We create chemistry

Safety data sheet

1. Identification

Product identifier

Caprolactam liquid

Chemical name: Caprolactam liquid
CAS Number: 105-60-2

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

Relevant identified uses: industrial chemicals
Recommended use: initial product for chemical syntheses, for the production of homopolymerisates and copolymerisates

Details of the supplier of the safety data sheet

Company:
BASF SE
67056 Ludwigshafen
GERMANY
Division Monomers

Telephone: +49 621 60 42737
E-mail address: pss.monomers@basf.com

Emergency telephone number

International emergency number:
Telephone: +49 180 2273-112

2. Hazards Identification

Classification of the substance or mixture

According to UN GHS criteria

Acute Tox. 4 (Inhalation - dust)
Acute Tox. 4 (oral)
Skin Corr./Irrit. 2
Eye Dam./Irrit. 2A
STOT SE 3 (irritating to respiratory system)

For the classifications not written out in full in this section the full text can be found in section 16.

Label elements

Globally Harmonized System (GHS)

Pictogram:

Signal Word:
Warning

Hazard Statement:

H319	Causes serious eye irritation.
H315	Causes skin irritation.
H335	May cause respiratory irritation.
H302 + H332	Harmful if swallowed or if inhaled

Precautionary Statements (Prevention):

P271	Use only outdoors or in a well-ventilated area.
P280	Wear protective gloves and eye protection or face protection.
P261	Avoid breathing dust.
P261	Avoid breathing dust or fume.
P270	Do not eat, drink or smoke when using this product.
P264	Wash contaminated body parts thoroughly after handling.

Precautionary Statements (Response):

P312	Call a POISON CENTER or physician if you feel unwell.
P305 + P351 + P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P304 + P340	IF INHALED: Remove person to fresh air and keep comfortable for breathing.
P302 + P352	IF ON SKIN: Wash with plenty of soap and water.
P330	Rinse mouth
P332 + P313	If skin irritation occurs: Get medical attention.
P337 + P313	If eye irritation persists: Get medical attention.
P362 + P364	Take off contaminated clothing and wash it before reuse.

Precautionary Statements (Storage):

P403 + P233	Store in a well-ventilated place. Keep container tightly closed.
P405	Store locked up.

Precautionary Statements (Disposal):

P501	Dispose of contents and container to hazardous or special waste collection point.

Other hazards

According to UN GHS criteria

No specific dangers known, if the regulations/notes for storage and handling are considered.

3. Composition/Information on Ingredients

Substances

Chemical nature

caprolactam

CAS Number: 105-60-2
EC-Number: 203-313-2
INDEX-Number: 613-069-00-2

Hazardous ingredients (GHS)
According to UN GHS criteria

caprolactam

Content (W/W): 100 %	Acute Tox. 4 (Inhalation - dust)
CAS Number: 105-60-2	Acute Tox. 4 (oral)
EC-Number: 203-313-2	Skin Corr./Irrit. 2
INDEX-Number: 613-069-00-2	Eye Dam./Irrit. 2A
	STOT SE 3 (irr. to respiratory syst.)
	H319, H315, H335, H302 + H332

For the classifications not written out in full in this section the full text can be found in section 16.

Mixtures

Not applicable

4. First-Aid Measures

Description of first aid measures

Immediately remove contaminated clothing. Avoid contact with the skin, eyes and clothing.

If inhaled:
Keep patient calm, remove to fresh air, seek medical attention.

On skin contact:
Wash thoroughly with soap and water Burns caused by molten material require hospital treatment.

On contact with eyes:
Immediately wash affected eyes for at least 15 minutes under running water with eyelids held open, consult an eye specialist.

On ingestion:
Immediately rinse mouth and then drink 200-300 ml of water, seek medical attention.

Most important symptoms and effects, both acute and delayed
Symptoms: Information, i.e. additional information on symptoms and effects may be included in the GHS labeling phrases available in Section 2 and in the Toxicological assessments available in Section 11.

Indication of any immediate medical attention and special treatment needed
Treatment: Treat according to symptoms (decontamination, vital functions), no known specific antidote.

