
Concentration of substance	100	%			
Fugacity	Low				
Vapour pressure of the substance	1 (corresponds to ca. 90 °C)	hPa			
Amounts used					



# Page 14 of 47 SAFETY DATA SHEET

(according to Regulation (EC) No 1907/2006 (REACH), ANNEX II)

# CAPROLACTAM



AZOI						
Not relevant in ECETOC TRA  Frequency and duration of use/exposure						
	15 main 1 h	l nor dou	T			
Duration of exposure	15 min-1 h	per day				
Frequency of exposure	≤ 240	days/year				
Other given operational conditions affecting workers exposure						
Location	Outdoors					
Domain	Industrial					
Technical conditions and measures at proces	s level (source) t	to prevent relea	se			
Not relevant						
Technical conditions and measures to control		n source toward	s the worker			
Appropriate local exhaust ventilation	No					
Organisational measures to prevent /limit rele						
Avoiding frequent and direct contact with substan						
Supervision in place to check that the RMMs in pl						
Conditions and measures related to personal		ene and nealth e	evaluation			
Use of suitable respiratory protection	No					
Use of suitable chemical resistant gloves in	0					
combination with basic employee training	Cross reterence	e to Qualitative Ex	xposure Assessment			
Use of suitable eye protection						
Control of workers exposure for PROC 8b (sol						
Title information related to contributing scena			ation /abouting/dischanges Araba (1997)			
Workers related free short title		stance or prepara edicated facilities	ation (charging/discharging) from/to vessels/large			
Use descriptor covered	PROC 8b					
Processes, tasks, activities covered	Dosing of solid Caprolactam to formulation step at ambient temperature.					
<b>Exposure Assessment Method</b>	Tool used: ECE	TOC TRA Worke	er (v2.0)			
Product characteristic						
Physical state	Solid		Operation conditions: ambient temperature			
Concentration of substance	100		%			
Dustiness	Low					
Vapour pressure of the substance	0.0013 (corresp ambient temper		hPa			
Amounts used	ambient temper	ataro)				
Not relevant						
Frequency and duration of use/exposure						
Duration of exposure	>4h		per day			
Frequency of exposure	≤ 240		days/year			
Other given operational conditions affecting w		<u> </u>	days/year			
Location	Indoors	<u> </u>				
Domain	Industrial					
Technical conditions and measures at proces		nrevent relea				
Not relevant	a ievei (audice)	o bieseiit ieieg	<b>3</b> 6			
Technical conditions and measures to control	dispersion from	Source toward	s the worker			
	No	i source toward	S the WOIRE			
Appropriate local exhaust ventilation		and evaceure				
Organisational measures to prevent /limit rele			as Popular clooping of equipment and work area			
Avoiding frequent and direct contact with substar Supervision in place to check that the RMMs in pl						
Conditions and measures related to personal						
	No	one and nealth	evaluation			
Use of suitable respiratory protection Use of suitable chemical resistant gloves in	INU		1			
combination with basic employee training	Cross reference	to Qualitativo E	vnosura Assassment			
Use of suitable eye protection						
See of suitable eye protection						
Control of workers exposure for PROC 9	l					
Title information related to contributing scena	rio					
Workers related free short title	Transfer of sub		ration into small containers (dedicated filling line,			
		including weighing)				
Use descriptor covered	PROC 9	-f f -  '	III a contain a con			
Processes, tasks, activities covered	Transfer, filling of flakes into small containers  Tool used: ECETOC TRA Worker (v2.0)					
Exposure Assessment Method	1001 used: ECE	TOC TRA Worke	er (v∠.u)			
Product characteristic						



# Page 15 of 47

# **SAFETY DATA SHEET**

(according to Regulation (EC) No 1907/2006 (REACH), ANNEX II)

# CAPROLACTAM

Revision date: 01.10.2024 Version 4.4



Physical state	Solid	Operation conditions: at ambient temperature
Concentration of substance	100	%
Dustiness	Low	
Vapour pressure of the substance	0.00013 (corresponds to ambient temperature)	hPa
Amounts used		
Not relevant in ECETOC TRA		
Frequency and duration of use/exposure		
Duration of exposure	> 4 hours	per day
Frequency of exposure	≤ 240	days/year
Other given operational conditions affecting v	workers exposure	
Location	Indoor	
Domain	Industrial	
Technical conditions and measures at proces	s level (source) to prevent releas	se
Not relevant		
Technical conditions and measures to contro	I dispersion from source towards	s the worker
Appropriate local exhaust ventilation	No	
Organisational measures to prevent /limit rele	eases, dispersion and exposure	
		s. Regular cleaning of equipment and work area.
Supervision in place to check that the RMMs in p	lace are being used correctly and (	OCs followed.
Conditions and measures related to personal	protection, hygiene and health e	evaluation
Use of suitable respiratory protection	No	
Use of suitable chemical resistant gloves in combination with basic employee training	Cross reference to Qualitative Ex	xposure Assessment
Use of suitable eye protection		

# **Exposure Estimation**

**Estimated exposure for workers** 

Estimated exposure for workers	T -		T
Route of exposure	Concentration	าร	Justification
	Value	Unit	
Long-term exposure, local, inhalative – PROC2 (liquid)	4.72	mg/m³	
Long-term exposure, local, inhalative – PROC8b (liquid)	3.3	mg/m³	
Long-term exposure, local, inhalative – PROC8b (solid)	0.5	mg/m³	
Long-term exposure, local, inhalative – PROC 9 (solid)	0.1	mg/m³	





(according to Regulation (EC) No 1907/2006 (REACH), ANNEX II)

# CAPROLACTAM



Vapour pressure of the substance

Revision date: 01.10.2024 Version 4.4

3. Exposure Scenario 3: Industrial fo	rmu	lation of solid preparations			
Number of the ES	3	3			
Title of exposure scenario	Ind	Industrial formulation- solid preparations			
List of all use descriptors related to the life cycle stage	SU3; PROC 3, 4, 5, 8b and 9; ERC 2 and 3				
Name of contributing environmental	For	mulation of preparation (ERC 2)			
scenario and corresponding ERC		mulation in materials (ERC 3)			
Name(s) of contributing worker scenarios and corresponding PROCs	PROC 3: Use in closed batch process (synthesis or formulation) PROC 4: Use in batch and other process (synthesis) where opportunity for exposure arises PROC 5: Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant con-tact) PROC 8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities PROC 9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing)				
Contributing exposure scenario controlling	ng w	orker exposure for PROC 3, 4, 5,	8b and 9		
Control of workers exposure for PROC 3					
Title information related to contributing so	cena	rio			
Workers related free short title		Use in closed batch process (form	mulation)		
Use descriptor covered		PROC 3			
Processes, tasks, activities covered		polymer matrix	solids, plasticizers), Caprolactam included in		
Exposure Assessment Method		Tool used: ECETOC TRA Worke	r (v2.0)		
Product characteristic					
Physical state		Solid	Operation conditions: ambient temperature		
Concentration of substance		TRA 5-25	%		
Dustiness	Low				
Vapour pressure of the substance	0.0013 (corresponds to ambient temperature) hPa				
Amounts used					
Not relevant in ECETOC TRA					
Frequency and duration of use/exposure			Ι		
Duration of exposure		> 4	hours/day		
Frequency of exposure		≤ 240	days/year		
Other given operational conditions affecti	ng v	_			
Location		Indoors			
Domain		Industrial			
Technical conditions and measures at pro	oces	s level (source) to prevent releas	5e		
Not relevant Technical conditions and measures to conditions		dispersion from source toward	a the weeker		
	ntro	-	s trie worker		
Local exhaust ventilation required  Organisational measures to prevent /limit	rolo	No			
			s. Regular cleaning of equipment and work area.		
Supervision in place to check that the RMMs					
Conditions and measures related to person					
Use of suitable respiratory protection		No			
Use of suitable chemical resistant gloves		Cross reference to Qualitative Ex	vnocure Accomment		
Use of suitable eye protection		Cross reference to Qualitative Ex	tposure Assessment		
Control of workers exposure for PROC 4					
Title information related to contributing so	cena	rio			
Workers related free short title		Use in batch and other process (	synthesis) where opportunity for exposure arises		
Use descriptor covered	PROC 4				
Processes, tasks, activities covered	Preparation of blends (mixing of solids/plasticizers), Caprolactam included in polymer matrix				
Exposure Assessment Method	Tool used: ECETOC TRA Worker (v2.0)				
Product characteristic			·		
Physical state		Solid	Operation conditions: ambient temperature		
Concentration of substance		TRA 5-25	%		
Dustiness		Low			
			<u> </u>		

0.0013 (corresponds to ambient hPa



# Page 17 of 47

# **SAFETY DATA SHEET**

(according to Regulation (EC) No 1907/2006 (REACH), ANNEX II)

# CAPROLACTAM

Revision date: 01.10.2024 Version 4.4

AZOT

AZOT				
	temperature)			
Amounts used				
Not relevant in ECETOC TRA				
Frequency and duration of use/exposure	> 4   bayya nay day	. T		
Duration of exposure	> 4 hours per day	/		
Frequency of exposure	≤ 240 days/year			
Other given operational conditions affecting v		T		
Location	Indoors			
Domain	Industrial			
Technical conditions and measures at proces	s level (source) to prevent rele	ase		
Not relevant  Technical conditions and measures to contro	diamensian from source tower	do the weeker		
	No	as the worker		
Appropriate local exhaust ventilation				
Organisational measures to prevent /limit rele				
Supervision in place to check that the RMMs in p		ses. Regular cleaning of equipment and work area.		
Conditions and measures related to personal				
Use of suitable respiratory protection	No	evaluation		
Use of suitable chemical resistant gloves in	INO	_		
combination with basic employee training	Cross reference to Qualitative	Exnosure Assessment		
Use of suitable eye protection	51033 Totorence to Qualitative	Exposure Assessing III		
Control of workers exposure for PROC 5				
Title information related to contributing scena	rio			
Workers related free short title	Mixing or blending in batch pro	cesses for formulation of preparations and articles		
Use descriptor covered	(multistage and/or significant contact) PROC 5			
Processes, tasks, activities covered	Preparation of blends (mixing of solids/plasticizers), Caprolactam included in			
Exposure Assessment Method	polymer matrix Tool used: ECETOC TRA Wor	ver (v2 0)		
Product characteristic	Tool used. LCL TOC TICA WOL	(VZ.U)		
Physical state	Solid	Operation conditions: ambient temperature		
Concentration of substance	TRA 5-25	%		
Dustiness	Low	76		
	0.0013 (corresponds to ambier	.+		
Vapour pressure of the substance	temperature)	" hPa		
Amounts used				
Not relevant in ECETOC TRA				
Frequency and duration of use/exposure				
Duration of exposure	> 4 hours	per day		
Frequency of exposure	≤ 240	days/year		
Other given operational conditions affecting v	vorkers exposure			
Location	Indoor			
Domain	Industrial			
Technical conditions and measures at proces	s level (source) to prevent rele	ase		
Not relevant				
Technical conditions and measures to contro	dispersion from source towar	ds the worker		
Appropriate local exhaust ventilation	No			
Organisational measures to prevent /limit rele				
Avoiding frequent and direct contact with substar Supervision in place to check that the RMMs in p		ses. Regular cleaning of equipment and work area.		
Conditions and measures related to personal				
Use of suitable respiratory protection	No			
Use of suitable chemical resistant gloves	NO			
Use of suitable eye protection	Cross reference to Qualitative	Exposure Assessment		
Control of workers exposure for PROC 8b				
Title information related to contributing scena	rio			
Workers related free short title	Transfer of substance or prepa	ration (charging/discharging) from/to vessels/large		
Use descriptor covered	containers at dedicated facilitie PROC 8b	S		
Processes, tasks, activities covered		ng preparation of blends, Caprolactam included in		
Proceeds tasks activities covered	polymer matrix	Or ipaniani in analy capitalatani inolaada in		





(according to Regulation (EC) No 1907/2006 (REACH), ANNEX II)

# CAPROLACTAM

C	н	E	R	ĸ	A	B	γ	
۸		7	7	-	٦	١.	T	
 ۰	١.	L		ï	J	,	ı	

Exposure Assessment Method	Tool used: ECETOC TRA Work	cer (v2 0)			
Product characteristic	Tool used. Edition The Work	(VZ.0)			
Physical state	Solid	Operation conditions: ambient temperature			
Concentration of substance	TRA 5-25	%			
Dustiness	Low	70			
Dustiness	0.0013 (corresponds to	+			
Vapour pressure of the substance	ambient temperature)	hPa			
Amounts used					
Not relevant in ECETOC TRA					
Frequency and duration of use/exposure					
Duration of exposure	> 4 hours	per day			
Frequency of exposure	≤ 240	days/year			
Other given operational conditions affecting	workers exposure				
Location	Indoor				
Domain	Industrial				
Technical conditions and measures at proces	ss level (source) to prevent relea	ase			
Not relevant					
Technical conditions and measures to control	l dispersion from source toward	ds the worker			
Appropriate local exhaust ventilation	No				
Organisational measures to prevent /limit rele	eases, dispersion and exposure	·			
Avoiding frequent and direct contact with substa	nce. Minimisation of manual phas	es. Regular cleaning of equipment and work area.			
Supervision in place to check that the RMMs in p					
Conditions and measures related to personal	protection, hygiene and health	evaluation			
Use of suitable respiratory protection	No				
Use of suitable chemical resistant gloves in					
combination with basic employee training	Cross reference to Qualitative E	Exposure Assessment			
Use of suitable eye protection					
Control of workers exposure for PROC 9					
Title information related to contributing scena	ario				
Workers related free short title	Transfer of substance or preparation into small containers (dedicated filling line, including weighing)				
Use descriptor covered	PROC 9				
Processes, tasks, activities covered	Transfer/filling dedicate followin polymer matrix	g preparation of blends, Caprolactam included in			
Exposure Assessment Method	Tool used: ECETOC TRA Work	xer (v2.0)			
Product characteristic					
Physical state	Solid	Operation conditions: ambient temperature			
Concentration of substance	TRA 5-25	%			
Dustiness	Low				
	0.0013 (corresponds to	<u> </u>			
Vapour pressure of the substance	ambient temperature)	hPa			
Amounts used					
Not relevant in ECETOC TRA					
Frequency and duration of use/exposure					
Duration of exposure	> 4 hours	per day			
Frequency of exposure	≤ 240	days/year			
Other given operational conditions affecting	I.				
Location	Indoor				
Domain	Industrial				
Technical conditions and measures at proces		ase			
Not relevant					
Technical conditions and measures to control	l dispersion from source toward	ds the worker			
Appropriate local exhaust ventilation	No				
Organisational measures to prevent /limit rele		<u> </u>			
		es. Regular cleaning of equipment and work area.			
Supervision in place to check that the RMMs in p  Conditions and measures related to personal	lace are being used correctly and	OCs followed.			
Use of suitable respiratory protection	No				
, osc or suitable respiratory protection	INO				
Use of suitable chemical registant gloves in					
Use of suitable chemical resistant gloves in combination with basic employee training Use of suitable eye protection	Cross reference to Qualitative E	Exposure Assessment			



# Page 19 of 47

# **SAFETY DATA SHEET**

(according to Regulation (EC) No 1907/2006 (REACH), ANNEX II)

# CAPROLACTAM

Revision date: 01.10.2024 Version 4.4



# **Exposure Estimation**

#### **Estimated exposure for workers**

Route of exposure	Concer	ntrations	Justification
	Value	Unit	
Long-term exposure, local, inhalative - PROC 3	0.06	mg/m³	
Long-term exposure, local, inhalative – PROC 4	0.3	mg/m³	
Long-term exposure, local, inhalative – PROC 5	0.3	mg/m³	
Long-term exposure, local, inhalative – PROC 8b	0.3	mg/m³	
Long-term exposure, local, inhalative – PROC 9	0.06	mg/m³	





(according to Regulation (EC) No 1907/2006 (REACH), ANNEX II)

# CAPROLACTAM

Revision date: 01.10.2024 Version 4.4

# AZOT

#### 4. Exposure Scenario 4: Industrial/professional formulation of liquid preparations

N. alamada PO				
Number of the ES	4			
Title of exposure scenario	Industrial/professional formulation of liquid preparations			
List of all use descriptors related to the life cycle stage	SU3, 22; PROC 2, 3, 4, 5, 8a, 8b, 9; ERC 2			
Name of contributing environmental scenario and corresponding ERC	Formulation of preparation (ERC 2)			
Name(s) of contributing worker scenarios and corresponding PROCs	PROC 2: Use in closed, continuous process with occasional controlled exposure PROC 3: Use in closed batch process (synthesis or formulation) PROC 4: Use in batch and other process (synthesis) where opportunity for exposure arises PROC 5: Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant con-tact) PROC 8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities PROC 8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities PROC 9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing)			
Contributing exposure scenario controllir		2, 3, 4, 5, 8a, 8b and 9		
Control of workers exposure for PROC 2				
Title information related to contributing s	cenario			
Workers related free short title		process with occasional controlled exposure		
Use descriptor covered	PROC 2	P. 20000 Man occasional controlled exposure		
Processes, tasks, activities covered		actam for formulation in closed container/bulk with		
<b>Exposure Assessment Method</b>	Tool used: ECETOC TRA	Worker (v2.0)		
Product characteristic				
Physical state	Liquid	Operation conditions: temperature 90 °C		
Concentration of substance	100	%		
Fugacity	Low			
Vapour pressure of the substance	1.0 (corresponds to 90 °C)	hPa		
Amounts used		1		
Not relevant in ECETOC TRA				
Frequency and duration of use/exposure				
Duration of exposure	> 4	hours/day		
Frequency of exposure	≤ 240	days/year		
Other given operational conditions affect	ng workers exposure			
Location	Indoors			
Domain	Industrial			
Technical conditions and measures at pro	ocess level (source) to prevent	release		
Not relevant				
Technical conditions and measures to co	ntrol dispersion from source to	owards the worker		
Local exhaust ventilation required	No			
Organisational measures to prevent /limit	releases, dispersion and expo	sure		
Avoiding frequent and direct contact with sul	ostance. Minimisation of manual	phases. Regular cleaning of equipment and work area.		
Supervision in place to check that the RMMs				
Conditions and measures related to person		ealth evaluation		
Use of suitable respiratory protection Use of suitable chemical resistant gloves in	No			
combination with basic employee training	Cross reference to Qualitative Exposure Assessment			
Use of suitable eye protection				
Best practice advise				
outside, LEV or breathing protection) are rec		y. Otherwise appropriate risk reduction measures (e.g.		
Control of workers exposure for PROC 3				
Title information related to contributing s	cenario			
Workers related free short title	Use in closed batch proces	ss (synthesis or formulation)		
Use descriptor covered				
Ose descriptor covered	PROC 3			





SAFETY DATA SHEET
(according to Regulation (EC) No 1907/2006 (REACH), ANNEX II)