5. Fire-Fighting Measures

Extinguishing media
Suitable extinguishing media:
foam, carbon dioxide, water spray

Special hazards arising from the substance or mixture
Hydrogen cyanide, nitrogen oxides
The substances/groups of substances mentioned can be released in case of fire.

Advice for fire-fighters
Further information:
Collect contaminated extinguishing water separately, do not allow to reach sewage or effluent systems.

6. Accidental Release Measures

Personal precautions, protective equipment and emergency procedures
Ensure adequate ventilation. Avoid contact with skin and eyes. Use breathing apparatus if exposed to vapours/dust/aerosol. Information regarding personal protective measures, see section 8.

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

Methods and material for containment and cleaning up
For large amounts: Allow to solidify and sweep/shovel up.
For residues: Rinse away with water.

7. Handling and Storage

Precautions for safe handling
Ensure thorough ventilation of stores and work areas. During transportation in silo trucks the product is covered with nitrogen, do not climb in. Avoid contact with skin and eyes. Wear suitable protective

clothing and eye/face protection. Handle in accordance with good industrial hygiene and safety practice.

Protection against fire and explosion:
Vapours may form explosive mixture with air. Take precautionary measures against static discharges.

Conditions for safe storage, including any incompatibilities

Segregate from acids and bases. Segregate from oxidants.

Suitable materials for containers: Stainless steel 1.4301 (V2), Aluminium, Stainless steel 1.4401
Further information on storage conditions: Keep under nitrogen.

Storage stability:
Storage temperature: 75 - 90 °C
The stated storage temperature should be noted.

Specific end use(s)

See exposure scenario(s) in the attachment to this safety data sheet.

8. Exposure Controls/Personal Protection

Control parameters

Components with occupational exposure limits

105-60-2: caprolactam

Exposure controls

Personal protective equipment

Respiratory protection:
Respiratory protection in case of vapour/aerosol release. Gas filter for gases/vapours of organic compounds (boiling point >65 °C, e. g. EN 14387 Type A)

Hand protection:
Chemical resistant protective gloves (EN ISO 374-1)
Suitable materials also with prolonged, direct contact (Recommended: Protective index 6, corresponding > 480 minutes of permeation time according to EN ISO 374-1):
butyl rubber (butyl) - 0.7 mm coating thickness
nitrile rubber (NBR) - 0.4 mm coating thickness
Manufacturer's directions for use should be observed because of great diversity of types.

Eye protection:
Tightly fitting safety goggles (splash goggles) (e.g. EN 166)

Body protection:
Body protection must be chosen depending on activity and possible exposure, e.g. apron, protecting boots, chemical-protection suit (according to EN 14605 in case of splashes or EN ISO 13982 in case of dust).

General safety and hygiene measures

Handle in accordance with good industrial hygiene and safety practice. Take off immediately all contaminated clothing. At the end of the shift the skin should be cleaned and skin-care agents applied.

9. Physical and Chemical Properties

Information on basic physical and chemical properties

Form:	melt	
Colour:	colourless	
Odour:	faint specific odour	
Odour threshold:	No data available.	
pH value:	7 - 8,5 (333 g/l, 20 °C)	(pH Meter)
solidification temperature:	69,3 °C	(other)
boiling temperature:	270,8 °C (1.013 mbar)	(other)
Sublimation point:	No applicable information available.	
Flash point:	141,5 °C	(ISO 2719, closed cup)
Evaporation rate:	No data available.	
Flammability:	not highly flammable	(UN Test N.1 (ready combustible solids))
Lower explosion limit:	(130,5 °C) The lower explosion point of the substance/mixture has been determined. The explosion point describes the temperature of a flammable liquid at which the concentration of the saturated vapour mixed with air equals the lower explosion limit.	(DIN EN 15794)
Upper explosion limit:	For solids not relevant for classification and labelling.	
Ignition temperature:	395 °C	(DIN 51794)
Vapour pressure:	0,0013 hPa (20 °C) Literature data. 0,089 hPa (60 °C) Literature data.	
Density:	1,014 g/cm3 (80 °C)	(OECD Guideline 109)
Relative density:	1,105 (20 °C)	(OECD Guideline 109)
Relative vapour density (air):	No data available.	
Solubility in water:	Literature data. 4.650 g/l (20 °C)	

Partitioning coefficient n-octanol/water (log Kow):	0,12 (25 °C)	(OECD Guideline 107)
Self ignition:	The value has not be determined because of the low risk of self-ignition in consequence of the low melting point.	Test type: Self-ignition at high temperatures.
	Based on its structural properties the product is not classified as self-igniting.	Test type: Spontaneous self-ignition at room-temperature.
Thermal decomposition:	No decomposition if correctly stored and handled.	
Viscosity, dynamic:	8,52 mPa.s (80 °C)	(internal method)
Viscosity, kinematic:	Study scientifically not justified.	
Explosion hazard:	Based on the chemical structure there is no indication of explosive properties.	
Fire promoting properties:	Based on its structural properties the product is not classified as oxidizing.	

Other information

Burning rate:	> 2,2 mm/s, 120 s	(UN Test N.1 (ready combustible solids))
Self heating ability:	It is not a substance capable of spontaneous heating.	
pKA:	The substance does not dissociate.	
Adsorption/water - soil:	KOC: 57,35; log KOC: 1,758	(calculated)
Surface tension:	Based on chemical structure, surface activity is not to be expected.	
Grain size distribution:	The substance / product is marketed or used in a non solid or granular form.	
Molar mass:	113,16 g/mol	

10. Stability and Reactivity

Reactivity

Corrosion to metals:	No corrosive effect on metal.	
Reactions with water/air:	Which flammable gases:	Incomplete combustion results in formation of toxic gases, containing mainly carbon monoxide and carbon dioxide.
	Which toxic gases:	nitrogen oxides
	Which Peroxides:	
Formation of flammable gases:	Remarks:	Forms no flammable gases in the presence of water.

Chemical stability
The product is stable if stored and handled as prescribed/indicated.

Possibility of hazardous reactions
Reacts with oxidizing agents. Polymerization coupled with heat formation.

Conditions to avoid
Temperature: > 100 °C
Avoid all sources of ignition: heat, sparks, open flame. Avoid formation of polymers in valves and pipes.

Incompatible materials

Substances to avoid:
oxidizing agents

Hazardous decomposition products

Thermal decomposition products:
No hazardous decomposition products if stored and handled as prescribed/indicated., Incomplete combustion results in formation of toxic gases, containing mainly carbon monoxide and carbon dioxide.

11. Toxicological Information

Information on toxicological effects

Acute toxicity

Assessment of acute toxicity:
Of moderate toxicity after short-term inhalation. Of moderate toxicity after single ingestion. Virtually nontoxic after a single skin contact.

Experimental/calculated data:
LD50 rat (oral): 1.475 mg/kg (Directive 84/449/EEC, B.1)

LC50 rat (by inhalation): approx. 8,16 mg/l 4 h (BASF-Test)
An aerosol with respirable particles was tested.

LD50 rat (dermal): > 2.000 mg/kg (Directive 92/69/EEC, B.3)

Irritation

Assessment of irritating effects:
Eye contact causes irritation. Skin contact causes irritation.

Experimental/calculated data:
Skin corrosion/irritation human: Irritant.

Serious eye damage/irritation human: Irritant.

Respiratory/Skin sensitization

Assessment of sensitization:
Skin sensitizing effects were not observed in animal studies.

Experimental/calculated data:
modified Buehler test guinea pig: Non-sensitizing. (OECD Guideline 406)

Germ cell mutagenicity

Assessment of mutagenicity:
Most of the results from the available studies show no evidence of a mutagenic effect.

Carcinogenicity

Assessment of carcinogenicity:
In long-term animal studies in which the substance was given in high concentrations by feed, a carcinogenic effect was not observed.

Experimental/calculated data:
rat (oral feed) 103 weeks
ca. 187.5 and 375 mg/kg bw
Result: negative

mouse (oral feed) 103 weeks
ca. 1071 and 2143 mg/kg bw
Result: negative

Reproductive toxicity

Assessment of reproduction toxicity:
The results of animal studies gave no indication of a fertility impairing effect.