# CAPROLACTAM



AZOT						
	repackaging).					
Exposure Assessment Method	Tool used: ECE	TOC TRA Worke	r (v2.0)			
Product characteristic						
Physical state	Liquid		Operation	n conditions: temperature 90°C		
Concentration of substance	TRA 5-25		%			
Fugacity	Low					
Vapour pressure of the substance	1.0 (correspond	s to 90°C)	hPa			
Amounts used						
Not relevant in ECETOC TRA						
Frequency and duration of use/exposure			_			
Duration of exposure	15 min – 1h	per day				
Frequency of exposure	≤ 240	days/year				
Other given operational conditions affecting v		<b>e</b>	_			
Location	Indoors					
Domain	Industrial					
Technical conditions and measures at proces	s level (source) t	to prevent releas	se			
Not relevant						
Technical conditions and measures to control	T	n source towards	s the worke	er		
Appropriate local exhaust ventilation	No					
Organisational measures to prevent/limit relea			. D'			
Avoiding frequent and direct contact with substar Supervision in place to check that the RMMs in p						
Conditions and measures related to personal				u.		
Use of suitable respiratory protection	No	ene and nearth e	valuation			
Use of suitable chemical resistant gloves in	INO					
combination with basic employee training	Cross reference	to Qualitative Ex	nosure Ass	sessment		
Use of suitable eye protection		to Quantative Ex	ipodure 7 loc	Sessinent		
Control of workers exposure for PROC 4						
Title information related to contributing scena	ario					
Workers related free short title		d other process (	synthesis) v	where opportunity for exposure arises		
Use descriptor covered	PROC 4		, ,	, .		
•	Use in batch manufacture of a chemical where significant opportunity for exposure arises, e.g. during charging, sampling or discharge of material, and when the nature of the design is likely to result in exposure					
Processes, tasks, activities covered	exposure arises	s, e.g. during ch	arging, sar	npling or discharge of material, and		
Processes, tasks, activities covered  Exposure Assessment Method	exposure arises when the nature	s, e.g. during ch	arging, sar likely to res	npling or discharge of material, and		
	exposure arises when the nature	s, e.g. during che of the design is	arging, sar likely to res	npling or discharge of material, and		
Exposure Assessment Method	exposure arises when the nature	s, e.g. during che of the design is	arging, sar likely to res r (v2.0)	npling or discharge of material, and		
Exposure Assessment Method Product characteristic	exposure arises when the nature Tool used: ECE	s, e.g. during che of the design is	arging, sar likely to res r (v2.0)	npling or discharge of material, and ult in exposure		
Exposure Assessment Method Product characteristic Physical state	exposure arises when the nature Tool used: ECE	s, e.g. during che of the design is	arging, sar likely to res r (v2.0)	npling or discharge of material, and ult in exposure		
Exposure Assessment Method Product characteristic Physical state Concentration of substance	exposure arises when the nature Tool used: ECE  Liquid TRA 1-5	s, e.g. during ch e of the design is TOC TRA Worke	arging, sar likely to res r (v2.0)	npling or discharge of material, and ult in exposure		
Exposure Assessment Method Product characteristic Physical state Concentration of substance Fugacity	exposure arises when the nature Tool used: ECE  Liquid TRA 1-5 Low	s, e.g. during ch e of the design is TOC TRA Worke	arging, sar likely to res r (v2.0)  Operation	npling or discharge of material, and ult in exposure		
Exposure Assessment Method Product characteristic Physical state Concentration of substance Fugacity Vapour pressure of the substance	exposure arises when the nature Tool used: ECE  Liquid TRA 1-5 Low 1 (corresponds	s, e.g. during che of the design is TOC TRA Worke	arging, sar likely to res r (v2.0)  Operation %  hPa	npling or discharge of material, and ult in exposure		
Exposure Assessment Method Product characteristic Physical state Concentration of substance Fugacity Vapour pressure of the substance Amounts used Not relevant in ECETOC TRA Frequency and duration of use/exposure	exposure arises when the nature Tool used: ECE  Liquid TRA 1-5 Low 1 (corresponds  Industrial Domain	to 90°C)  Professior Domain	arging, sar likely to res r (v2.0)  Operation % hPa	npling or discharge of material, and ult in exposure		
Exposure Assessment Method Product characteristic Physical state Concentration of substance Fugacity Vapour pressure of the substance Amounts used Not relevant in ECETOC TRA Frequency and duration of use/exposure Duration of exposure	exposure arises when the nature Tool used: ECE  Liquid TRA 1-5 Low 1 (corresponds Industrial Domain 1- 4 hours	s, e.g. during che of the design is TOC TRA Worke  to 90°C)  Professior Domain 15min – 1h	arging, sar likely to res r (v2.0)  Operation % hPa	npling or discharge of material, and ult in exposure		
Exposure Assessment Method Product characteristic Physical state Concentration of substance Fugacity Vapour pressure of the substance Amounts used Not relevant in ECETOC TRA Frequency and duration of use/exposure Duration of exposure Frequency of exposure	exposure arises when the nature Tool used: ECE  Liquid TRA 1-5 Low 1 (corresponds  Industrial Domain 1- 4 hours ≤ 240	s, e.g. during che of the design is TOC TRA Worke  to 90°C)  Professior Domain  15min – 1h ≤ 240	arging, sar likely to res r (v2.0)  Operation % hPa	npling or discharge of material, and ult in exposure  n conditions: temperature 90°C		
Exposure Assessment Method Product characteristic Physical state Concentration of substance Fugacity Vapour pressure of the substance Amounts used Not relevant in ECETOC TRA Frequency and duration of use/exposure Duration of exposure	exposure arises when the nature Tool used: ECE  Liquid TRA 1-5 Low 1 (corresponds  Industrial Domain 1- 4 hours ≤ 240	s, e.g. during che of the design is TOC TRA Worke  to 90°C)  Professior Domain  15min – 1h ≤ 240	arging, sar likely to res r (v2.0)  Operation % hPa	npling or discharge of material, and ult in exposure  n conditions: temperature 90°C		
Exposure Assessment Method  Product characteristic  Physical state  Concentration of substance  Fugacity  Vapour pressure of the substance  Amounts used  Not relevant in ECETOC TRA  Frequency and duration of use/exposure  Duration of exposure  Frequency of exposure  Other given operational conditions affecting values.	exposure arises when the nature Tool used: ECE  Liquid TRA 1-5 Low 1 (corresponds  Industrial Domain 1- 4 hours ≤ 240  workers exposure Indoor	s, e.g. during che of the design is TOC TRA Worke  to 90°C)  Profession Domain  15min – 1h ≤ 240 e  Indoor	arging, sar likely to res r (v2.0)  Operation hPa	npling or discharge of material, and ult in exposure  n conditions: temperature 90°C		
Exposure Assessment Method  Product characteristic  Physical state  Concentration of substance  Fugacity  Vapour pressure of the substance  Amounts used  Not relevant in ECETOC TRA  Frequency and duration of use/exposure  Duration of exposure  Frequency of exposure  Other given operational conditions affecting value in the control of	exposure arises when the nature Tool used: ECE  Liquid TRA 1-5 Low 1 (corresponds:  Industrial Domain 1- 4 hours ≤ 240 workers exposure Indoor Industrial	s, e.g. during che of the design is TOC TRA Worker  to 90°C)  Profession Domain  15min – 1h ≤ 240 e  Indoor Profession	arging, sar likely to res r (v2.0)  Operation hPa  hal	npling or discharge of material, and ult in exposure  n conditions: temperature 90°C		
Exposure Assessment Method  Product characteristic  Physical state  Concentration of substance  Fugacity  Vapour pressure of the substance  Amounts used  Not relevant in ECETOC TRA  Frequency and duration of use/exposure  Duration of exposure  Frequency of exposure  Other given operational conditions affecting value and conditions affecting value and conditions and measures at process	exposure arises when the nature Tool used: ECE  Liquid TRA 1-5 Low 1 (corresponds:  Industrial Domain 1- 4 hours ≤ 240 workers exposure Indoor Industrial	s, e.g. during che of the design is TOC TRA Worker  to 90°C)  Profession Domain  15min – 1h ≤ 240 e  Indoor Profession	arging, sar likely to res r (v2.0)  Operation hPa  hal	npling or discharge of material, and ult in exposure  n conditions: temperature 90°C		
Exposure Assessment Method Product characteristic Physical state Concentration of substance Fugacity Vapour pressure of the substance Amounts used Not relevant in ECETOC TRA Frequency and duration of use/exposure Duration of exposure Frequency of exposure Other given operational conditions affecting value and conditions affecting value and conditions and measures at process Not relevant	exposure arises when the nature Tool used: ECE  Liquid TRA 1-5 Low 1 (corresponds  Industrial Domain 1- 4 hours ≤ 240  workers exposure Indoor Industrial selevel (source) to the selevel	s, e.g. during che of the design is TOC TRA Worke  to 90°C)  Professior Domain  15min – 1h  ≤ 240  Indoor Profession Profession to prevent release	arging, sar likely to res r (v2.0)  Operation % hPa  hal	per day days/year		
Exposure Assessment Method Product characteristic Physical state Concentration of substance Fugacity Vapour pressure of the substance Amounts used Not relevant in ECETOC TRA Frequency and duration of use/exposure Duration of exposure Frequency of exposure Other given operational conditions affecting value and the conditions and measures at process Not relevant Technical conditions and measures to control	exposure arises when the nature Tool used: ECE  Liquid TRA 1-5 Low 1 (corresponds  Industrial Domain 1- 4 hours ≤ 240  workers exposure Indoor Industrial se level (source) to the series of the serie	s, e.g. during che of the design is TOC TRA Worke  to 90°C)  Professior Domain  15min – 1h  ≤ 240  Indoor Profession Profession to prevent release	arging, sar likely to res r (v2.0)  Operation % hPa  hal	per day days/year		
Exposure Assessment Method  Product characteristic  Physical state  Concentration of substance  Fugacity  Vapour pressure of the substance  Amounts used  Not relevant in ECETOC TRA  Frequency and duration of use/exposure  Duration of exposure  Frequency of exposure  Other given operational conditions affecting variation  Domain  Technical conditions and measures at proces  Not relevant  Technical conditions and measures to control  Appropriate local exhaust ventilation	exposure arises when the nature Tool used: ECE  Liquid TRA 1-5 Low 1 (corresponds  Industrial Domain 1- 4 hours ≤ 240  workers exposure Indoor Industrial se level (source) to the series of the seri	e of the design is TOC TRA Worke  to 90°C)  Profession Domain  15min – 1h  ≤ 240  Indoor Profession Profession  to prevent release In source towards	arging, sar likely to res r (v2.0)  Operation % hPa  hal	per day days/year		
Exposure Assessment Method  Product characteristic  Physical state  Concentration of substance  Fugacity  Vapour pressure of the substance  Amounts used  Not relevant in ECETOC TRA  Frequency and duration of use/exposure  Duration of exposure  Frequency of exposure  Other given operational conditions affecting value and conditions and measures at proces  Not relevant  Technical conditions and measures to control  Appropriate local exhaust ventilation  Organisational measures to prevent /limit relevant	exposure arises when the nature Tool used: ECE  Liquid TRA 1-5 Low 1 (corresponds:  Industrial Domain 1-4 hours ≤ 240  workers exposure Indoor Industrial selevel (source) to the seases, dispersion from No eases, dispersion	e of the design is TOC TRA Worke  to 90°C)  Profession Domain  15min – 1h ≤ 240  e Indoor Profession Profession to prevent releas n source towards	arging, sar likely to res r (v2.0)  Operation % hPa  hal  se s the worke	per day days/year		
Exposure Assessment Method  Product characteristic  Physical state  Concentration of substance  Fugacity  Vapour pressure of the substance  Amounts used  Not relevant in ECETOC TRA  Frequency and duration of use/exposure  Duration of exposure  Frequency of exposure  Other given operational conditions affecting value and conditions and measures at procest Not relevant  Technical conditions and measures to control Appropriate local exhaust ventilation  Organisational measures to prevent /limit relevant Supervision in place to check that the RMMs in possible states and supervision in place to check that the RMMs in possible states and supervision in place to check that the RMMs in possible states are supervision in place to check that the RMMs in possible states are supervision in place to check that the RMMs in possible states are supervision in place to check that the RMMs in possible states are supervision in place to check that the RMMs in possible states are supervision in place to check that the RMMs in possible states are supervision in place to check that the RMMs in possible states are supervision in place to check that the RMMs in possible states are supervision in place to check that the RMMs in possible states are supervision in place to check that the RMMs in possible states are supervision in place to check that the RMMs in possible states are supervision in place to check that the RMMs in possible states are supervision in place to check that the RMMs in possible states are supervision in place to check that the RMMs in possible states are supervision in place to check that the RMMs in possible states are supervision in place to check that the RMMs in possible states are supervision in place to check that the RMMs in possible states are supervision in place to check that the RMMs in possible states are supervision in place to check that the RMMs in possible states are supervision in place to check that the RMMs in possible states are supervision in place to check the supervision in place to check th	exposure arises when the nature Tool used: ECE  Liquid TRA 1-5 Low 1 (corresponds  Industrial Domain 1-4 hours ≤ 240  workers exposure Indoor Industrial selevel (source) to the selevel (source) to	e of the design is  TOC TRA Worke  to 90°C)  Profession 15min – 1h ≤ 240  Indoor Profession to prevent release  and exposure of manual phase ed correctly and 0	arging, sar likely to res r (v2.0)  Operation % hPa  hal  se s the worke DCs followe	per day days/year  cleaning of equipment and work area.		
Exposure Assessment Method  Product characteristic  Physical state  Concentration of substance  Fugacity  Vapour pressure of the substance  Amounts used  Not relevant in ECETOC TRA  Frequency and duration of use/exposure  Duration of exposure  Frequency of exposure  Other given operational conditions affecting value and to the conditions and measures at procest Not relevant  Technical conditions and measures to control Appropriate local exhaust ventilation  Organisational measures to prevent /limit relevant and direct contact with substantiants.	exposure arises when the nature Tool used: ECE  Liquid TRA 1-5 Low 1 (corresponds  Industrial Domain 1-4 hours ≤ 240  workers exposure Indoor Industrial selevel (source) to the selevel (source) to	e of the design is  TOC TRA Worke  to 90°C)  Profession 15min – 1h ≤ 240  Indoor Profession to prevent release  and exposure of manual phase ed correctly and 0	arging, sar likely to res r (v2.0)  Operation % hPa  hal  se s the worke DCs followe	per day days/year  cleaning of equipment and work area.		
Exposure Assessment Method  Product characteristic  Physical state  Concentration of substance  Fugacity  Vapour pressure of the substance  Amounts used  Not relevant in ECETOC TRA  Frequency and duration of use/exposure  Duration of exposure  Frequency of exposure  Other given operational conditions affecting value and conditions and measures at procest Not relevant  Technical conditions and measures to control Appropriate local exhaust ventilation  Organisational measures to prevent /limit relevation and measures to control Avoiding frequent and direct contact with substant Supervision in place to check that the RMMs in purpose to suitable respiratory protection	exposure arises when the nature Tool used: ECE  Liquid TRA 1-5 Low 1 (corresponds  Industrial Domain 1-4 hours ≤ 240  workers exposure Indoor Industrial selevel (source) to the selevel (source) to	e of the design is  TOC TRA Worke  to 90°C)  Profession 15min – 1h ≤ 240  Indoor Profession to prevent release  and exposure of manual phase ed correctly and 0	arging, sar likely to res r (v2.0)  Operation % hPa  hal  se s the worke DCs followe	per day days/year  cleaning of equipment and work area.		
Exposure Assessment Method  Product characteristic  Physical state  Concentration of substance  Fugacity  Vapour pressure of the substance  Amounts used  Not relevant in ECETOC TRA  Frequency and duration of use/exposure  Duration of exposure  Frequency of exposure  Other given operational conditions affecting value and conditions and measures at proces  Not relevant  Technical conditions and measures to control appropriate local exhaust ventilation  Organisational measures to prevent /limit relevation and measures to control appropriate local exhaust ventilation  Organisational measures to prevent /limit relevation and measures to prevent /limit relevation and measures to prevent /limit relevation and measures related to personal use of suitable respiratory protection  Use of suitable chemical resistant gloves in	exposure arises when the nature Tool used: ECE  Liquid TRA 1-5 Low 1 (corresponds  Industrial Domain 1- 4 hours ≤ 240  Vorkers exposure Indoor Industrial is level (source) to eases, dispersion from No eases, dispersion lace are being use protection, hygie No	es, e.g. during che of the design is TOC TRA Worker  to 90°C)  Profession Domain  15min – 1h ≤ 240  Indoor Profession Profession to prevent release	arging, sar likely to res r (v2.0)  Operation % hPa  hPa  al se s the worke cocs followe evaluation	per day days/year  cleaning of equipment and work area. d.		
Exposure Assessment Method  Product characteristic  Physical state  Concentration of substance  Fugacity  Vapour pressure of the substance  Amounts used  Not relevant in ECETOC TRA  Frequency and duration of use/exposure  Duration of exposure  Frequency of exposure  Other given operational conditions affecting value and conditions and measures at procest Not relevant  Technical conditions and measures to control Appropriate local exhaust ventilation  Organisational measures to prevent /limit relevation and measures to control Avoiding frequent and direct contact with substant Supervision in place to check that the RMMs in purpose to suitable respiratory protection	exposure arises when the nature Tool used: ECE  Liquid TRA 1-5 Low 1 (corresponds  Industrial Domain 1- 4 hours ≤ 240  Vorkers exposure Indoor Industrial is level (source) to eases, dispersion from No eases, dispersion lace are being use protection, hygie No	e of the design is  TOC TRA Worke  to 90°C)  Profession 15min – 1h ≤ 240  Indoor Profession to prevent release  and exposure of manual phase ed correctly and 0	arging, sar likely to res r (v2.0)  Operation % hPa  hPa  al se s the worke cocs followe evaluation	per day days/year  cleaning of equipment and work area. d.		



# Page 22 of 47 SAFETY DATA SHEET

(according to Regulation (EC) No 1907/2006 (REACH), ANNEX II)

# CAPROLACTAM



Title information related to contributing scer	nario				
Workers related free short title				mulation of preparations and article	
Use descriptor covered	PROC 5		]		
Processes, tasks, activities covered	Manufacture or formulation of chemical products or articles using technologies related to mixing and blending, where the process is in stages and provides the opportunity for significant contact at any stage				
<b>Exposure Assessment Method</b>	Tool used: ECETOC				
Product characteristic	1001 0000. 202100	11011101110	51 (12.0)		
Physical state	Liquid		Operation	conditions: 90°C	
Concentration of substance	TRA 1-5		%	5011411101101.00	
Fugacity	Low		,,,		
Vapour pressure of the substance	1 (corresponds to 90°	C)	hPa		
Amounts used	1 (concepting to co	<u> </u>	<u> </u>		
Not relevant in ECETOC TRA					
Frequency and duration of use/exposure	Industrial Domain	Profession Domain	onal		
Duration of exposure	1- 4 hours	15min – 1	1h	per day	
Frequency of exposure	≤ 240	≤ 240		days/year	
Other given operational conditions affecting					
Location	Indoor	Indoor			
Domain	Industrial	Professio	nal		
Technical conditions and measures at proce					
Not relevant	sas level (addite) to pre	vent reica	36		
Technical conditions and measures to contr	al disparsion from sour	rea toward	s the worker	•	
Appropriate local exhaust ventilation	No	ice lowaru	The Worker		
Organisational measures to prevent /limit re		OVDOCUTO			
		exposure			
Avaiding frequent and direct contact with subst	anaa Minimiaatian of ma	nual nhace	o Dogular al	coning of equipment and work area	
Avoiding frequent and direct contact with substa					
Supervision in place to check that the RMMs in	place are being used cor	rectly and	OCs followed		
Supervision in place to check that the RMMs in Conditions and measures related to personal	place are being used con	rectly and	OCs followed		
Supervision in place to check that the RMMs in Conditions and measures related to personal Use of suitable respiratory protection	place are being used cor	rectly and	OCs followed		
Supervision in place to check that the RMMs in Conditions and measures related to personal Use of suitable respiratory protection Use of suitable chemical resistant gloves in	place are being used con protection, hygiene a No	rectly and ond health of	OCs followed evaluation		
Supervision in place to check that the RMMs in Conditions and measures related to personal Use of suitable respiratory protection Use of suitable chemical resistant gloves in combination with basic employee training	place are being used con	rectly and ond health of	OCs followed evaluation		
Supervision in place to check that the RMMs in Conditions and measures related to personal Use of suitable respiratory protection Use of suitable chemical resistant gloves in combination with basic employee training Use of suitable eye protection	place are being used con protection, hygiene a No	rectly and ond health of	OCs followed evaluation		
Supervision in place to check that the RMMs in Conditions and measures related to personal Use of suitable respiratory protection Use of suitable chemical resistant gloves in combination with basic employee training Use of suitable eye protection Control of workers exposure for PROC 8a	place are being used con protection, hygiene a No  Cross reference to Quantum protection of the protec	rectly and ond health of	OCs followed evaluation		
Supervision in place to check that the RMMs in Conditions and measures related to personal Use of suitable respiratory protection Use of suitable chemical resistant gloves in	place are being used con protection, hygiene a No  Cross reference to Quartic Transfer of substance	rectly and ond health on h	OCs followed evaluation  xposure Asse		
Supervision in place to check that the RMMs in Conditions and measures related to personal Use of suitable respiratory protection Use of suitable chemical resistant gloves in combination with basic employee training Use of suitable eye protection Control of workers exposure for PROC 8a Title information related to contributing scer Workers related free short title	place are being used con protection, hygiene a No  Cross reference to Quartic Transfer of substance containers at non-decimal protection.	rectly and ond health on h	OCs followed evaluation  xposure Asse	essment	
Supervision in place to check that the RMMs in Conditions and measures related to personal Use of suitable respiratory protection Use of suitable chemical resistant gloves in combination with basic employee training Use of suitable eye protection Control of workers exposure for PROC 8a Title information related to contributing scer Workers related free short title Use descriptor covered	place are being used con protection, hygiene a No  Cross reference to Quantum Transfer of substance containers at non-decomprocess.	rectly and ond health on h	OCs followed evaluation  xposure Asse	essment	
Supervision in place to check that the RMMs in Conditions and measures related to personal Use of suitable respiratory protection Use of suitable chemical resistant gloves in combination with basic employee training Use of suitable eye protection Control of workers exposure for PROC 8a Title information related to contributing scer Workers related free short title Use descriptor covered Processes, tasks, activities covered	place are being used con protection, hygiene a No  Cross reference to Quantum Cross reference to Quant	and health e	OCs followed evaluation  xposure Asse ation (chargination)	essment	
Supervision in place to check that the RMMs in Conditions and measures related to personal Use of suitable respiratory protection Use of suitable chemical resistant gloves in combination with basic employee training Use of suitable eye protection Control of workers exposure for PROC 8a Title information related to contributing scer Workers related free short title Use descriptor covered Processes, tasks, activities covered Exposure Assessment Method	place are being used con protection, hygiene a No  Cross reference to Quantum Transfer of substance containers at non-decomprocess.	and health e	OCs followed evaluation  xposure Asse ation (chargination)	essment	
Supervision in place to check that the RMMs in Conditions and measures related to personal Use of suitable respiratory protection Use of suitable chemical resistant gloves in combination with basic employee training Use of suitable eye protection Control of workers exposure for PROC 8a Title information related to contributing scer Workers related free short title Use descriptor covered Processes, tasks, activities covered Exposure Assessment Method Product characteristic	place are being used con protection, hygiene a No  Cross reference to Quartic Cross reference to Quart	and health e	OCs followed evaluation  xposure Asse ation (chargin lities  er (v2.0)	essment  ng/discharging) from/to vessels/larg	
Supervision in place to check that the RMMs in Conditions and measures related to personal Use of suitable respiratory protection Use of suitable chemical resistant gloves in combination with basic employee training Use of suitable eye protection Control of workers exposure for PROC 8a Title information related to contributing scer Workers related free short title Use descriptor covered Processes, tasks, activities covered Exposure Assessment Method Product characteristic Physical state	place are being used con protection, hygiene a No  Cross reference to Quartic Cross reference to Quart	and health e	OCs followed evaluation  xposure Asse ation (chargir lities  er (v2.0)  Operation of	essment	
Supervision in place to check that the RMMs in Conditions and measures related to personal Use of suitable respiratory protection Use of suitable chemical resistant gloves in combination with basic employee training Use of suitable eye protection Control of workers exposure for PROC 8a Title information related to contributing scer Workers related free short title Use descriptor covered Processes, tasks, activities covered Exposure Assessment Method Product characteristic Physical state Concentration of substance	place are being used con protection, hygiene a No  Cross reference to Quartic Containers at non-decontainers at non-decontaine	and health e	OCs followed evaluation  xposure Asse ation (chargin lities  er (v2.0)	essment  ng/discharging) from/to vessels/larg	
Supervision in place to check that the RMMs in  Conditions and measures related to personal Use of suitable respiratory protection Use of suitable chemical resistant gloves in combination with basic employee training Use of suitable eye protection  Control of workers exposure for PROC 8a  Title information related to contributing scer  Workers related free short title  Use descriptor covered  Processes, tasks, activities covered  Exposure Assessment Method  Product characteristic  Physical state  Concentration of substance  Fugacity	place are being used con protection, hygiene a No  Cross reference to Quartic Cross reference to Quart	ualitative Existence or prepara	ation (chargin lities  Operation of the control of	essment  ng/discharging) from/to vessels/larg	
Supervision in place to check that the RMMs in  Conditions and measures related to personal Use of suitable respiratory protection Use of suitable chemical resistant gloves in combination with basic employee training Use of suitable eye protection  Control of workers exposure for PROC 8a  Title information related to contributing scent Workers related free short title  Use descriptor covered Processes, tasks, activities covered  Exposure Assessment Method  Product characteristic  Physical state Concentration of substance  Fugacity  Vapour pressure of the substance	place are being used con protection, hygiene a No  Cross reference to Quartic Containers at non-decontainers at non-decontaine	ualitative Existence or prepara	OCs followed evaluation  xposure Asse ation (chargir lities  er (v2.0)  Operation of	essment  ng/discharging) from/to vessels/larg	
Supervision in place to check that the RMMs in Conditions and measures related to personal Use of suitable respiratory protection Use of suitable chemical resistant gloves in combination with basic employee training Use of suitable eye protection Control of workers exposure for PROC 8a Title information related to contributing scer Workers related free short title Use descriptor covered Processes, tasks, activities covered Exposure Assessment Method Product characteristic Physical state Concentration of substance Fugacity Vapour pressure of the substance Amounts used	place are being used con protection, hygiene a No  Cross reference to Quartic Cross reference to Quart	ualitative Existence or prepara	ation (chargin lities  Operation of the control of	essment  ng/discharging) from/to vessels/larg	
Supervision in place to check that the RMMs in  Conditions and measures related to personal Use of suitable respiratory protection Use of suitable chemical resistant gloves in combination with basic employee training Use of suitable eye protection  Control of workers exposure for PROC 8a  Title information related to contributing scer  Workers related free short title  Use descriptor covered  Processes, tasks, activities covered  Exposure Assessment Method  Product characteristic  Physical state  Concentration of substance  Fugacity  Vapour pressure of the substance  Amounts used  Not relevant in ECETOC TRA	place are being used con protection, hygiene a No  Cross reference to Quartic Cross reference to Quart	rectly and ond health of h	OCs followed evaluation  xposure Assertation (charginalities er (v2.0)  Operation of the properties of	essment  ng/discharging) from/to vessels/larg	
Supervision in place to check that the RMMs in Conditions and measures related to personal Use of suitable respiratory protection Use of suitable chemical resistant gloves in combination with basic employee training Use of suitable eye protection Control of workers exposure for PROC 8a Title information related to contributing scer Workers related free short title Use descriptor covered Processes, tasks, activities covered Exposure Assessment Method Product characteristic Physical state Concentration of substance Fugacity Vapour pressure of the substance Amounts used Not relevant in ECETOC TRA Frequency and duration of use/exposure	place are being used con protection, hygiene a No  Cross reference to Quartic Containers at non-decontainers at non-decontaine	rectly and ond health of h	OCs followed evaluation  xposure Asse ation (chargir lities  er (v2.0)  Operation of the properties of	essment  ag/discharging) from/to vessels/larg  conditions: 90°C	
Supervision in place to check that the RMMs in Conditions and measures related to personal Use of suitable respiratory protection Use of suitable chemical resistant gloves in combination with basic employee training Use of suitable eye protection Control of workers exposure for PROC 8a Title information related to contributing scer Workers related free short title Use descriptor covered Processes, tasks, activities covered Exposure Assessment Method Product characteristic Physical state Concentration of substance Fugacity Vapour pressure of the substance Amounts used Not relevant in ECETOC TRA Frequency and duration of use/exposure Duration of exposure	place are being used con protection, hygiene a No  Cross reference to Quartic Containers at non-decontainers at non-decontaine	rectly and ond health ond health on	OCs followed evaluation  xposure Asse ation (chargir lities  er (v2.0)  Operation of the properties of	essment  ag/discharging) from/to vessels/larg  conditions: 90°C	
Supervision in place to check that the RMMs in Conditions and measures related to personal Use of suitable respiratory protection Use of suitable chemical resistant gloves in combination with basic employee training Use of suitable eye protection Control of workers exposure for PROC 8a Title information related to contributing scer Workers related free short title Use descriptor covered Processes, tasks, activities covered Exposure Assessment Method Product characteristic Physical state Concentration of substance Fugacity Vapour pressure of the substance Amounts used Not relevant in ECETOC TRA Frequency and duration of use/exposure Duration of exposure Frequency of exposure	place are being used con protection, hygiene a No  Cross reference to Quartic Containers at non-dection PROC 8a e.g. sampling Tool used: ECETOC  Liquid TRA 1-5 Low 1 (corresponds to 90  Industrial Domain 15 min - 1 hours ≤ 240	rectly and ond health of h	OCs followed evaluation  xposure Asse ation (chargir lities  er (v2.0)  Operation of the properties of	essment  ag/discharging) from/to vessels/larg  conditions: 90°C	
Supervision in place to check that the RMMs in Conditions and measures related to personal Use of suitable respiratory protection Use of suitable chemical resistant gloves in combination with basic employee training Use of suitable eye protection Control of workers exposure for PROC 8a Title information related to contributing scer Workers related free short title Use descriptor covered Processes, tasks, activities covered Exposure Assessment Method Product characteristic Physical state Concentration of substance Fugacity Vapour pressure of the substance Amounts used Not relevant in ECETOC TRA Frequency and duration of use/exposure Duration of exposure Frequency of exposure Other given operational conditions affecting	place are being used con protection, hygiene a No  Cross reference to Quartic Containers at non-dection PROC 8a e.g. sampling Tool used: ECETOC  Liquid TRA 1-5 Low 1 (corresponds to 90  Industrial Domain 15 min - 1 hours ≤ 240  workers exposure	rectly and ond health ond health ond health on health o	OCs followed evaluation  xposure Asse ation (chargir lities  er (v2.0)  Operation of the properties of	essment  ag/discharging) from/to vessels/larg  conditions: 90°C	
Supervision in place to check that the RMMs in Conditions and measures related to personal Use of suitable respiratory protection Use of suitable chemical resistant gloves in combination with basic employee training Use of suitable eye protection Control of workers exposure for PROC 8a Title information related to contributing scer Workers related free short title Use descriptor covered Processes, tasks, activities covered Exposure Assessment Method Product characteristic Physical state Concentration of substance Fugacity Vapour pressure of the substance Amounts used Not relevant in ECETOC TRA Frequency and duration of use/exposure Duration of exposure Frequency of exposure Other given operational conditions affecting Location	place are being used con protection, hygiene a No  Cross reference to Quartic Containers at non-dection PROC 8a e.g. sampling Tool used: ECETOC  Liquid TRA 1-5 Low 1 (corresponds to 90  Industrial Domain 15 min - 1 hours ≤ 240  workers exposure Indoor	rectly and ond health ond health ond health on the latest part of the	OCs followed evaluation  Exposure Assertion (charginalities  Exposure (v2.0)  Operation of the properties of the propert	essment  ag/discharging) from/to vessels/larg  conditions: 90°C	
Supervision in place to check that the RMMs in Conditions and measures related to personal Use of suitable respiratory protection Use of suitable chemical resistant gloves in combination with basic employee training Use of suitable eye protection Control of workers exposure for PROC 8a Title information related to contributing scer Workers related free short title Use descriptor covered Processes, tasks, activities covered Exposure Assessment Method Product characteristic Physical state Concentration of substance Fugacity Vapour pressure of the substance Amounts used Not relevant in ECETOC TRA Frequency and duration of use/exposure Duration of exposure Frequency of exposure Other given operational conditions affecting Location Domain	place are being used con protection, hygiene a No  Cross reference to Quartic Cross reference to Quar	rectly and ond health ond health ond health ond health on health	oCs followed evaluation  xposure Assertion (charginalities  er (v2.0)  Operation of the properties of	essment  ag/discharging) from/to vessels/larg  conditions: 90°C	
Supervision in place to check that the RMMs in Conditions and measures related to personal Use of suitable respiratory protection Use of suitable chemical resistant gloves in combination with basic employee training Use of suitable eye protection Control of workers exposure for PROC 8a Title information related to contributing scer Workers related free short title Use descriptor covered Processes, tasks, activities covered Exposure Assessment Method Product characteristic Physical state Concentration of substance Fugacity Vapour pressure of the substance Amounts used Not relevant in ECETOC TRA Frequency and duration of use/exposure Duration of exposure Frequency of exposure Other given operational conditions affecting Location Domain Technical conditions and measures at proce	place are being used con protection, hygiene a No  Cross reference to Quartic Cross reference to Quar	rectly and ond health ond health ond health ond health on health	oCs followed evaluation  xposure Assertion (charginalities  er (v2.0)  Operation of the properties of	essment  ag/discharging) from/to vessels/larg  conditions: 90°C	
Supervision in place to check that the RMMs in Conditions and measures related to personal Use of suitable respiratory protection Use of suitable chemical resistant gloves in combination with basic employee training Use of suitable eye protection Control of workers exposure for PROC 8a Title information related to contributing scer Workers related free short title Use descriptor covered Processes, tasks, activities covered Exposure Assessment Method Product characteristic Physical state Concentration of substance Fugacity Vapour pressure of the substance Amounts used Not relevant in ECETOC TRA Frequency and duration of use/exposure Duration of exposure Frequency of exposure Other given operational conditions affecting Location Domain Technical conditions and measures at proce	place are being used con protection, hygiene a No  Cross reference to Quartic Containers at non-dection PROC 8a e.g. sampling Tool used: ECETOC  Liquid TRA 1-5 Low 1 (corresponds to 90  Industrial Domain 15 min - 1 hours ≤ 240  workers exposure Indoor Industrial	rectly and ond health ond health ond health on	OCs followed evaluation  Exposure Assertation (chargin littles  Operation of the properties of the pro	essment  ag/discharging) from/to vessels/larg  conditions: 90°C  per day days/year	
Supervision in place to check that the RMMs in Conditions and measures related to personal Use of suitable respiratory protection Use of suitable chemical resistant gloves in combination with basic employee training Use of suitable eye protection Control of workers exposure for PROC 8a Title information related to contributing scer Workers related free short title Use descriptor covered Processes, tasks, activities covered Exposure Assessment Method Product characteristic Physical state Concentration of substance Fugacity Vapour pressure of the substance Amounts used Not relevant in ECETOC TRA Frequency and duration of use/exposure Duration of exposure Frequency of exposure Other given operational conditions affecting Location Domain Technical conditions and measures at proce	place are being used con protection, hygiene a No  Cross reference to Quartic Containers at non-dection PROC 8a e.g. sampling Tool used: ECETOC  Liquid TRA 1-5 Low 1 (corresponds to 90  Industrial Domain 15 min - 1 hours ≤ 240  workers exposure Indoor Industrial	rectly and ond health ond health ond health on	OCs followed evaluation  Exposure Assertation (chargin littles  Operation of the properties of the pro	essment  ag/discharging) from/to vessels/larg  conditions: 90°C  per day days/year	



# Page 23 of 47

# **SAFETY DATA SHEET**

(according to Regulation (EC) No 1907/2006 (REACH), ANNEX II)

# CAPROLACTAM



AZOT					
Avoiding frequent and direct contact with substa				ing of equipment and work area.	
Supervision in place to check that the RMMs in p					
Conditions and measures related to personal	protection, hygiene an	d health e	valuation		
Use of suitable respiratory protection	No				
Use of suitable chemical resistant gloves in					
combination with basic employee training	Cross reference to Qua	alitative Ex	posure Assessm	nent	
Use of suitable eye protection					
Control of workers exposure for PROC 8b					
Title information related to contributing scen	ario				
Workers related free short title			ation (charging/d	ischarging) from/to vessels/large	
Use descriptor covered	PROC 8b	i iaciiilies			
Processes, tasks, activities covered	Sampling				
Exposure Assessment Method	Tool used: ECETOC T	DA Marka	r (v2 0)		
Product characteristic	1001 useu. ECETOC 1	KA WOIKE	i (V2.U)		
	Limita		0	d:#: 00°0	
Physical state	Liquid		Operation cond	aitions: 90°C	
Concentration of substance	TRA 1-5		%		
Fugacity	Low				
Vapour pressure of the substance	1 (corresponds to 90°C	;)	hPa		
Amounts used					
Not relevant					
Frequency and duration of use/exposure	Industrial Domain	Profes	sional Domain		
Duration of exposure	1-4 hours	15min -	- 1h	per day	
Frequency of exposure	≤ 240	≤ 240		days/year	
Other given operational conditions affecting	workers exposure	1			
Location	Indoor	Indoor			
Domain	Industrial	Profess	ional		
Technical conditions and measures at proces					
Not relevant	oo level (oouloo) to prov	one roiou.	50		
Technical conditions and measures to control	l dispersion from source	e toward	s the worker		
Appropriate local exhaust ventilation	No	Ctowara	S the Worker		
Organisational measures to prevent /limit rele		vnosuro			
Avoiding frequent and direct contact with substa			e Pogular cloan	ing of equipment and work area	
Supervision in place to check that the RMMs in p				ing or equipment and work area.	
Conditions and measures related to personal					
	No	a nealth e	valuation		
Use of suitable respiratory protection Use of suitable chemical resistant gloves in	INU				
combination with basic employee training	Cross reference to Our	alitativa Ex	roccuro Accocom	aont	
Use of suitable eye protection	Cross reference to Qua	anialive =	tposure Assessir	ient	
Control of workers exposure for PROC 9					
Title information related to contributing scen	orio				
Workers related free short title	Transfer of substance	or prepar	ation into small	containers (dedicated filling line,	
Use descriptor covered	including weighing) PROC 9				
Use descriptor covered		down			
Processes, tasks, activities covered	Maintenance and clear		r (v2 0)		
Exposure Assessment Method	Tool used: ECETOC T	KA WORKE	:i (V∠.U)		
Product characteristic	T		l		
Physical state	Liquid		Operation cond	ditions: 90 °C	
Concentration of substance	TRA 1-5		%		
Fugacity	Low				
Vapour pressure of the substance	1 (corresponds to 90 °C	C)	hPa		
Amounts used					
Not relevant in ECETOC TRA					
Frequency and duration of use/exposure	Industrial Domain	Profes	sional Domain		
Duration of exposure	1-4 hours	15min -	- 1h	per day	
Frequency of exposure	≤ 240	≤ 240		days/year	
Other given operational conditions affecting					
Location	Indoor	Indoor			
	1				