Experimental/calculated data:
Fertility rat (oral feed)
NOAEL Mat.: 500 mg/kg
NOAEL F1: approx. 100 mg/kg
NOAEL F2: 100 mg/kg

Developmental toxicity

Assessment of teratogenicity:
The substance did not cause malformations in animal studies; however, toxicity to development was observed at high doses that were toxic to the parental animals.

Experimental/calculated data:
rat (gavage) 6-15 days of gestation; 100, 500, 1000 mg/kg
NOAEL Teratog.: 1.000 mg/kg
NOAEL Mat.: 100 mg/kg

rabbit (gavage) 6-28 days of gestation; 50, 150, 250 mg/kg
NOAEL Teratog.: > 250 mg/kg
NOAEL Mat.: 150 mg/kg

Experiences in humans

Experimental/calculated data:
local skin irritation, irritation of the mucous membranes:
The symptoms/diagnosis/findings mentioned can occur in higher concentrations.

Specific target organ toxicity (single exposure)

Assessment of STOT single:
Causes temporary irritation of the respiratory tract.

Repeated dose toxicity and Specific target organ toxicity (repeated exposure)

Assessment of repeated dose toxicity:
After repeated exposure the prominent effect is local irritation. The substance may cause damage to the upper respiratory tract after repeated inhalation, as shown in animal studies.

Aspiration hazard

No aspiration hazard expected.

Other relevant toxicity information

Based on our experience and the information available, no adverse health effects are expected if handled as recommended with suitable precautions for designated uses.

12. Ecological Information

Toxicity

Assessment of aquatic toxicity:
There is a high probability that the product is not acutely harmful to aquatic organisms. The inhibition of the degradation activity of activated sludge is not anticipated when introduced to biological treatment plants in appropriate low concentrations.

Toxicity to fish:
LC0 (96 h) 100 mg/l, Oryzias latipes (OECD Guideline 203, semistatic)

LC50 (96 h) 500 - 1.000 mg/l, Salmo gairdneri, syn. O. mykiss (OECD 203; ISO 7346; 84/449/EEC, C.1, static)

LC50 (96 h) 707,1 mg/l, Salmo gairdneri, syn. O. mykiss (OECD 203; ISO 7346; 84/449/EEC, C.1, static)

Aquatic invertebrates:
EC50 (48 h) > 1.000 mg/l, Daphnia magna (OECD Guideline 202, part 1, static)

EC50 (48 h) > 500 mg/l, Daphnia magna (DIN 38412 Part 11, static)

EC50 (48 h) > 500 mg/l, Daphnia magna (DIN 38412 Part 11, static)

Aquatic plants:
No observed effect concentration (72 h) 1.000 mg/l (growth rate), Pseudokirchneriella subcapitata (OECD Guideline 201, static)

EC50 (72 h) > 1.000 mg/l (growth rate), Selenastrum capricornutum (OECD Guideline 201, static)

EC50 (72 h) 427,5 mg/l (growth rate), Scenedesmus subspicatus (DIN 38412 Part 9, static)

EC50 (72 h) > 1.000 mg/l (biomass), Selenastrum capricornutum (OECD Guideline 201, static)

Microorganisms/Effect on activated sludge:
EC50 (17 h) 4.240 mg/l, Pseudomonas putida (other, aquatic)

Chronic toxicity to fish:
Study scientifically not justified.

Chronic toxicity to aquatic invertebrates:
No observed effect concentration (21 d) 100 mg/l, Daphnia magna (OECD Guideline 211, semistatic)

Assessment of terrestrial toxicity:
No data available.
Study scientifically not justified.

Persistence and degradability

Assessment biodegradation and elimination (H2O):
Readily biodegradable (according to OECD criteria).

Elimination information:
82 % BOD of the ThOD (14 d) (OECD 301C; ISO 9408; 92/69/EEC, C.4-F) (aerobic, activated sludge) Readily biodegradable (according to OECD criteria).