# Page 24 of 47

# **SAFETY DATA SHEET**

(according to Regulation (EC) No 1907/2006 (REACH), ANNEX II)

# CAPROLACTAM

Revision date: 01.10.2024 Version 4.4

AZOT

Domain	Industrial	Professional				
Technical conditions and measures at process level (source) to prevent release						
Not relevant						
Technical conditions and measures to control dispersion from source towards the worker						
Appropriate local exhaust ventilation No						
Organisational measures to prevent /limit releases, dispersion and exposure						
		al phases. Regular cleaning of equipment and work area.				
Supervision in place to check that the RMMs in p						
Conditions and measures related to personal	protection, hygiene and	health evaluation				
Use of suitable respiratory protection	No					
Use of suitable chemical resistant gloves in						
combination with basic employee training	Cross reference to Qualitative Exposure Assessment					
Use of suitable eye protection	1					

# **Exposure Estimation**

Estimated exposure for workers PROC2 and 3

Route of exposure	Concentrations		Justification
	Value	Unit	
Long-term exposure, local, inhalative – PROC2	4.72	mg/m³	
Long-term exposure, local, inhalative - PROC3	1.69	mg/m³	

Estimated exposure for workers - PROC 4, 5, 8a, 8b, 9

Route of exposure	Concentrations			Justification
	Industrial Domain	Professional Domain	Unit	
Long-term exposure, local, inhalativer – PROC4	2.83	1.89	mg/m³	
Long-term exposure, local, inhalativer - PROC5	2.83	1.89	mg/m³	
Long-term exposure, local, inhalativer – PROC8a	1.89	2.36	mg/m³	
Long-term exposure, local, inhalativer – PROC8b	2.83	1.89	mg/m³	
Long-term exposure, local, inhalativer – PROC9	2.83	1.89	mg/m³	



(according to Regulation (EC) No 1907/2006 (REACH), ANNEX II)

# CAPROLACTAM

Revision date: 01.10.2024 Version 4.4



#### 5. Exposure Scenario 5: Use as intermediate

Number of the ES	5					
Title of exposure scenario	Use as intermediate					
List of all use descriptors related to the life cycle stage	SU	SU3, 8, 9; PROC 1, 2, 3, 4, 8b and 9; ERC 6a; PC19				
Name of contributing environmental	Indi	Industrial use resulting in manufacture of another substance (use of intermediates)				
scenario and corresponding ERC		(ERC6a)				
Name(s) of contributing worker scenarios and corresponding PROCs	PROC 1: Use in closed process, no likelihood of exposure PROC 2: Use in closed, continuous process with occasional controlled exposure PROC 3: Use in closed batch process (synthesis or formulation) PROC 4: Use in batch and other process (syn-thesis) where opportunity for exposure arises PROC 8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities PROC 9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing)					
Contributing exposure scenario controlling	g wo	rker exposure for PROC 1, 2, 3, 4	, 8b and 9			
Control of workers exposure for PROC 1						
Title information related to contributing so	cenar	io				
Workers related free short title		Use in closed process, no likelihoo	od of exposure			
Use descriptor covered		PROC 1	•			
Processes, tasks, activities covered			tegrity contained system where little potential			
Exposure Assessment Method		Tool used: ECETOC TRA Worker				
Product characteristic						
Physical state		Liquid	Operation conditions: temperature ca. 90°C			
Concentration of substance		100	%			
Fugacity		Low				
Vapour pressure of the substance		1.0 (corresponds to ca. 90°C)	hPa			
Amounts used		· · · · · · · · · · · · · · · · · · ·				
Not relevant in ECETOC TRA						
Frequency and duration of use/exposure						
Duration of exposure		> 4	hours/day			
Frequency of exposure		≤ 240	days/year			
Other given operational conditions affecti	ng w	orkers exposure				
Location		Indoors				
Domain		Industrial				
Technical conditions and measures at pro	cess	level (source) to prevent release				
Not applicable – closed system						
Technical conditions and measures to con	ntrol	-	he worker			
Local exhaust ventilation required		No				
Organisational measures to prevent /limit	relea	ises, dispersion and exposure				
Not relevant in ECETOC TRA	ma!	votation bysican and bealth	aluation			
Conditions and measures related to perso	nai p		สเนสแอก			
Use of suitable respiratory protection  Control of workers exposure for PROC 2		No				
-	2022	io				
Title information related to contributing so	enar		with appaired controlled over			
Workers related free short title			with occasional controlled exposure			
Use descriptor covered		PROC 2	adadam while combining the section of the section o			
Processes, tasks, activities covered			e design philosophy is not specifically aimed at exposure will arise e.g. through maintenance, es			
Exposure Assessment Method		Tool used: ECETOC TRA Worker	(v2.0)			
Product characteristic						
Physical state		Liquid	Operation conditions: temperature ca. 90°C			
Concentration of substance		100	%			
Fugacity	Low					
		2011	<u> </u>			



# Page 26 of 47

# **SAFETY DATA SHEET**

(according to Regulation (EC) No 1907/2006 (REACH), ANNEX II)

# CAPROLACTAM



and a state of the						
Amounts used						
Not relevant in ECETOC TRA						
Frequency and duration of use/exposure						
Duration of exposure	> 4	hours/day				
Frequency of exposure	≤ 240	days/year				
Other given operational conditions affecting workers exposure						
Location						
Domain	Industrial					
Technical conditions and measures at process		nrovent release				
Not relevant	s level (source) it	prevent release				
	dispersion from	course towards t	ho worker			
Technical conditions and measures to control	_	Source towards t	ile worker			
Local exhaust ventilation required	No .					
Organisational measures to prevent /limit relea			<del></del>			
Avoiding frequent and direct contact with substan						
Supervision in place to check that the RMMs in place						
Conditions and measures related to personal		ne and nealth eva	aluation			
Use of suitable respiratory protection	No					
Use of suitable chemical resistant gloves	Cross reference	to Qualitative Exp	osure Assessment			
Use of suitable eye protection  Best practice advise						
	a abauld mat aven	ad 4h/day Otham	vice commonwists wisk reduction recovers (c.s.			
Probing/sampling with considerable vapor releas outside, LEV or breathing protection) are recomm		eu maay. Otherv	wise appropriate risk reduction measures (e.g.			
Control of workers exposure for PROC 3	ciiucu.					
	ria					
Title information related to contributing scena						
Workers related free short title		atch process (synth	nesis or formulation)			
Use descriptor covered	PROC 3					
Processes, tasks, activities covered	e.g. through en		edominant handling is in a contained manner, but where some opportunity for contact with moling			
Exposure Assessment Method		TOC TRA Worker				
Product characteristic	1001 0000. 202	TOO THURST TOOMOR	(+2.0)			
Physical state	Liquid		Operation conditions: temperature ca. 90°C			
Concentration of substance	100		%			
			70			
Fugacity	Low	. 1. 00 00)	I.D.			
Vapour pressure of the substance	1.0 (correspond:	s to 90 °C)	hPa			
Amounts used						
Not relevant in ECETOC TRA	1		1			
Frequency and duration of use/exposure						
Duration of exposure	> 4 h		per day			
Frequency of exposure	≤ 240		days per year			
Other given operational conditions affecting w	orkers exposure					
Location	Indoors					
Domain	Industrial					
Technical conditions and measures at process	s level (source) to	prevent release				
Not relevant	•					
Technical conditions and measures to control	dispersion from	source towards t	he worker			
Appropriate local exhaust ventilation	No					
Organisational measures to prevent /limit release		and exposure				
Avoiding frequent and direct contact with substan			Regular cleaning of equipment and work area			
Supervision in place to check that the RMMs in place						
Conditions and measures related to personal						
	No	no and nealth eva	AIMQUIVII			
Use of suitable respiratory protection	INU					
Use of suitable chemical resistant gloves	Cross reference	to Qualitative Exp	osure Assessment			
Use of suitable eye protection		<u>'</u>				
Control of workers exposure for PROC 4						
Title information related to contributing scena						
Workers related free short title	arises	d other process (sy	ynthesis) where opportunity for exposure			
Use descriptor covered	PROC 8b					
Processes, tasks, activities covered	exposure arises	s, e.g. during chai	chemical where significant opportunity for rging, sampling or discharge of material, and kely to result in exposure			



# Page 27 of 47 SAFETY DATA SHEET

(according to Regulation (EC) No 1907/2006 (REACH), ANNEX II)

# CAPROLACTAM



AZOI	T	TD 4 147 :	( 0 0)	
Exposure Assessment Method Product characteristic	Tool used: ECETOC	I KA Worke	r (v2.0)	
	1			2000
Physical state	Liquid		Operation conditions: temperature ca. 90°C %	
Concentration of substance	100		70	
Fugacity  Vapour pressure of the substance	Low	00°C\	hDo	
· · ·	1 (corresponds to ca	. 90 C)	hPa	
Amounts used  Not relevant in ECETOC TRA				
Frequency and duration of use/exposure				
Duration of exposure	> 4 hours	per day		
Frequency of exposure	≤ 240	days/year		
Other given operational conditions affecting w		uays/yeai		
Location	Indoor			
Domain	Industrial			
Technical conditions and measures at process		vent release	<u> </u>	<u> </u>
Not relevant	siever (source) to pre	vent release	•	
Technical conditions and measures to control	dispersion from sour	ce towards	the worker	<u> </u>
Appropriate local exhaust ventilation	No	oc towards	tile Worker	
Organisational measures to prevent /limit relea		exposure		
Avoiding frequent and direct contact with substant			Regular cl	eaning of equipment and work area
Supervision in place to check that the RMMs in pla				
Conditions and measures related to personal p				
Use of suitable respiratory protection	No			
Use of suitable chemical resistant gloves	0			
Use of suitable eye protection	Cross reference to Q	ualitative Ex	posure Ass	essment
Control of workers exposure for PROC 8b				
Title information related to contributing scenar	rio			
Workers related free short title	Transfer of subs vessels/large contain			
Use descriptor covered	PROC 8b			
Processes, tasks, activities covered		o dust, vap		ng, bagging in dedicated facilities. sols or spillage, and cleaning of
Exposure Assessment Method	Tool used: ECETOC		r (v2.0)	
Product characteristic				
Physical state	Liquid		Operation	conditions: temperature ca. 90°C
Concentration of substance	100		%	
Fugacity	Low			
Vapour pressure of the substance	1 (corresponds to ca.	. 90 °C)	hPa	
Amounts used				
Not relevant in ECETOC TRA				
Frequency and duration of use/exposure		·		
Duration of exposure	15min - 1h		per day	
Frequency of exposure	≤ 240		days/year	
Other given operational conditions affecting w	orkers exposure			
Location	Indoors			
Domain	Industrial			
Technical conditions and measures at process	level (source) to pre	vent release	9	
Not relevant				
Technical conditions and measures to control	dispersion from sour	ce towards	the worker	•
Appropriate local exhaust ventilation	No			
Organisational measures to prevent /limit relea				
Avoiding frequent and direct contact with substant				
Supervision in place to check that the RMMs in place				
Conditions and measures related to personal p		nd health ev	aluation	
Use of suitable respiratory protection	No			
Use of suitable chemical resistant gloves	Cross reference to Q	ualitative Fx	posure Ass	essment
Use of suitable eye protection	3.111.70.0.01100.10 0			
Control of workers exposure for PROC 9				
Title information related to contributing scenar	rio			



# Page 28 of 47

# **SAFETY DATA SHEET**

(according to Regulation (EC) No 1907/2006 (REACH), ANNEX II)

# CAPROLACTAM

Revision date: 01.10.2024 Version 4.4



Workers related free short title	Transfer of substance or preparation into small containers (dedicated filling line, including weighing)				
Use descriptor covered	PROC 9				
Processes, tasks, activities covered	Maintenance, clean down				
Exposure Assessment Method	Tool used: ECETOC TRA Work	ser (v2.0)			
Product characteristic					
Physical state	Liquid	Operation conditions: temperature ca. 90°C			
Concentration of substance	TRA 1-5	%			
Fugacity	Low				
Vapour pressure of the substance	1 (corresponds to ca. 90°C)	hPa			
Amounts used					
Not relevant in ECETOC TRA					
Frequency and duration of use/exposure					
Duration of exposure	15 min - 1 hours per day				
Frequency of exposure	≤ 240 days/year				
Other given operational conditions affecting w	vorkers exposure				
Location	Indoors				
Domain	Industrial				
Technical conditions and measures at process level (source) to prevent release					
Not relevant					
Technical conditions and measures to control	dispersion from source toward	ls the worker			
Appropriate local exhaust ventilation	No				
Organisational measures to prevent /limit rele					
Avoiding frequent and direct contact with substar Supervision in place to check that the RMMs in pl		es. Regular cleaning of equipment and work area. OCs followed.			
Conditions and measures related to personal	protection, hygiene and health	evaluation			
Use of suitable respiratory protection	No				
Use of suitable chemical resistant gloves	Cross reference to Qualitative F	Evnocure Accessment			
Use of suitable eye protection	Cross reference to Qualitative Exposure Assessment				

#### **Exposure Estimation**

# **Estimated exposure for workers**

Route of exposure	Concentrations		Justification
	Value	Unit	
Long-term exposure, local, inhalative - PROC1	0.047	mg/m³	
Long-term exposure, local, inhalative – PROC2	4.72	mg/m³	
Long-term exposure, local, inhalative – PROC3	1.41	mg/m³	
Long-term exposure, local, inhalative – PROC4	2.36	mg/m³	
Long-term exposure, local, inhalative – PROC8b	4.72	mg/m³	
Long-term exposure, local, inhalative – PROC9	4.72	mg/m³	





(according to Regulation (EC) No 1907/2006 (REACH), ANNEX II)

# CAPROLACTAM

Revision date: 01.10.2024 Version 4.4



# 6. Exposure Scenario 6: Use of caprolactam as monomer for polyamide, polymers, thermoplastics

Number of the EC					
Number of the ES	6	Use of caprolactam as monomer for polyamide, polymers, thermoplastics			
Title of exposure scenario	US	e of caprolactam a	as monomer for po	olyamide, polymers, thermoplastics	
List of all use descriptors related to the life cycle stage	SU	3, 12; PROC 1, 2,	3, 8b; ERC 6c, P	PC32	
Name of contributing environmental	Ind	ustrial use of mon	omers for manufa	acture of thermo-plastics (ERC6c)	
scenario and corresponding ERC				, ,	
Name(s) of contributing worker scenarios and corresponding PROCs	PR PR PR	OC 2: Use in clos OC 3: Use in clos	ed, continuous pr ed batch process r of substance	telihood of exposure occess with occasional controlled exposure (synthesis or formulation) or preparation (charging/discharging) from/to facilities	
Contributing exposure scenario controlling	ng wo	orker exposure f	or PROC 1, 2, 3,	8b	
Control of workers exposure for PROC 1					
Title information related to contributing s	cena	rio			
Workers related free short title			ocess, no likeliho	od of exposure	
Use descriptor covered		PROC 1		оч от охровито	
Processes, tasks, activities covered			n closed system,	250°C	
Exposure Assessment Method			TOC TRA Worker		
Product characteristic		1001 0300. LOL	TOO TICA WORKE	(VZ.0)	
Physical state		Liquid		Operation conditions: temperature ca. 250°C	
Concentration of substance		100		%	
Fugacity		High		/0	
Vapour pressure of the substance		700 (correspond	to to on 250°C\	hPa	
Amounts used		700 (correspond	15 to ca. 250 C)	IIFa	
Not relevant in ECETOC TRA					
Frequency and duration of use/exposure					
Duration of exposure		> 4		hours/day	
		≤ 240		hours/day	
Frequency of exposure  Other given operational conditions affect	ina u		<u> </u>	days/year	
	ilig w	-	<del>,</del>		
Location		Indoors			
Domain		Industrial			
Technical conditions and measures at pro	oces	s ievei (source) t	o prevent releas	ie	
Not applicable – closed system					
Technical conditions and measures to co	ntrol	dispersion from	source towards	s the worker	
Local exhaust ventilation required		No			
Organisational measures to prevent /limit releases, dispersion and exposure					
Not relevant					
Conditions and measures related to person	onal	protection, hygie	ene and health e	valuation	
Use of suitable respiratory protection		No			
Control of workers exposure for PROC 2					
Title information related to contributing s	cena	rio			
Workers related free short title		Use in closed, c	ontinuous proces	s with occasional controlled exposure	
Use descriptor covered		PROC 2			
Processes, tasks, activities covered		Spinning and co	oling of the unext	racted melt	
Exposure Assessment Method			TOC TRA Worker		
Product characteristic					
Physical state		Liquid		Operation conditions: temperature ca. 250°C	
Concentration of substance		TRA 1-5		%	
Fugacity		High			
Vapour pressure of the substance		700 (correspond	ds to ca. 250°C)	hPa	
Amounts used		. 55 (55/16695/16		I 2	
Not relevant in ECETOC TRA					
Frequency and duration of use/exposure					
Duration of exposure		> 4 h	hours per day		
Frequency of exposure		≤ 240	days/year		
Other given operational conditions affect	ina w	-		1	
Canon given operational conditions affect	y v	ornera exposuit	•		



# Page 30 of 47

SAFETY DATA SHEET
(according to Regulation (EC) No 1907/2006 (REACH), ANNEX II)

# CAPROLACTAM

Revision date: 01.10.2024 Version 4.4

AZOT

Location	Indoors				
Domain	Industrial				
Technical conditions and measures at process level (source) to prevent release  Not relevant					
Technical conditions and measures to contro	l disporsion from source towards	the worker			
Appropriate local exhaust ventilation	Yes	Effectiveness: 90 %			
_ ' ' '		Effectiveness: 90 %			
Organisational measures to prevent /limit release Avoiding frequent and direct contact with substant		Degular elegning of equipment and work area			
Supervision in place to check that the RMMs in p					
Conditions and measures related to personal					
Use of suitable respiratory protection	No	valuation			
Use of suitable chemical resistant gloves					
Use of suitable eye protection	Cross reference to Qualitative Ex	posure Assessment			
Best practice advise					
Probing/sampling with considerable vapor release	se should not exceed 1h/day. Other	erwise appropriate risk reduction measures (e.g.			
outside, LEV or breathing protection) are recomn					
Control of workers exposure for PROC 3					
Title information related to contributing scena	ario				
Workers related free short title	Use in closed batch process (syn	thesis or formulation)			
Use descriptor covered	PROC 3	·			
Processes, tasks, activities covered	Mixing and feeding of batch vess	el			
Exposure Assessment Method	Tool used: ECETOC TRA Worker				
Product characteristic		. (-1.0)			
Physical state	Liquid	Operation conditions: temperature ca. 90°C			
Concentration of substance	100	%			
Fugacity	Low	70			
Vapour pressure of the substance	1 (corresponds to ca. 90 °C)	hPa			
Amounts used	1 (corresponds to ca. 90 °C)	ПГа			
Not relevant in ECETOC TRA					
Frequency and duration of use/exposure					
Duration of exposure	15min - 1h	per day			
Frequency of exposure	≤ 240	days/year			
Other given operational conditions affecting v	-	uays/year			
Location	Indoors				
Domain	Industrial				
Technical conditions and measures at proces		•			
Not relevant	is level (source) to prevent releas	e			
Technical conditions and measures to contro	l diamensian from acures towards	the weeker			
	·	s the worker			
Appropriate local exhaust ventilation	No				
Organisational measures to prevent /limit rele	· · · · · · · · · · · · · · · · · · ·	Desiries also sing of a suing out and work area			
Avoiding frequent and direct contact with substal Supervision in place to check that the RMMs in p					
Conditions and measures related to personal					
Use of suitable respiratory protection	No	valuatiOII			
Use of suitable chemical resistant gloves in	INO				
combination with basic employee training	Cross reference to Qualitative Ex	nosure Assessment			
Use of suitable eye protection	Cross reference to Qualitative Ex	posare mocessinent			
Control of workers exposure for PROC 8b: Op	peration conditions at 90°C				
Title information related to contributing scena					
		tion (charging/discharging) from/to vessels/large			
Workers related free short title	containers at dedicated facilities	tion (charging/disonarging) nom/to vessels/large			
Use descriptor covered	PROC 8b				
Processes, tasks, activities covered	Sampling				
Exposure Assessment Method	Tool used: ECETOC TRA Worker	r (v2.0)			
Product characteristic	151. 353. 252. 35. 110. 170.	. (.=/			
Physical state	Liquid	Operation conditions: temperature 90°C			
Concentration of substance	100	%			
Fugacity	Low	//			
Vapour pressure of the substance		hPa			
Amounts used	1 (corresponds to 90°C)	ιιι α			
Not relevant in ECETOC TRA					
NOUTEIEVAIILIII EGETOG TRA					



# Page 31 of 47

SAFETY DATA SHEET
(according to Regulation (EC) No 1907/2006 (REACH), ANNEX II)

# CAPROLACTAM



Frequency and duration of use/exposure		
Duration of exposure	15min-1h	per day
Frequency of exposure	≤ 240	
Other given operational conditions affecting v	:	days/year
Location	Indoors	
Domain	Industrial	
Technical conditions and measures at proces		
-	is level (source) to prevent relea	ise
Not relevant  Technical conditions and measures to contro	l diaparaian fram agures taurar	lo the weeker
Appropriate local exhaust ventilation	No	is the worker
	1 10	
Organisational measures to prevent /limit rele		- Description of an investment and work area
Supervision in place to check that the RMMs in p		es. Regular cleaning of equipment and work area.
Conditions and measures related to personal		
Use of suitable respiratory protection	No	evaluation
Use of suitable chemical resistant gloves in	INO	
combination with basic employee training	Cross reference to Qualitative E	vnosure Assessment
Use of suitable eye protection	Closs reference to Qualitative L	Aposure Assessment
Control of workers exposure for PROC 8b: Op	peration conditions at 250°C	
Title information related to contributing scena		
		ration (charging/discharging) from/to vessels/large
Workers related free short title	containers at dedicated facilities	
Use descriptor covered	PROC 8b	
Processes, tasks, activities covered		ed polyamide melt, cooling down
Exposure Assessment Method	Tool used: ECETOC TRA Work	
Product characteristic		
Physical state	Liquid	Operation conditions: at 250°C
Concentration of substance	TRA 1-5	%
Fugacity	High	7.5
Vapour pressure of the substance	700 (corresponds to 250°C)	hPa
Amounts used	(	4
Not relevant		
Frequency and duration of use/exposure		
Duration of exposure	1-4 hours	per day
Frequency of exposure	≤ 240	days/year
Other given operational conditions affecting v		dayoryodi
Location	Indoors	
Domain	Industrial	
Technical conditions and measures at proces		ise
-		
Minimisation of manual phases. Avoidance of cor	ntact with contaminated tools and	
Minimisation of manual phases. Avoidance of con		,
Technical conditions and measures to contro	dispersion from source toward	s the worker
·		ds the worker  Effectiveness: 97 %
Technical conditions and measures to contro	dispersion from source toward Yes	s the worker
Technical conditions and measures to contro  Appropriate local exhaust ventilation  Organisational measures to prevent /limit rele	I dispersion from source toward Yes ases, dispersion and exposure	ds the worker  Effectiveness: 97 %
Technical conditions and measures to contro  Appropriate local exhaust ventilation  Organisational measures to prevent /limit rele	Yes  ases, dispersion and exposure nce. Minimisation of manual phase	Is the worker  Effectiveness: 97 % (as PROC relates to dedicated facilities)  es. Regular cleaning of equipment and work area.
Technical conditions and measures to contro Appropriate local exhaust ventilation Organisational measures to prevent /limit rele Avoiding frequent and direct contact with substant	Yes  asses, dispersion and exposure nce. Minimisation of manual phase lace are being used correctly and	Is the worker  Effectiveness: 97 % (as PROC relates to dedicated facilities)  es. Regular cleaning of equipment and work area. OCs followed.
Technical conditions and measures to contro Appropriate local exhaust ventilation  Organisational measures to prevent /limit rele Avoiding frequent and direct contact with substar Supervision in place to check that the RMMs in p	Yes  asses, dispersion and exposure nce. Minimisation of manual phase lace are being used correctly and	Is the worker  Effectiveness: 97 % (as PROC relates to dedicated facilities)  es. Regular cleaning of equipment and work area. OCs followed.
Appropriate local exhaust ventilation  Organisational measures to prevent /limit rele Avoiding frequent and direct contact with substar Supervision in place to check that the RMMs in p Conditions and measures related to personal Use of suitable respiratory protection Use of suitable chemical resistant gloves in	Yes  Pases, dispersion and exposure race. Minimisation of manual phase lace are being used correctly and protection, hygiene and health	Is the worker  Effectiveness: 97 % (as PROC relates to dedicated facilities)  es. Regular cleaning of equipment and work area. OCs followed.
Appropriate local exhaust ventilation  Organisational measures to prevent /limit rele Avoiding frequent and direct contact with substar Supervision in place to check that the RMMs in p Conditions and measures related to personal Use of suitable respiratory protection	Yes  Pases, dispersion and exposure race. Minimisation of manual phase lace are being used correctly and protection, hygiene and health	Effectiveness: 97 % (as PROC relates to dedicated facilities)  es. Regular cleaning of equipment and work area. OCs followed. evaluation



# Page 32 of 47

# **SAFETY DATA SHEET**

(according to Regulation (EC) No 1907/2006 (REACH), ANNEX II)

# CAPROLACTAM

Revision date: 01.10.2024 Version 4.4



#### **Exposure Estimation**

#### **Estimated exposure for workers**

Lottinated expectate for workers			
Route of exposure	Concentrations		Justification
	Value	Unit	
Long-term exposure, local, inhalative - PROC1	0.047	mg/m³	
Long-term exposure, local, inhalative – PROC2	4.72	mg/m³	
Long-term exposure, local, inhalative – PROC3	2.83	mg/m³	
Long-term exposure, local, inhalative – PROC8b (90°C)	4.72	mg/m³	
Long-term exposure, local, inhalative – PROC8b (250°C)	2.55	mg/m³	





(according to Regulation (EC) No 1907/2006 (REACH), ANNEX II)

# CAPROLACTAM

Revision date: 01.10.2024 Version 4.4

# AZOT

# 7. Exposure Scenario 7: Use of caprolactam as monomer for resins

Number of the ES	7				
Title of exposure scenario	Us	Use of caprolactam as monomer for resins			
List of all use descriptors related to the life cycle stage	SU	3; PROC 1, 2, 3, 8b; ERC 6c			
Name of contributing environmental scenario and corresponding ERC	Ind	ustrial use of monomers for manufa	cture of thermo-plastics (ERC6c)		
occinatio and corresponding Live	PR	OC 1: Use in closed process, no like	elihood of exposure		
Name(s) of contributing worker scenarios and corresponding PROCs	PR PR PR	OC 2: Use in closed, continuous pro OC 3: Use in closed batch process	ocess with occasional controlled exposure (synthesis or formulation) or preparation (charging/discharging) from/to		
Contributing exposure scenario controlling	ng w	orker exposure for PROC 1, 2, 3, 8	Bb		
Control of workers exposure for PROC 1					
Title information related to contributing s	cena	rio			
Workers related free short title		Use in closed process, no likelihoo	od of exposure		
Use descriptor covered		PROC 1	·		
Processes, tasks, activities covered		Use of the substances in high in exists for exposures, e.g. any sam	ntegrity contained system where little potential apling via closed loop systems		
Exposure Assessment Method		Tool used: ECETOC TRA Worker	(v2.0)		
Product characteristic					
Physical state		Liquid	Operation conditions: temperature ca. 250°C		
Concentration of substance		100	%		
Fugacity		High			
Vapour pressure of the substance		700 (corresponds to ca. 250°C)	hPa		
Amounts used					
Not relevant in ECETOC TRA					
Frequency and duration of use/exposure		1.4	L		
Duration of exposure		> 4	hours/day		
Frequency of exposure		≤ 240	days/year		
	operational conditions affecting workers exposure				
Location Domain		Indoors			
Technical conditions and measures at pro	Industrial				
Not applicable – closed system	JCES	s level (source) to prevent release	<del>g</del>		
Technical conditions and measures to co	ntro	dispersion from source towards	the worker		
Local exhaust ventilation required	No				
	/limit releases, dispersion and exposure				
Not relevant	1010	acco, diopersion and expectate			
Conditions and measures related to person	onal	protection, hygiene and health ev	valuation		
-	Jilai		and the state of t		
Use of suitable respiratory protection		No			
Control of workers exposure for PROC 2					
Title information related to contributing s	cena	•			
Workers related free short title			s with occasional controlled exposure		
Use descriptor covered		PROC 2			
Processes, tasks, activities covered		minimizing emissions e.g. spini Occasional exposure will arise equipment breakages.	e design philosophy is not specifically aimed at ning and cooling of the unextracted melts. e.g. through maintenance, sampling and		
Exposure Assessment Method		Tool used: ECETOC TRA Worker	(v2.0)		
Product characteristic		,			
Physical state		Liquid	Operation conditions: temperature ca. 100°C		
Concentration of substance		TRA 1-5	%		
Fugacity		High			
Vapour pressure of the substance		700 (corresponds to ca. 250°C)	hPa		
Amounts used					
Not relevant					
Frequency and duration of use/exposure					
Duration of exposure		> 4 h hours per day			



# Page 34 of 47

# **SAFETY DATA SHEET**

(according to Regulation (EC) No 1907/2006 (REACH), ANNEX II)