Assessment of stability in water:
In contact with water the substance will hydrolyse slowly.
Information on Stability in Water (Hydrolysis):
$t_{1/2}$ > 1 a, (other, pH 7)

Bioaccumulative potential

Assessment bioaccumulation potential:
Because of the n-octanol/water distribution coefficient (log Pow) accumulation in organisms is not to be expected.

Bioaccumulation potential:
Because of the n-octanol/water distribution coefficient (log Pow) accumulation in organisms is not to be expected.

Mobility in soil

Assessment transport between environmental compartments:
Volatility: The substance will not evaporate into the atmosphere from the water surface.
Adsorption in soil: Adsorption to solid soil phase is not expected.

Results of PBT and vPvB assessment

According to Annex XIII of Regulation (EC) No.1907/2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH): The product does not fulfill the criteria for PBT

(Persistent/bioaccumulative/toxic) and vPvB (very persistent/very bioaccumulative). Self classification

Other adverse effects

The substance is not listed in Regulation (EC) 1005/2009 on substances that deplete the ozone layer.

Additional information

Sum parameter

Chemical oxygen demand (COD): 1.960 mg/g

Biochemical oxygen demand (BOD): 1.110 mg/g

Other ecotoxicological advice:
Do not release untreated into natural waters.

13. Disposal Considerations

Waste treatment methods

Contact manufacturer.
Incinerate in suitable incineration plant, observing local authority regulations.

Contaminated packaging:
Uncleaned empties should be disposed of in the same manner as the contents.

14. Transport Information

Land transport

ADR

	Not classified as a dangerous good under transport regulations
UN number or ID number:	Not applicable
UN proper shipping name:	Not applicable
Transport hazard class(es):	Not applicable
Packing group:	Not applicable
Environmental hazards:	Not applicable
Special precautions for user	None known

RID

	Not classified as a dangerous good under transport regulations
UN number or ID number:	Not applicable
UN proper shipping name:	Not applicable
Transport hazard class(es):	Not applicable
Packing group:	Not applicable

Environmental hazards:	Not applicable
Special precautions for user	None known

Inland waterway transport

ADN

Not classified as a dangerous good under transport regulations

UN number or ID number:	Not applicable
UN proper shipping name:	Not applicable
Transport hazard class(es):	Not applicable
Packing group:	Not applicable
Environmental hazards:	Not applicable
Special precautions for user:	None known

Transport in inland waterway vessel

Not evaluated

Sea transport

IMDG

Not classified as a dangerous good under transport regulations

UN number or ID number:	Not applicable
UN proper shipping name:	Not applicable
Transport hazard class(es):	Not applicable
Packing group:	Not applicable
Environmental hazards:	Not applicable
Special precautions for user	None known

Air transport

IATA/ICAO

Not classified as a dangerous good under transport regulations

UN number or ID number	Not applicable
UN proper shipping name:	Not applicable
Transport hazard class(es):	Not applicable
Packing group:	Not applicable
Environmental hazards:	Not applicable
Special precautions for user	None known

Maritime transport in bulk according to IMO instruments

Maritime transport in bulk is not intended.

15. Regulatory Information

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

If other regulatory information applies that is not already provided elsewhere in this safety data sheet, then it is described in this subsection.

16. Other Information

Full text of classifications, hazard symbols and hazard statements, if mentioned in section 2 or 3:

Acute Tox.	Acute toxicity
Skin Corr./Irrit.	Skin corrosion/irritation
Eye Dam./Irrit.	Serious eye damage/eye irritation
STOT SE	Specific target organ toxicity — single exposure
H319	Causes serious eye irritation.
H315	Causes skin irritation.
H335	May cause respiratory irritation.
H302 + H332	Harmful if swallowed or if inhaled

The data contained in this safety data sheet are based on our current knowledge and experience and describe the product only with regard to safety requirements. This safety data sheet is neither a Certificate of Analysis (CoA) nor technical data sheet and shall not be mistaken for a specification agreement. Identified uses in this safety data sheet do neither represent an agreement on the corresponding contractual quality of the substance/mixture nor a contractually designated use. It is the responsibility of the recipient of the product to ensure any proprietary rights and existing laws and legislation are observed.