# CAPROLACTAM



Trequency of exposure   \$ 240   days/year	AZOT	<u> </u>	
Location	Frequency of exposure		
Industrial   Technical conditions and measures at process level (source) to prevent release   Not relevant   Technical conditions and measures to control dispersion from source towards the worker   Appropriate local exhaust ventilation   Yes   Effectiveness: 90%   Organisational measures to prevent filmit releases, dispersion and exposure   Appropriate local exhaust ventilation   Yes   Effectiveness: 90%   Organisational measures to prevent filmit releases, dispersion and exposure   Appropriate local exhaust ventilation   Yes   Effectiveness: 90%   Organisational measures created to personal protection, hygiene and health evaluation   Yes	Other given operational conditions affecting v	vorkers exposure	
Technical conditions and measures at process level (source) to prevent release  Not relevant  Technical conditions and measures to control dispersion from source towards the worker  Appropriate local exhaust verillation  Porganisational measures to revent / limit releases, dispersion and exposure  Avoiding frequent and direct contact with substance. Minimisation of manual phases. Regular cleaning of equipment and work area. Supervision in place to these than the RNMs in place at be being used correctly and OCs followed.  Conditions and measures related to personal protection, hygiene and health evaluation  We of suitable respiratory protection  No  See of suitable respiratory protection  No  See structure separatory protection  No  Sees practice advises  Probing/sampling with considerable vapor releases should not exceed 1h/day. Otherwise appropriate risk reduction measures (e.g. outside. LEV or betaining protection) are recommended.  Control of workers exposure for PROC 3  Title information related to contributing scenario  Workers related free short title  Use in closed batch process (synthesis or formulation)  Use descriptor covered  Proposesse, tasks, activities covered  Mixing and feeding  Exposure Assessment Method  Tool used: ECETOC TRA Worker (v2.0)  Product characteristic  Physical state  Liquid  Operation conditions: temperature ca. 90°C  Concentration of substance  1000  %  Froquency and duration of usefexposure  1000  Not relevant in ECETOC TRA  Frequency and duration of usefexposure  15min - 1h  per day  Frequency and duration of usefexposure  15min - 1h  Industrial  Technical conditions and measures at process level (source) to prevent release  Not relevant in ECETOC TRA  Frequency and duration of usefexposure  15min - 1h  Technical conditions and measures to control dispersion from source towards the worker  Appropriate local exhaust venillation  No relevant in ECETOC TRA  Frequency and duration of usefexposure  15min - 1h  Technical conditions and measures to control dispersion from source towar	Location	Indoors	
Not relevant Technical conditions and measures to control dispersion from source towards the worker Appropriate local exhaust vertilation Yes Effectiveness: 90% Organisational measures to prevent /limit releases, dispersion and exposure Avoiding frequent and direct contact with substance. Minimisation of manual phases. Regular cleaning of equipment and work area. Supervision in place to check that the RNMe in place are being used correctly and OCs followed. Conditions and measures related to personal protection, hygiene and health evaluation Use of suitable respiratory protection Use of suitable chemical resistant gloves Use of suitable chemical resistant gloves Use of suitable every protection Sest practice advise Probing sampling withing protection is recommended. Control of workers exposure to PROC 3 Title information related to contributing scenario Workers related free short title Use descriptor covered PROC 3 Processes, tasks, activities covered Mixing and feeding Product characteristic Projugacity Low Vapour pressure of the substance I (upud Operation conditions: temperature ca. 90°C Concentration of substance I (upud Vapour pressure of the substance) I (upud Vapour pressure of the substance	Domain	Industrial	
Technical conditions and measures to control dispersion from source towards the worker Appropriate local exhaust ventilation Yes Dispersion in place to check that with substance. Minimisation of manual phases. Regular calming of equipment and work area. Supervision in place to check that the RMMs in place are being used correctly and OCs followed. Conditions and measures related to personal protection, hygiene and health evaluation Use of suitable respiratory protection Use of suitable respiratory protection Use of suitable respiratory protection Use of suitable very protection Use of suitable of the very protection Use of suitable very protection are recommended. Control of workers exposure for PROC 3 Title information related to contributing scenario Use descriptor covered PROC 3 Processes, tasks, activities covered PROC 3 Product characteristic Product character	Technical conditions and measures at proces	s level (source) to prevent releas	se
Appropriate local exhaust ventilation Yes Effectiveness: 90% Organisational measures to prevent / filmit releases, dispersion and exposure Avoiding frequent and direct contact with substance. Minimisation of manual phases. Regular cleaning of equipment and work area. Supervision in place to check that the RMMs in place are being used correctly and OCs followed.  Conditions and measures related to personal protection, hygiene and health evaluation Use of suitable respiratory protection Use of suitable respiratory protection Use of suitable respiratory protection Use of suitable very protection Use descriptor covered Use of suitable very protection Use of suitable	Not relevant		
Organisational measures to prevent // Ilmit releases, dispersion and exposure Avoiding frequent and direct contact with substance. Minimisation of manual phases. Regular cleaning of equipment and work area. Supervision in place to check that the RMMs in place are being used correctly and OCs followed.  Conditions and measures related to personal protection, hygiene and health evaluation Use of suitable respiratory protection are recommended.  Control of workers exposure for PROC 3 Title information related to contributing scenario Workers related free short title Use descriptor covered PROC 3 Processes, tasks, activities covered PROC 3 Processes, tasks, activities covered Product characteristic Priyacia slate Liquid Operation conditions: temperature ca. 90°C Concentration of substance  1 (corresponds to ca. 90°C) New Yeard Processes, tasks, activities covered Proguency of exposure  1 (corresponds to ca. 90°C) New Yeard Processes, tasks, activities covered Processes, tasks, activities covered Processes, tasks	Technical conditions and measures to control	I dispersion from source toward	s the worker
Avoiding frequent and direct contact with substance. Minimisation of manual phases. Regular cleaning of equipment and work area. Supervision in place to check that the RMMs in place are being used correctly and OCs follows:  Lose of suitable respiratory protection  Lise of suitable respiratory protection  Best practice advise  Probing/sampling with considerable vapor release should not exceed 1h/day. Otherwise appropriate risk reduction measures (e.g. outside, LEV or breathing protection) are recommended.  Control of workers exposure for PRCC 3  Title information related to contributing scenario  Workers related free short title  Use in closed batch process (synthesis or formulation)  Lise descriptor covered  PRCC 3  Processes, tasks, activities covered  Mixing and feeding  Processes (synthesis or formulation)  Product characteristic  Physical state  Liquid  Operation conditions: temperature ca. 90°C  Concentration of substance  100  %  Anounts used  Low  Vapour pressure of the substance  1 (corresponds to ca. 90°C)  Anounts used  Not relevant in ECETOC TRA  Frequency and duration of use/exposure  Location  Domain  Industrial  Liquid  Industrial  Liquid  No  Operation conditions and measures at processes level (source) to prevent release  Not relevant in exposure  1 schnical conditions and measures at processes level (source) to prevent release  Not relevant place to check that the RMMs in place are being used correctly and OCs followed.  Conditions and measures related to personal protection, hygiene and health evaluation  No  Corresponds to care of prevent limit eleases, dispersion and exposure  Avoiding frequent and direct contact with substance. Minimisation of manual phases. Regular cleaning of equipment and work area. Supervision in place to check that the RMMs in	Appropriate local exhaust ventilation	Yes	Effectiveness: 90%
Avoiding frequent and direct contact with substance. Minimisation of manual phases. Regular cleaning of equipment and work area. Supervision in place to check that the RMMs in place are being used correctly and OCs follows:  Lose of suitable respiratory protection  Lise of suitable respiratory protection  Best practice advise  Probing/sampling with considerable vapor release should not exceed 1h/day. Otherwise appropriate risk reduction measures (e.g. outside, LEV or breathing protection) are recommended.  Control of workers exposure for PRCC 3  Title information related to contributing scenario  Workers related free short title  Use in closed batch process (synthesis or formulation)  Lise descriptor covered  PRCC 3  Processes, tasks, activities covered  Mixing and feeding  Processes (synthesis or formulation)  Product characteristic  Physical state  Liquid  Operation conditions: temperature ca. 90°C  Concentration of substance  100  %  Anounts used  Low  Vapour pressure of the substance  1 (corresponds to ca. 90°C)  Anounts used  Not relevant in ECETOC TRA  Frequency and duration of use/exposure  Location  Domain  Industrial  Liquid  Industrial  Liquid  No  Operation conditions and measures at processes level (source) to prevent release  Not relevant in exposure  1 schnical conditions and measures at processes level (source) to prevent release  Not relevant place to check that the RMMs in place are being used correctly and OCs followed.  Conditions and measures related to personal protection, hygiene and health evaluation  No  Corresponds to care of prevent limit eleases, dispersion and exposure  Avoiding frequent and direct contact with substance. Minimisation of manual phases. Regular cleaning of equipment and work area. Supervision in place to check that the RMMs in	Organisational measures to prevent /limit rele	ases, dispersion and exposure	
Supervision in place to check that the RMMs in place are being used correctly and OCs followed.  Conditions and measures related to personal protection, hygiene and health evaluation  Use of suitable respiratory protection  No Live of suitable respiratory protection  Live of suitable respiratory protection  No Live of suitable respiratory protection  Sest practice advise Probing/sampling with considerable vapor release should not exceed 1h/day. Otherwise appropriate risk reduction measures (e.g. outside, LEV or breathing protection) are recommended.  Control of workers exposure or PROC 3  Title information related to contributing scenario  Workers related free short title  Use in closed batch process (synthesis or formulation)  Use descriptor covered  PROC 3  Processes, tasks, activities covered  Exposure Assessment Method  Tool used: ECETOC TRA Worker (v2.0)  Product characteristic  Physical state  Liquid  Operation conditions: temperature ca. 90°C  Oncentration of substance  1 (corresponds to ca. 90°C)  NPa Amounts used  Not relevant in ECETOC TRA  Frequency and duration of use/exposure  Location  Domain  Industrial  Technical conditions and measures at process level (source) to prevent release  Not relevant  Technical conditions and measures to control dispersion from source towards the worker  Appropriate local exhaust ventilation  No Organisational measures to prevent limit releases, dispersion and exposure  Avoiding frequent and direct contact with substance. Minimisation of manual phases. Regular cleaning of equipment and work area. Supervision in place to check that the RMMs in place are being used correctly and OCs followed.  Conditions and measures related to personal protection, hygiene and health evaluation  Use of suitable chemical resistant gloves in combination with basic employed training  Live of suitable chemical resistant gloves in combination related to contributing scenario  Workers related free short title  Use descriptor covered  PROC 8b  Product characteristic  Product characteristic  Li			s. Regular cleaning of equipment and work area.
Use of suitable respiratory protection   No			
Use of suitable chemical resistant gloves   Use of Suitable very protection	Conditions and measures related to personal	protection, hygiene and health e	evaluation
Use of suitable eve protection	Use of suitable respiratory protection	No	
Use of suitable eye protection  Bost practice advise Probing/sampling with considerable vapor releases should not exceed 1h/day. Otherwise appropriate risk reduction measures (e.g. outside, LEV or breathing protection) are recommended.  Control of workers exposure for PROC 3 Title information related to contributing scenario Workers related free short title Use in closed batch process (synthesis or formulation) Use descriptor covered PROC 3 Processes, tasks, activities covered Exposure Assessment Method Product characteristic  Physical state Liquid Operation conditions: temperature ca. 90°C Concentration of substance 100 % Progenity Low Vapour pressure of the substance 11 (corresponds to ca. 90°C) hPa Amounts used Not relevant in ECETOC TRA Morker (v2.0) Prequency and duration of use/exposure Location Domain Industrial Technical conditions and measures at process level (source) to prevent release Not relevant Technical conditions and measures to control dispersion from source towards the worker Appropriate local exhaust ventilation Nor Cognisational measures to prevent / flmit releases, dispersion and exposure Avoiding frequent and direct contact with substance. Minimisation of manual phases. Regular cleaning of equipment and work area. Supervision in place to check that the RMMs in place are being used correctly and OCS followed. Conditions and measures to prevent / flmit releases, dispersion and exposure Avoiding frequent and direct contact with substance. Minimisation of manual phases. Regular cleaning of equipment and work area. Supervision in place to check that the RMMs in place are being used correctly and OCS followed. Conditions and measures related to personal protection, hygiene and health evaluation Use of suitable respiratory protection  Control of workers exposure for PROC 8b Title information related to contributing scenario Workers related free short title  Use descriptor covered PROC 8b Treasiers at dedicated facilities Product characteristic Prysical state Liquid Operation conditions: temperat	Use of suitable chemical resistant gloves	Cross reference to Qualitative Ev	vnoguro Accoment
Probling/sampling with considerable vapor release should not exceed 1h/day. Otherwise appropriate risk reduction measures (e.g. outside, LEV or breathing protection) are recommended.    Control of workers exposure for PROC 3		Closs reference to Qualitative Ex	xposure Assessment
outside, LEV or breathing protection) are recommended.  Control of workers exposure for PRCC 3  Title information related to contributing scenario  Workers related free short title  Use in closed batch process (synthesis or formulation)  Be descriptor covered  PROC 3  Processes, tasks, activities covered  PROC 3  Processes, tasks, activities covered  PROC 3  Product characteristic  Physical state  Liquid  Operation conditions: temperature ca. 90°C  Concentration of substance  100  %  Low  Vapour pressure of the substance  1 (corresponds to ca. 90°C)  hPa  Amounts used  Not relevant in ECETOC TRA  Frequency and duration of use/exposure  Duration of exposure  1 fishin - 1h  Per day  Frequency of exposure  Coation  Indoors  Not relevant  Technical conditions and measures at process level (source) to prevent release  Not relevant  Technical conditions and measures to control dispersion from source towards the worker  Appropriate local exhaust ventilation  No  Organisational measures to prevent // limit releases, dispersion and exposure  Aportional measures to prevent // limit releases, dispersion and exposure  Supervision in place to check that the RMMs in place are being used correctly and OCs followed.  Conditions and measures to prevent // limit releases, dispersion and exposure  Avoiding frequent and direct contact with substance. Minimisation of manual phases. Regular cleaning of equipment and work area.  Supervision in place to check that the RMMs in place are being used correctly and OCs followed.  Conditions and measures related to personal protection, hygiene and health evaluation  No  Use of suitable respiratory protection  Use of suitable respiratory protection  Use of suitable respiratory protection  Use of suitable chemical resistant gloves in containing and measures to control dispersion from source towards the valuation  No  Cross reference to Qualifiative Exposure Assessment  Verkers related for personal protection, hygiene and health evaluation (charging/discharging) from/to vessels/large container			
Control of workers exposure for PROC 3			wise appropriate risk reduction measures (e.g.
Title information related to contributing scenario  Workers related free short title  Use in closed batch process (synthesis or formulation)  Use descriptor covered  PROC 3  Processes, tasks, activities covered  Exposure Assessment Method  Tool used: ECETOC TRA Worker (v2.0)  Product characteristic  Physical state  Liquid  Qperation conditions: temperature ca. 90°C  Concentration of substance  100  %  Supervisor of the substance  100  My  Supervisor of the substance  Anounts used  Not relevant in ECETOC TRA  Not relevant in ECETOC TRA  Frequency and duration of use/exposure  Duration of exposure  15min - 1h  Per day  15min - 1h  Pe		nended.	
Use in closed batch process (synthesis or formulation)   PROC 3			
Use descriptor covered PROC 3  Processes, tasks, activities covered Mixing and feeding Exposure Assessment Method Tool used: ECETOC TRA Worker (v2.0)  Product characteristic Physical state Liquid Operation conditions: temperature ca. 90°C Concentration of substance 100 %  Fugacity Low Vapour pressure of the substance 1100 %  Fugacity Low Vapour pressure of the substance 11 (corresponds to ca. 90°C) hPa  Amounts used Not relevant in ECETOC TRA  Frequency and duration of use/exposure  Duration of exposure 15min - 1h per day days/year Other given operational conditions affecting workers exposure  Location Industrial Indust	<del>_</del>		
Processes, tasks, activities covered   Mixing and feeding	Workers related free short title	Use in closed batch process (syr	nthesis or formulation)
Tool used: ECETOC TRA Worker (v2.0)   Product characteristic   Physical state   Liquid   Operation conditions: temperature ca. 90°C	Use descriptor covered	PROC 3	
Product characteristic Physical state	Processes, tasks, activities covered	Mixing and feeding	
Product characteristic Physical state	Exposure Assessment Method	Tool used: ECETOC TRA Worke	er (v2.0)
Concentration of substance 100	•		
Concentration of substance 100	Physical state	Liquid	Operation conditions: temperature ca. 90°C
Fugacity	,		
Vapour pressure of the substance         1 (corresponds to ca. 90°C)         hPa           Amounts used         Not relevant in ECETOC TRA           Frequency and duration of use/exposure         15min - 1h         per day           Frequency of exposure         ≤ 240         days/year           Other given operational conditions affecting workers exposure         Location         Indoors           Domain         Indoors         Industrial           Technical conditions and measures at process level (source) to prevent release         Not relevant           Technical conditions and measures to control dispersion from source towards the worker         Appropriate local exhaust ventilation         No           Organisational measures to prevent /limit releases, dispersion and exposure         Avoiding frequent and direct contact with substance. Minimisation of manual phases. Regular cleaning of equipment and work area.           Supervision in place to check that the RMMs in place are being used correctly and OCs followed.           Conditions and measures related to personal protection, hygiene and health evaluation         No           Use of suitable respiratory protection         No           Use of suitable eye protection         No           Use of suitable eye protection         Cross reference to Qualitative Exposure Assessment           Workers related free short title         Transfer of substance or preparation (charging/discharging) from/to ves			70
Amounts used  Not relevant in ECETOC TRA  Frequency and duration of use/exposure  Duration of exposure  \$240 \$240 \$days/year  Other given operational conditions affecting workers exposure  Location  Domain  Indoors  Domain  Industrial  Technical conditions and measures at process level (source) to prevent release  Not relevant  Technical conditions and measures to control dispersion from source towards the worker  Appropriate local exhaust ventilation  No  Organisational measures to prevent /limit releases, dispersion and exposure  Avoiding frequent and direct contact with substance. Minimisation of manual phases. Regular cleaning of equipment and work area. Supervision in place to check that the RMMs in place are being used correctly and OCs followed.  Conditions and measures related to personal protection, hygiene and health evaluation  Use of suitable respiratory protection  No  Use of suitable chemical resistant gloves in combination with basic employee training  Use of suitable eye protection  Control of workers exposure for PROC 8b  Title information related to contributing scenario  Workers related free short title  Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities  Use descriptor covered  PROC 8b  PROS 8b	<u> </u>		hDa
Not relevant in ECETOC TRA		1 (corresponds to ca. 90 C)	III a
Duration of exposure			
Duration of exposure 15min - 1h per day Frequency of exposure ≤ 240 days/year  Other given operational conditions affecting workers exposure Location Indoors  Domain Industrial  Technical conditions and measures at process level (source) to prevent release  Not relevant  Technical conditions and measures to control dispersion from source towards the worker  Appropriate local exhaust ventilation No  Organisational measures to prevent //limit releases, dispersion and exposure  Avoiding frequent and direct contact with substance. Minimisation of manual phases. Regular cleaning of equipment and work area. Supervision in place to check that the RMMs in place are being used correctly and OCs followed.  Conditions and measures related to personal protection, hygiene and health evaluation  Use of suitable respiratory protection  Use of suitable expiratory protection  Use of suitable expiratory protection  Control of workers exposure for PROC 8b  Title information related to contributing scenario  Workers related free short title  Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities  Use descriptor covered  PROC 8b  Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities  Exposure Assessment Method  Tool used: ECETOC TRA Worker (v2.0)  Product characteristic  Physical state  Liquid  Operation conditions: temperature 90°C  Concentration of substance  100  Fugacity  Low			
Frequency of exposure         ≤ 240         days/year           Other given operational conditions affecting workers exposure         Indoors           Domain         Industrial           Technical conditions and measures at process level (source) to prevent release         Not relevant           Technical conditions and measures to control dispersion from source towards the worker           Appropriate local exhaust ventilation         No           Organisational measures to prevent /limit releases, dispersion and exposure         Avoiding frequent and direct contact with substance. Minimisation of manual phases. Regular cleaning of equipment and work area. Supervision in place to check that the RMMs in place are being used correctly and OCs followed.           Conditions and measures related to personal protection, hygiene and health evaluation         No           Use of suitable respiratory protection         No           Use of suitable chemical resistant gloves in combination with basic employee training         Cross reference to Qualitative Exposure Assessment           Use of suitable eye protection         Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities           Workers related free short title         Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities           Use descriptor covered         PROC 8b           Processes, tasks, activities covered         Sampling		45 mains 4h	n an day
Other given operational conditions affecting workers exposure  Location   Indoors   Domain   Industrial   Technical conditions and measures at process level (source) to prevent release  Not relevant  Technical conditions and measures to control dispersion from source towards the worker  Appropriate local exhaust ventilation   No   Organisational measures to prevent /limit releases, dispersion and exposure  Avoiding frequent and direct contact with substance. Minimisation of manual phases. Regular cleaning of equipment and work area. Supervision in place to check that the RMMs in place are being used correctly and OCs followed.  Conditions and measures related to personal protection, hygiene and health evaluation  Use of suitable respiratory protection   No   Use of suitable expiratory protection   Organization with basic employee training   Use of suitable eye protection   Control of workers exposure for PROC 8b  Title information related to contributing scenario  Workers related free short title   Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities   Use descriptor covered   PROC 8b   Processes, tasks, activities covered   Sampling   Exposure Assessment Method   Tool used: ECETOC TRA Worker (v2.0)  Product characteristic  Physical state   Liquid   Operation conditions: temperature 90°C   Concentration of substance   100   %   Fugacity   Low   Fugacity   Low   Fugacity   Fuga	•	-	
Indoors			days/year
Domain   Industrial	,		I
Technical conditions and measures at process level (source) to prevent release  Not relevant  Technical conditions and measures to control dispersion from source towards the worker  Appropriate local exhaust ventilation  Organisational measures to prevent /limit releases, dispersion and exposure  Avoiding frequent and direct contact with substance. Minimisation of manual phases. Regular cleaning of equipment and work area. Supervision in place to check that the RMMs in place are being used correctly and OCs followed.  Conditions and measures related to personal protection, hygiene and health evaluation  Use of suitable respiratory protection  Use of suitable chemical resistant gloves in combination with basic employee training  Use of suitable eye protection  Control of workers exposure for PROC 8b  Title information related to contributing scenario  Workers related free short title  Use descriptor covered  PROC 8b  Processes, tasks, activities covered  Exposure Assessment Method  Tool used: ECETOC TRA Worker (v2.0)  Product characteristic  Physical state  Liquid  Operation conditions: temperature 90°C  Concentration of substance  100  Fugacity  Description of the worker of			
Not relevant   Technical conditions and measures to control dispersion from source towards the worker			
Technical conditions and measures to control dispersion from source towards the worker		s level (source) to prevent relea	se
Appropriate local exhaust ventilation			
Organisational measures to prevent /limit releases, dispersion and exposure  Avoiding frequent and direct contact with substance. Minimisation of manual phases. Regular cleaning of equipment and work area. Supervision in place to check that the RMMs in place are being used correctly and OCs followed.  Conditions and measures related to personal protection, hygiene and health evaluation  Use of suitable respiratory protection  Use of suitable chemical resistant gloves in combination with basic employee training  Use of suitable eye protection  Control of workers exposure for PROC 8b  Title information related to contributing scenario  Workers related free short title  Use descriptor covered  PROC 8b  Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities  Use descriptor covered  PROC 8b  Exposure Assessment Method  Tool used: ECETOC TRA Worker (v2.0)  Product characteristic  Physical state  Liquid  Operation conditions: temperature 90°C  Concentration of substance  100  %  Fugacity  Low	Technical conditions and measures to control	dispersion from source toward	s the worker
Avoiding frequent and direct contact with substance. Minimisation of manual phases. Regular cleaning of equipment and work area. Supervision in place to check that the RMMs in place are being used correctly and OCs followed.  Conditions and measures related to personal protection, hygiene and health evaluation  Use of suitable respiratory protection  Use of suitable chemical resistant gloves in combination with basic employee training  Use of suitable eye protection  Use of suitable eye protection  Control of workers exposure for PROC 8b  Title information related to contributing scenario  Workers related free short title  Use descriptor covered  PROC 8b  Processes, tasks, activities covered  Exposure Assessment Method  Tool used: ECETOC TRA Worker (v2.0)  Product characteristic  Physical state  Liquid  Operation conditions: temperature 90°C  Concentration of substance  100  %  Fugacity  Low	Appropriate local exhaust ventilation	No	
Supervision in place to check that the RMMs in place are being used correctly and OCs followed.  Conditions and measures related to personal protection, hygiene and health evaluation  Use of suitable respiratory protection Use of suitable chemical resistant gloves in combination with basic employee training Use of suitable eye protection  Control of workers exposure for PROC 8b  Title information related to contributing scenario  Workers related free short title  Use descriptor covered PROC 8b  Processes, tasks, activities covered Exposure Assessment Method Tool used: ECETOC TRA Worker (v2.0)  Product characteristic  Physical state Liquid Operation conditions: temperature 90°C Concentration of substance 100 % Fugacity  Liquid Operation conditions: temperature 90°C Concentration of substance  Liquid Operation conditions: temperature 90°C			
Conditions and measures related to personal protection, hygiene and health evaluation  Use of suitable respiratory protection Use of suitable chemical resistant gloves in combination with basic employee training Use of suitable eye protection  Control of workers exposure for PROC 8b  Title information related to contributing scenario  Workers related free short title Use descriptor covered PROC 8b  Processes, tasks, activities covered Exposure Assessment Method Tool used: ECETOC TRA Worker (v2.0)  Product characteristic  Physical state Liquid Operation conditions: temperature 90°C Concentration of substance 100 % Fugacity Low			
Use of suitable respiratory protection Use of suitable chemical resistant gloves in combination with basic employee training Use of suitable eye protection  Control of workers exposure for PROC 8b  Title information related to contributing scenario  Workers related free short title Use descriptor covered PROC 8b  Processes, tasks, activities covered Exposure Assessment Method Tool used: ECETOC TRA Worker (v2.0)  Product characteristic  Physical state Liquid Operation conditions: temperature 90°C Concentration of substance Liquid Fugacity Low			
Use of suitable chemical resistant gloves in combination with basic employee training Use of suitable eye protection  Control of workers exposure for PROC 8b  Title information related to contributing scenario  Workers related free short title  Use descriptor covered  Processes, tasks, activities covered  Exposure Assessment Method  Product characteristic  Physical state  Liquid  Cross reference to Qualitative Exposure Assessment  Cross reference to Qualitative Exposure Assessment  Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities  PROC 8b  Sampling  Exposure Assessment Method  Tool used: ECETOC TRA Worker (v2.0)  Product characteristic  Physical state  Liquid  Operation conditions: temperature 90°C  Concentration of substance  100  %  Fugacity	Conditions and measures related to personal	protection, hygiene and health e	evaluation
Cross reference to Qualitative Exposure Assessment  Use of suitable eye protection  Control of workers exposure for PROC 8b  Title information related to contributing scenario  Workers related free short title  Use descriptor covered  Processes, tasks, activities covered  Exposure Assessment Method  Product characteristic  Physical state  Cross reference to Qualitative Exposure Assessment  Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities  PROC 8b  Sampling  Exposure Assessment Method  Tool used: ECETOC TRA Worker (v2.0)  Product characteristic  Physical state  Liquid  Operation conditions: temperature 90°C  Concentration of substance  100  %  Fugacity  Low		No	
Use of suitable eye protection  Control of workers exposure for PROC 8b  Title information related to contributing scenario  Workers related free short title  Use descriptor covered  PROC 8b  Processes, tasks, activities covered  Exposure Assessment Method  Product characteristic  Physical state  Liquid  Concentration of substance  Liquid  Low  Low			
Control of workers exposure for PROC 8b  Title information related to contributing scenario  Workers related free short title  Use descriptor covered  PROC 8b  Processes, tasks, activities covered  Exposure Assessment Method  Product characteristic  Physical state  Concentration of substance  Liquid  Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities  PROC 8b  Sampling  Tool used: ECETOC TRA Worker (v2.0)  Product characteristic  Physical state  Liquid  Operation conditions: temperature 90°C  Concentration of substance  100  W  Fugacity  Low		Cross reference to Qualitative Ex	xposure Assessment
Title information related to contributing scenario  Workers related free short title  Use descriptor covered  PROC 8b  Processes, tasks, activities covered  Exposure Assessment Method  Product characteristic  Physical state  Concentration of substance  Liquid  Liquid  Operation conditions: temperature 90°C  Concentration of substance  Low			
Workers related free short title  Use descriptor covered PROC 8b  Processes, tasks, activities covered Exposure Assessment Method Product characteristic  Physical state Concentration of substance  Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities  PROC 8b  Sampling Tool used: ECETOC TRA Worker (v2.0)  Product characteristic  Physical state Concentration of substance  100  W  Fugacity  Low	Control of workers exposure for PROC 8b		
Workers related free short title  Use descriptor covered PROC 8b  Processes, tasks, activities covered Exposure Assessment Method Product characteristic  Physical state Concentration of substance  Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities  PROC 8b  Sampling Tool used: ECETOC TRA Worker (v2.0)  Product characteristic  Physical state Concentration of substance  100  W  Fugacity  Low	Title information related to contributing scena	nrio	
Processes, tasks, activities covered     Sampling       Exposure Assessment Method     Tool used: ECETOC TRA Worker (v2.0)       Product characteristic     Value       Physical state     Liquid     Operation conditions: temperature 90°C       Concentration of substance     100     %       Fugacity     Low	Workers related free short title		ation (charging/discharging) from/to vessels/large
Processes, tasks, activities covered     Sampling       Exposure Assessment Method     Tool used: ECETOC TRA Worker (v2.0)       Product characteristic     Value       Physical state     Liquid     Operation conditions: temperature 90°C       Concentration of substance     100     %       Fugacity     Low	Use descriptor covered		
Exposure Assessment Method     Tool used: ECETOC TRA Worker (v2.0)       Product characteristic     Uiquid     Operation conditions: temperature 90°C       Physical state     Liquid     W       Concentration of substance     100     %       Fugacity     Low	•		•
Product characteristic       Physical state     Liquid     Operation conditions: temperature 90°C       Concentration of substance     100     %       Fugacity     Low		. ,	er (v2.0)
Physical stateLiquidOperation conditions: temperature 90°CConcentration of substance100%FugacityLow	•	1 .00. 4004. LOLIOO IIA WOING	(12.0)
Concentration of substance 100 % Fugacity Low		Liquid	Operation conditions: tomporature 90°C
Fugacity Low			
			/0
vapour pressure of the substance   1 (corresponds to 90°C)   hPa			LD-
	vapour pressure of the substance	(corresponds to 90°C)	nra



# Page 35 of 47

# **SAFETY DATA SHEET**

(according to Regulation (EC) No 1907/2006 (REACH), ANNEX II)

# CAPROLACTAM

Revision date: 01.10.2024 Version 4.4

AZOT

Amounts used			
Not relevant in ECETOC TRA			
Frequency and duration of use/exposure			
Duration of exposure	15min-1h	per day	
Frequency of exposure	≤ 240	days/year	
Other given operational conditions affecting w	orkers exposure		
Location	Indoors		
Domain	Industrial		
Technical conditions and measures at proces	s level (source) to prevent releas	se	
Not relevant			
Technical conditions and measures to control	dispersion from source toward	s the worker	
Appropriate local exhaust ventilation	No		
Organisational measures to prevent /limit releases, dispersion and exposure			
Avoiding frequent and direct contact with substar Supervision in place to check that the RMMs in pl			
Conditions and measures related to personal	protection, hygiene and health e	evaluation	
Use of suitable respiratory protection	No		
Use of suitable chemical resistant gloves in combination with basic employee training	Cross reference to Qualitative Ex	cposure Assessment	
Use of suitable eye protection			

#### **Exposure Estimation**

Estimated exposure for workers

Estimated exposure for workers			
Route of exposure	Concer	ntrations	Justification
	Value	Unit	
Long-term exposure, local, inhalative - PROC1	0.047	mg/m³	
Long-term exposure, local, inhalative – PROC2	4.72	mg/m³	
Long-term exposure, local, inhalative – PROC3	2.83	mg/m³	
Long-term exposure, local, inhalative – PROC8b	4.72	mg/m³	



8. Exposure Scenario 8: Use of caprolactam as monomer for thermo hardened resins



# SAFETY DATA SHEET

(according to Regulation (EC) No 1907/2006 (REACH), ANNEX II)

# CAPROLACTAM

AZOT

Number of the ES	8		
		of convoluentous on management for th	anne barden d'recine
Title of exposure scenario	Use	of caprolactam as monomer for the	iernio nardened resins
List of all use descriptors related to the life cycle stage	SU	B; PROC 1, 3, 8a and 8b; ERC 6c	
Name of contributing environmental scenario and corresponding ERC	Indu	ustrial use of monomers for manufa	acture of thermo-plastics (ERC6c)
Name(s) of contributing worker scenarios and corresponding PROCs	PRO PRO Vess PRO Vess	sels/large containers at non-dedica DC 8b: Transfer of substance sels/large containers at dedicated	(synthesis or formulation) or preparation (charging/discharging) from/to ated facilities or preparation (charging/discharging) from/to facilities
Contributing exposure scenario controlling	ng wo	orker exposure for PROC 1, 3, 8a	and 8b
Control of workers exposure for PROC 1			
Title information related to contributing s	cena	rio	
Workers related free short title		Use in closed process, no likeliho	ood of exposure
Use descriptor covered		PROC 1	and the composition
Processes, tasks, activities covered		Use of the substances in high exists for exposures, e.g. any sar	
Exposure Assessment Method		Tool used: ECETOC TRA Worke	r (v2.0)
Product characteristic			
Physical state		Liquid	Operation conditions: temperature ca. 100°C
Concentration of substance		100	%
Fugacity		Low	
Vapour pressure of the substance		2 (corresponds to ca. 100°C)	hPa
Amounts used			
Not relevant			
Frequency and duration of use/exposure			
Duration of exposure		> 4	hours/day
Frequency of exposure		≤ 240	days/year
Other given operational conditions affect	ing w	orkers exposure	, , ,
Location		Indoors	
Domain		Industrial	
Technical conditions and measures at pro-	ocess	level (source) to prevent releas	se
Not applicable – closed system			
Technical conditions and measures to co	ntrol	dispersion from source towards	s the worker
Local exhaust ventilation required		No	
Organisational measures to prevent /limit	t relea		
Not relevant			
Conditions and measures related to person	onal r	protection, hygiene and health e	valuation
Use of suitable respiratory protection		No	
Control of workers exposure for PROC 3			
Title information related to contributing s	cena	rio	
Workers related free short title		Use in closed batch process (syn	thesis or formulation)
Use descriptor covered		PROC 3	anosio or iorinalation)
Processes, tasks, activities covered		Batch manufacture where the p e.g. through enclosed transfers	redominant handling is in a contained manner, but where some opportunity for contact with
Evnoure Accoment Method		chemicals occurs, e.g. through sa	
Exposure Assessment Method		Tool used: ECETOC TRA Worke	I (VZ.U)
Product characteristic	1	Liquid	Operation conditions: temperature as 400°C
Physical state Concentration of substance		Liquid 100	Operation conditions: temperature ca. 100°C %
			/0
Fugacity Vapour programs of the substance		2 (corresponde to as 100°C)	hDo
Vapour pressure of the substance		2 (corresponds to ca. 100°C)	hPa
Amounts used			
Not relevant in ECETOC TRA			
Frequency and duration of use/exposure	1	1Emin 1h	nor day
Duration of exposure		15min - 1h	per day



# Page 37 of 47

SAFETY DATA SHEET
(according to Regulation (EC) No 1907/2006 (REACH), ANNEX II)

# CAPROLACTAM



	1	<u></u>
Frequency of exposure	≤ 240	days/year
Other given operational conditions affecting v	vorkers exposure	<del>-</del>
Location	Indoors	
Domain	Industrial	
Technical conditions and measures at proces	s level (source) to prevent releas	se
Not relevant		
Technical conditions and measures to control	dispersion from source toward	s the worker
Appropriate local exhaust ventilation	No	
Organisational measures to prevent /limit rele	ases, dispersion and exposure	
Avoiding frequent and direct contact with substar		s. Regular cleaning of equipment and work area.
Supervision in place to check that the RMMs in p		
Conditions and measures related to personal	protection, hygiene and health e	evaluation
Use of suitable respiratory protection	No	
Use of suitable chemical resistant gloves in		
combination with basic employee training	Cross reference to Qualitative Ex	cposure Assessment
Use of suitable eye protection		
Control of workers exposure for PROC 8a		
Title information related to contributing scena	rio	
Workers related free short title	Transfer of substance or prepara containers at non-dedicated facil	ation (charging/discharging) from/to vessels/large ities
Use descriptor covered	PROC 8a	
Processes, tasks, activities covered	Filling in non- dedicated facilities	
Exposure Assessment Method	Tool used: ECETOC TRA Worke	
Product characteristic		,
Physical state	Solid	Operation conditions: ambient temperature (< 40°C)
Concentration of substance	100	%
Dustiness	Low	
Vapour pressure of the substance	0.0013 (corresponds to ambient temperature)	hPa
Amounts used	ambient temperature)	
Not relevant in ECETOC TRA		
Frequency and duration of use/exposure		
Duration of exposure	<15 min	per day
Frequency of exposure	≤ 240	days/year
Other given operational conditions affecting v		days/year
Location	Indoors	<u> </u>
Domain Tack and discount of the control of the cont	Industrial	
Technical conditions and measures at proces	s level (source) to prevent releas	Se .
Not relevant		
Technical conditions and measures to control		s the worker
Appropriate local exhaust ventilation	No	
Organisational measures to prevent /limit rele Avoiding frequent and direct contact with substar	nce. Minimisation of manual phase	
Supervision in place to check that the RMMs in p Conditions and measures related to personal		
		- variaution
Use of suitable respiratory protection	No	
Use of suitable chemical resistant gloves in combination with basic employee training	Cross reference to Qualitative Co	vnosura Assassment
Use of suitable eye protection	Cross reference to Qualitative Ex	Aposure Mosessinelli
Control of workers exposure for PROC 8b		
Title information related to contributing scena	rio	
Workers related free short title	Transfer of substance or prepara	ation (charging/discharging) from/to vessels/large
Use descriptor covered	containers at dedicated facilities PROC 8b	<u> </u>
Use descriptor covered		
Processes, tasks, activities covered	Sampling	··· (+2 0)
Exposure Assessment Method	Tool used: ECETOC TRA Worke	: (VZ.U)
Product characteristic	I	I a
Physical state	Liquid	Operation conditions: temperature 100°C
Concentration of substance	100	%
Fugacity	Low	



# Page 38 of 47

# **SAFETY DATA SHEET**

(according to Regulation (EC) No 1907/2006 (REACH), ANNEX II)

# CAPROLACTAM

Revision date: 01.10.2024 Version 4.4



Vapour pressure of the substance	2 (corresponds to 100°C)	hPa		
Amounts used				
Not relevant				
Frequency and duration of use/exposure				
Duration of exposure	15min-1h	per day		
Frequency of exposure	≤ 240	days/year		
Other given operational conditions affecting v	workers exposure			
Location	Indoors			
Domain	Industrial			
Technical conditions and measures at process level (source) to prevent release				
Not relevant				
Technical conditions and measures to contro	I dispersion from source toward	s the worker		
Appropriate local exhaust ventilation	No			
Organisational measures to prevent /limit releases, dispersion and exposure				
Avoiding frequent and direct contact with substal Supervision in place to check that the RMMs in p		s. Regular cleaning of equipment and work area.  OCs followed.		
Conditions and measures related to personal				
Use of suitable respiratory protection	No			
Use of suitable chemical resistant gloves in combination with basic employee training  Cross reference to Qualitative Exposure Assessment				
Use of suitable eye protection				

#### **Exposure Estimation**

Estimated exposure for workers

Estimated exposure for workers				
Route of exposure	Concentratio	ns	Justification	
	Value	Unit		
Long-term exposure, local, inhalative – PROC1	0.047	mg/m³		
Long-term exposure, local, inhalative - PROC3	2.83	mg/m³		
Long-term exposure, local, inhalative – PROC8a	0.05	mg/m³		
Long-term exposure, local, inhalative – PROC8b	4.72	mg/m³		





(according to Regulation (EC) No 1907/2006 (REACH), ANNEX II)

# CAPROLACTAM

Revision date: 01.10.2024 Version 4.4



Processes, tasks, activities covered

**Exposure Assessment Method** 

**Product characteristic** 

Concentration of substance

Physical state

Dustiness

9. Exposure Scenario 9: Use of capi	olact	am as plasticizer for polyamide			
Number of the ES	9				
Title of exposure scenario	Use	Use of caprolactam as plasticizer for polyamide			
List of all use descriptors related to the life cycle stage		SU3; PROC 2, 3, 8b and 14; ERC 5			
Name of contributing environmental			(FD05)		
scenario and corresponding ERC		ustrial use resulting in inclusion into	· · ·		
Name(s) of contributing worker scenarios and corresponding PROCs	PRO PRO ves PRO	PROC 2: Use in closed, continuous process with occasional controlled exposure PROC 3: Use in closed batch process (synthesis or formulation) PROC 8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities PROC 14: Production of preparations or articles by tabletting, compression, extrusion, pelletisation			
Contributing exposure scenario controlli	ng wo	orker exposure for PROC 2, 3, 8b	and 14		
Control of workers exposure for PROC 2		• • • • • • • • • • • • • • • • • • • •			
Title information related to contributing s	cena	rio			
Workers related free short title	00.10		s with occasional controlled exposure		
Use descriptor covered		PROC 2	That economic controlled exposure		
Processes, tasks, activities covered		Continuous process but where the	e design philosophy is not specifically aimed at I exposure will arise e.g. through maintenance, es		
Exposure Assessment Method		Tool used: ECETOC TRA Worker	(v2.0)		
Product characteristic					
Physical state		Liquid	Operation conditions: temperature ca. 250°C		
Concentration of substance		TRA 1-5	%		
Fugacity		High			
Vapour pressure of the substance		700 (corresponds to ca. 250°C)	hPa		
Amounts used		,	,		
Not relevant in ECETOC TRA					
Frequency and duration of use/exposure					
Duration of exposure		> 4	hours/day		
Frequency of exposure		≤ 240	days/year		
Other given operational conditions affect	ing w	orkers exposure			
Location		Indoors			
Domain		Industrial			
Technical conditions and measures at pro-	ocess	level (source) to prevent release	9		
Not relevant					
Technical conditions and measures to co	ntrol	dispersion from source towards	the worker		
Local exhaust ventilation required		Yes	Effectiveness: 90%		
Organisational measures to prevent /limit					
Supervision in place to check that the RMMs	in pl	ace are being used correctly and O			
Conditions and measures related to pers	onal <sub>l</sub>		raluation		
Use of suitable respiratory protection		No			
Use of suitable chemical resistant gloves in					
combination with basic employee training Use of suitable eye protection	Cross reference to Qualitative Exposure Assessment				
Best practice advise	ļ				
Probing/sampling with considerable vapor routside, LEV or breathing protection) are rec			rwise appropriate risk reduction measures (e.g.		
Control of workers exposure for PROC 3	2				
Title information related to contributing s	cena	rio			
Workers related free short title	, ,	Use in closed batch process (synt	hesis or formulation)		
Use descriptor covered		PROC 3			

Mixing and feeding of pellets

Solid

100

Low

Tool used: ECETOC TRA Worker (v2.0)

Operation conditions: ambient temperature



**SAFETY DATA SHEET** (according to Regulation (EC) No 1907/2006 (REACH), ANNEX II)

# CAPROLACTAM

ÄŽÕŤ	Revision date. 01.10.2024 vers	NOTI 4.4
Vapour pressure of the substance	0.0013 (corresponds to	hPa
· · ·	ambient temperature)	π α
Amounts used		
Not relevant in ECETOC TRA  Frequency and duration of use/exposure		
Duration of exposure	>4h	nor day
Frequency of exposure	≤ 240	per day days/year
Other given operational conditions affecting v		uays/year
Location	Indoors	
Domain	Industrial	
Technical conditions and measures at proces		ase
Not relevant	10 10 10 10 (00 al 00) 10 pi 0 10 il 10 il	
Technical conditions and measures to contro	I dispersion from source toward	ds the worker
Appropriate local exhaust ventilation	No	
Organisational measures to prevent /limit rele	eases, dispersion and exposure	
		es. Regular cleaning of equipment and work area.
Supervision in place to check that the RMMs in p	lace are being used correctly and	OCs followed.
Conditions and measures related to personal	protection, hygiene and health	evaluation
Use of suitable respiratory protection	No	
Use of suitable chemical resistant gloves in		
combination with basic employee training	Cross reference to Qualitative E	Exposure Assessment
Use of suitable eye protection		
Control of workers exposure for PROC 8b	•	
Title information related to contributing scena		
Workers related free short title	containers at dedicated facilities	ration (charging/discharging) from/to vessels/large
Use descriptor covered	PROC 8b	
Processes, tasks, activities covered	Granulation and transfer/filling i	n dedicated facilities, 60°C
Exposure Assessment Method	Tool used: ECETOC TRA Work	
Product characteristic	1001 0000. 202100 1101 1101	(V2.0)
Physical state	Solid	Operation conditions: temperature 60°C
Concentration of substance	TRA 1-5	%
Dustiness	low	
Vapour pressure of the substance	< 1 (corresponds to 60 °C)	hPa
Amounts used		
Not relevant in ECETOC TRA		
Frequency and duration of use/exposure		
Duration of exposure	> 4 h	per day
Frequency of exposure	≤ 240	days/year
Other given operational conditions affecting	workers exposure	1 7 - 7
Location	indoors	
Domain	Industrial	
Technical conditions and measures at proces	s level (source) to prevent relea	ase
Not relevant	, , ,	
Technical conditions and measures to contro	I dispersion from source toward	ds the worker
Appropriate local exhaust ventilation	No	
Organisational measures to prevent /limit rele		
		es. Regular cleaning of equipment and work area.
Supervision in place to check that the RMMs in p		
Conditions and measures related to personal		
Use of suitable respiratory protection	No	
Use of suitable chemical resistant gloves in		
combination with basic employee training	Cross reference to Qualitative E	Exposure Assessment
Use of suitable eye protection		
Control of workers exposure for PROC 14		
Title information related to contributing scena	•	
Workers related free short title	Production of preparations or pelletisation	articles by tabletting, compression, extrusion,
Use descriptor covered	PROC 8b	
Processes, tasks, activities covered	Pelletisation under cold water a	t ambient temperature, maximum 60°C
Exposure Assessment Method	Tool used: ECETOC TRA Work	•



# Page 41 of 47

# **SAFETY DATA SHEET**

(according to Regulation (EC) No 1907/2006 (REACH), ANNEX II)

# CAPROLACTAM

Revision date: 01.10.2024 Version 4.4



Product characteristic				
Physical state	Solid	Operation conditions: temperature max. 60°C		
Concentration of substance	TRA 1-5	%		
Dustiness	Low			
Vapour pressure of the substance	< 1 (corresponds to 60°C)	hPa		
Amounts used				
Not relevant in ECETOC TRA				
Frequency and duration of use/exposure				
Duration of exposure	> 4 h	per day		
Frequency of exposure	≤ 240	days/year		
Other given operational conditions affecting v	vorkers exposure			
Location	Indoors			
Domain	Industrial			
Technical conditions and measures at proces	s level (source) to prevent releas	se		
Not relevant				
Technical conditions and measures to control	dispersion from source towards	s the worker		
Appropriate local exhaust ventilation	No			
Organisational measures to prevent/limit release	• •			
		s. Regular cleaning of equipment and work area.		
Supervision in place to check that the RMMs in p				
Conditions and measures related to personal	protection, hygiene and health e	valuation		
Use of suitable respiratory protection	No			
Use of suitable chemical resistant gloves in				
combination with basic employee training	Cross reference to Qualitative Exposure Assessment			
Use of suitable eye protection				

#### **Exposure Estimation**

Estimated exposure for workers

Estilliated exposure for workers				
Route of exposure	Concentration	ns	Justification	
	Value	Unit		
Long-term exposure, local, inhalative – PROC2	4.72	mg/m³		
Long-term exposure, local, inhalative - PROC3	0.1	mg/m³		
Long-term exposure, local, inhalative – PROC8b	0.1	mg/m³		
Long-term exposure, local, inhalative – PROC14	0.02	ma/m³		



(according to Regulation (EC) No 1907/2006 (REACH), ANNEX II)

# CAPROLACTAM



Location

Domain

Revision date: 01.10.2024 Version 4.4

AZOT  10. Exposure Scenario 10: Use of ca	nrol	actam in loather tanning	. finichi	na improanatio	n coatings and paints
		actain in leather tailining	j, iiiii5iii	ng, impregnatio	n, coatings and paints
Number of the ES	10				
Title of exposure scenario	Use	Use of caprolactam in leather tanning, finishing, impregnation, coatings and paints			gnation, coatings and paints
List of all use descriptors related to the life cycle stage	SU	SU3, 22; PROC 10, 13; ERC 6b			
Name of contributing environmental scenario and corresponding ERC	Ind	ustrial use of reactive pro	cessing a	aids (ERC 6b)	
Name(s) of contributing worker scenarios and corresponding PROCs		OC 10: Roller application OC 13: Treatment of artic			7
Contributing exposure scenario controlling				oping and pounn	9
		orker exposure for PRO	C 10, 13		
Control of workers exposure for PROC 10		-1-			
Title information related to contributing s	cena	,	- le !		
Workers related free short title		Roller application or bru	sning		
Use descriptor covered		PROC 10			
Processes, tasks, activities covered		Low energy spreading of			
Exposure Assessment Method		Tool used: ECETOC TR	RA Worke	er (v2.0)	
Product characteristic					
Physical state		Liquid		Operation cond	ditions: at ambient temperatures
Concentration of substance		TRA 1-5		%	
Fugacity		Low			
Vapour pressure of the substance		0.0013 (corresponds to 90°C	C)	hPa	
Amounts used					
Not relevant in ECETOC TRA					
Frequency and duration of use/exposure		Industrial Domain	Profes	sional Domain	
Duration of exposure		15min – 1h	15min		per day
Frequency of exposure		≤ 240	≤ 240		days/year
Other given operational conditions affect	ina v		10		adyonyour
Location	iiig v	Indoor	Indoor		
				sional	
Domain		Industrial	Profess		
Technical conditions and measures at pro	oces	s level (source) to preve	nt relea	se	
Not relevant					
Technical conditions and measures to co	ntro	•	toward	s the worker	
Appropriate local exhaust ventilation		No			
Organisational measures to prevent /limit					
Avoiding frequent and direct contact with sul Supervision in place to check that the RMMs	in pl	ace are being used corre	ctly and	OCs followed.	ing of equipment and work area.
Conditions and measures related to person	onal	protection, hygiene and	health e	evaluation	
Use of suitable respiratory protection		No			
Use of suitable chemical resistant gloves in					
combination with basic employee training		Cross reference to Qual	litative Ex	xposure Assessm	nent
Use of suitable eye protection					
Control of workers exposure for PROC 13	3				
Title information related to contributing s	cena	rio			
Workers related free short title		Treatment of articles by	dipping	and pouring	
Use descriptor covered		PROC 13			
Processes, tasks, activities covered		Immersion operations (le	ow energ	v application ont	o a surface)
Exposure Assessment Method		Tool used: ECETOC TR		• • • • • • • • • • • • • • • • • • • •	,
Product characteristic				` '/	
Physical state		Liquid		Operation cond	ditions: at ambient temperatures
Concentration of substance		<del>-                                    </del>			attorio. at ambient temperatures
Fugacity		TRA 1-5			
Vapour pressure of the substance		0.0013 (corresponds to	au <sub>°C</sub> ,	hPa	
Amounts used		0.00 to (corresponds to	90 C)	IIFa	
Not relevant in ECETOC TRA		Industrial Days 1	D	alanal Dawy	
Frequency and duration of use/exposure		Industrial Domain		sional Domain	
Duration of exposure		15min – 1h	15min	– 1 <b>h</b>	per day
Frequency of exposure		≤ 240	≤ 240		days/year
Other given operational conditions affect	ing v		1		
Location		Indoor	Indoor		

Indoor

Industrial

Indoor

Professional



# Page 43 of 47

# **SAFETY DATA SHEET**

(according to Regulation (EC) No 1907/2006 (REACH), ANNEX II)

# CAPROLACTAM

Revision date: 01.10.2024 Version 4.4



Technical conditions and measures at process level (source) to prevent release				
Not relevant				
Technical conditions and measures to control dispersion from source towards the worker				
Appropriate local exhaust ventilation	No			
Organisational measures to prevent /limit releases, dispersion and exposure				
Avoiding frequent and direct contact with substance. Minimisation of manual phases. Regular cleaning of equipment and work area.				
Supervision in place to check that the RMMs in place are being used correctly and OCs followed.				
Conditions and measures related to personal protection, hygiene and health evaluation				
Use of suitable respiratory protection	No			
Use of suitable chemical resistant gloves in				
combination with basic employee training	Cross reference to Qualitative Ex	xposure Assessment		
Use of suitable eye protection				

# **Exposure Estimation**

Estimated exposure for workers - PROC 10, 13

Route of exposure	Concentrations			Justification
	Industrial Domain	Professional Domain	Unit	
Long-term exposure, local, inhalative - PROC10	2.83	4.72	mg/m³	
Long-term exposure, local, inhalative – PROC13	2.83	2.83	mg/m³	





(according to Regulation (EC) No 1907/2006 (REACH), ANNEX II)

# CAPROLACTAM

Revision date: 01.10.2024 Version 4.4

# AZOT

# 11. Exposure Scenario 11: Use as laboratory chemical

Normalian of the EO	4.4			
Number of the ES		11		
Title of exposure scenario	Use as	Use as laboratory chemical		
List of all use descriptors related to the life cycle stage	SU 22;	SU 22; PROC 15; ERC 8c, PC21		
Name of contributing environmental	Wide d	Wide dispersive indoor use resulting in inclusion into or onto a matrix (ERC 8c)		
scenario and corresponding ERC	vvide d	vide dispersive indoor discresulting in inclusion into or onto a matrix (Live de)		
Name(s) of contributing worker scenarios and corresponding PROCs	Use as	laboratory reagent		
Contributing exposure scenario controlli	ng work	er exposure for PROC 15		
Control of workers exposure for PROC 1	5 (Solid)	-		
Title information related to contributing s				
Workers related free short title		se as laboratory reagent		
Use descriptor covered		ROC 15		
Processes, tasks, activities covered	Ar	nalytical work in the lab		
Exposure Assessment Method		ool used: ECETOC TRA Worke	er (v2.0)	
Product characteristic			- 1 -7	
Physical state	Sc	olid	Operation conditions: ambient temperature	
Concentration of substance	10		%	
Dustiness	Lo			
		0013 (corresponds to	LD-	
Vapour pressure of the substance		nbient temperature)	hPa	
Amounts used		•		
Not relevant in ECETOC TRA				
Frequency and duration of use/exposure				
Duration of exposure	> -	4h	per day	
Frequency of exposure	≤ 2	240	days/year	
Other given operational conditions affect	ting wor	kers exposure		
Location	In	doors		
Domain	Pr	ofessional		
Technical conditions and measures at pr	ocess le	evel (source) to prevent relea	ase	
Not relevant				
Technical conditions and measures to co	ontrol di	spersion from source toward	ds the worker	
Appropriate local exhaust ventilation	No	)		
Organisational measures to prevent/limit	release	s, dispersion and exposure		
			ses. Regular cleaning of equipment and work area.	
Supervision in place to check that the RMMs				
Conditions and measures related to pers	onal pro	otection, hygiene and health	evaluation	
Use of suitable respiratory protection	No	)		
Use of suitable chemical resistant gloves in				
combination with basic employee training	Cr	oss reference to Qualitative E	xposure Assessment	
Use of suitable eye protection				
Control of workers exposure for PROC 1				
Title information related to contributing s				
Workers related free short title		se as laboratory reagent		
Use descriptor covered		ROC 15		
Processes, tasks, activities covered		nalytical work in the lab		
Exposure Assessment Method	To	ool used: ECETOC TRA Worke	er (v2.0)	
Product characteristic	1 -		T	
Physical state		quid	Operation conditions: 90°C	
Concentration of substance	10		%	
Fugacity  Vapour pressure of the substance	1	ow (corresponds to ambient	hPa	
	te	mperature)	~	
Amounts used				
Not relevant				
Frequency and duration of use/exposure		41.	T	
Duration of exposure		4h	per day	
Frequency of exposure		240	days/year	
Other given operational conditions affect	ing wor	kers exposure		



# Page 45 of 47

# **SAFETY DATA SHEET**

(according to Regulation (EC) No 1907/2006 (REACH), ANNEX II)

# CAPROLACTAM

Revision date: 01.10.2024 Version 4.4

AZOT

Location	Indoors			
Domain	Professional			
Technical conditions and measures at process level (source) to prevent release				
Not relevant				
Technical conditions and measures to control	I dispersion from source toward	ds the worker		
Appropriate local exhaust ventilation	Yes	Effectiveness 80%		
Organisational measures to prevent /limit releases, dispersion and exposure				
	Avoiding frequent and direct contact with substance. Minimisation of manual phases. Regular cleaning of equipment and work area.			
Supervision in place to check that the RMMs in p				
Conditions and measures related to personal	protection, hygiene and health	evaluation		
Use of suitable respiratory protection	No			
Use of suitable chemical resistant gloves in				
combination with basic employee training	Cross reference to Qualitative Exposure Assessment			
Use of suitable eye protection				

# **Exposure Estimation**

Estimated exposure for workers - PROC 15 (solid)

		<i></i>	
Route of exposure	Concentrations		Justification
	Value	Unit	
Long-term exposure, local, inhalative	0.1	mg/m³	

Estimated exposure for workers – PROC 15 (liquid)

Route of exposure	Concentrations		Justification
	Value	Unit	
Long-term exposure, local, inhalative	4.72	mg/m³	

#### Page 46 of 47



#### SAFETY DATA SHEET

(according to Regulation (EC) No 1907/2006 (REACH), ANNEX II)

### CAPROLACTAM

Revision date: 01.10.2024 Version 4.4



#### 12. Exposure Scenario 12: Consumer use in coatings/paints

<u>General remarks:</u> For the use of coatings, paints and adhesives containing caprolactam the use of ready-to-use products for which no dilution and mixing steps are necessary was assumed.

PC18: To reflect a reasonable worst case scenario, the following assumptions have been made:

- A toner contains 750g of printing ink
- 750g print ink is sufficient to print 8000 pages
- 500 pages per day are printed
- The printing rate is 50 pages per minute

Generally, two steps have been assessed. Refilling of toners (cartridges) (Part A) and the printing process itself (Part B-1 or Part B-2). For the step "Refilling of toners" the ConsExpo default database for Cleaning and washing/All-purpose cleaner/Liquid/Mixing and Loading was regarded to be suitable as a basis for the inhalative exposure estimation. The step "Printing process" was calculated using the evaporation model postulating instantaneous release as a worst case. Two possible scenarios were evaluated: Part B-1 and B-2.

Control of consumer exposure for PC 18	version and a world base. It	vo possible scenarios were evaluated. Part B-1 and B-2.			
Name of contributing scenario	Use in Printing inks				
Use descriptor covered	SU21, PC 18				
Processes, tasks, activities covered	Refilling of toners (car Printing process – Par Part B-1 - Continuous pages over a period of	Refilling of toners (cartridges) – Part A; Printing process – Part B: Part B-1 - Continuous printing of pages over a longer period of time (e.g. 500 pages over a period of 8 hours) Part B-2 - Printing of a large number of pages at once (e.g. 500 pages within			
Assessment Method	Cleaning and washing				
Part A. Refilling step	<u> </u>	·			
Product characteristic					
Physical state	Liquid				
Concentration of substance	max. 5%				
Vapour pressure of the substance	0.0013 hPa (ambient t	emperature)			
Mol weight matrix	113.16 g/mol	High fraction of water is assumed			
Mass transfer rate	0.284 m/min	Thibodeaux's method <sup>1</sup> ;			
Amounts used	1	· · · · · · · · · · · · · · · · · · ·			
Applied amount	750 g				
Frequency and duration of use/exposure	1				
Duration of exposure	0.75 min	(Default value)			
Duration of application	0.3 min	(Default value)			
Frequency of exposure	365 days/year	Not relevant for the calculation of the mean concentration on day of exposure			
Human factors not influenced by risk mana	agement				
Type of activity (inhalation rate)	Light activity	See footnote 2			
Other given operational conditions affecting	g workers exposure				
Location	Inside				
Room volume	-	A "personal volume" of 1m3 is assumed			
Ventilation rate	0.5 per hour	(Default value)			
Release area	20cm <sup>2</sup>	(Default value)			
Application temperature	25°C				
Conditions and measures related to inform	ation and behavioural advic	ce to consumers			
Not applicable					
Conditions and measures related to person	nal protection and hygiene				
Not applicable	-				
Part B-1. Printing process/8 hours					
Product characteristic					
Physical state	Liquid				
Concentration of substance	max. 5%				
Vapour pressure of the substance	0.0013 hPa				
Amounts used	•				
Applied amount	46.8 g/day	Amount of printing ink needed to print 500 pages			
Frequency and duration of use/exposure	, 5 - 7	, <u>, , , , , , , , , , , , , , , , , , </u>			
Duration of exposure	8 hours				
Frequency of exposure	365 days/year	Not relevant for the calculation of the mean concentration on day of exposure			



#### Page 47 of 47

# **SAFETY DATA SHEET**

(according to Regulation (EC) No 1907/2006 (REACH), ANNEX II)

#### CAPROLACTAM

Revision date: 01.10.2024 Version 4.4

AZOT

Human factors not influenced by risk ma	anagement			
Type of activity (inhalation rate)	Light activity	See footnote 2		
Other given operational conditions affect	ting workers exposure			
Location	Inside			
Room volume	25 m³	See footnote 3		
Ventilation rate	0.6 per hour	See footnote 4		
Application temperature	25°C	25°C		
Organisational measures to prevent /lim	it releases, dispersion and exp	oosure		
Not applicable				
Conditions and measures related to personal	sonal protection, hygiene and	health evaluation		
Not applicable				
Part B-2. Printing process / 10 mins				
Product characteristic				
Physical state	Liquid	Liquid		
Concentration of substance	max. 5%	max. 5%		
Vapour pressure of the substance	0.0013 hPa	0.0013 hPa		
Amounts used				
Applied amount	46.8 g/day	Amount of printing ink needed to print 500 pages		
Frequency and duration of use/exposure	• <u> </u>			
Duration of exposure	10 min			
Frequency of exposure	365 days/year	Not relevant for the calculation of the mean concentration on day of exposure		
Human factors not influenced by risk ma	anagement			
Type of activity (inhalation rate)	Light activity	See footnote 2		
Other given operational conditions affect	ting workers exposure			
Location	Inside			
Room volume	25m³	See footnote 3		
Ventilation rate	0.6 per hour	See footnote 4		
Application temperature	25°C			
Organisational measures to prevent /lim	it releases, dispersion and exp	oosure		
Not applicable				
Conditions and measures related to personal	sonal protection, hygiene and	health evaluation		
Not applicable				
According to the ConsExpo Manual (Delmaar J.E. et al., Cons	Expo4.0 – Consumer Exposure and Untake M	odels – Program Manual, RIVM report 320104004/2005) the Thibodeaux's method		

According to the ConsExpo Manual (Delmaar, J.E. et al., ConsExpo4.0 - Consumer Exposure and Uptake Models - Program Manual. RIVM report 320104004/2005) the Thibodeaux's method is

an approximation for the evaporation of a solute from water. Thus the exposure estimation based on Thibodeaux's method applies for waterbased printing inks.

The type of activity and the corresponding influence do not have direct relevance for the given exposure estimations. However the type of activity is regarded to be considered within the DNEL derivation.

### Estimated exposure for consumers for PC18

Route of exposure	dose/conc	Unit	Justification
Part A. Refilling step			·
Long-term exposure, local, inhalative	3.09*10 <sup>-5</sup>	mg/m³	Estimated exposure value is regarded to be negligible and will be disregarded in further assessment (chapter 10)
Long-term exposure, local, dermal	NA	mg/kg bw/d	Quantitative assessment
Long-term exposure, systemic	NA	mg/kg bw/d	See General remarks
Part B-1. Printing process			
Long-term exposure, local, inhalative	0.000412	mg/m³	
Long-term exposure, systemic, dermal	NA	mg/kg bw/d	Quantitative assessment
Long-term exposure, systemic	NA	mg/kg bw/d	See General remarks
Part B-2. Printing process			
Long-term exposure, systemic/local, inhalative	0.0198	mg/m³	
Long-term exposure, systemic, dermal	NA	mg/kg bw/d	Quantitative assessment
Long-term exposure, systemic, oral	NA	mg/kg bw/d	See General remarks

<sup>&</sup>lt;sup>3</sup>A room volume of 25 m<sup>3</sup> is postulated. This is considered to represent the worst case for the room volume of a home office (room with workstation and some racks)

<sup>4</sup>An air exchange rate of 0.6 hour is considered to represent a reasonable average value (Wallace, L.A. et al., 2002. Continuous measurements of air exchange rates in an occupied house for 1 year. The effect of temperature, wind, fans and windows. Journal of Exposure and Environmental Epidemiology, 12, 296-306; Bremmer, H. J. et al. General Fact Sheet. Limiting conditions and reliability, ventilation, room size, body surface area Updated version for ConsExpo 4. RIVM report 320104002/2006)