

SAFETY DATA SHEET

according to Regulation (EC) No. 1907/2006

PIPERAZINE ANHYDROUS (PIP-ANH)

Version 2

Revision Date 29.06.2016

Print Date 29.08.2016

GB / EN

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

1.1 Product identifier

Trade name : PIPERAZINE ANHYDROUS (PIP-ANH)

Substance name : Piperazine

Index-No. : 612-057-00-4

REACH Registration Number : 01-2119480384-35-0000

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

Use of the Substance/Mixture : Specific use(s): Refer to attached exposure scenario Annex.

1.3 Details of the supplier of the safety data sheet

Company : Akzo Nobel
Functional Chemicals AB
SE 444 85 Stenungsund
Sweden

Telephone : +4630385000

Telefax : +46303770551

E-mail address : CustomerService.Amin@akzonobel.com

1.4 Emergency telephone number

Emergency telephone number : 24 hours emergency response number: +31 57 06 79211
Kemiakuten-SE: 020 99 60 00

SECTION 2: HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

Classification (REGULATION (EC) No 1272/2008)

Flammable solids, 1, H228

Skin corrosion, 1B, H314

Serious eye damage, 1, H318

Respiratory sensitisation, 1B, H334

Skin sensitisation, 1B, H317

Reproductive toxicity, 2, H361

For the full text of the H-Statements mentioned in this Section, see Section 16.

PIPERAZINE ANHYDROUS (PIP-ANH)

Version 2

Revision Date 29.06.2016

Print Date 29.08.2016

GB / EN

2.2 Label elements

Labelling (REGULATION (EC) No 1272/2008)

Pictogram



Signal word

: Danger

Hazard statements

: H228
H314

Flammable solid.
Causes severe skin burns and eye damage.

H317
H334

May cause an allergic skin reaction.
May cause allergy or asthma symptoms or breathing difficulties if inhaled.

H361

Suspected of damaging fertility or the unborn child.

Precautionary statements

: **Prevention:**
P210

Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.

P260

Do not breathe dust.

P280

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

P285

In case of inadequate ventilation wear respiratory protection.

Response:

P303 + P361 + P353

IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower.

P304 + P340 + P310

IF INHALED: Remove person to fresh air and keep comfortable for breathing. Immediately call a POISON CENTER/doctor.

P305 + P351 + P338 + P310

IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a POISON CENTER/doctor.

P308 + P313

IF exposed or concerned: Get medical advice/ attention.

Hazardous components which must be listed on the label:

Piperazine

110-85-0

2.3 Other hazards

PIPERAZINE ANHYDROUS (PIP-ANH)

Version 2

Revision Date 29.06.2016

Print Date 29.08.2016

GB / EN

Risk of dust explosion.
No further data available.

PBT and vPvB assessment : This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

PIPERAZINE ANHYDROUS (PIP-ANH)

Version 2

Revision Date 29.06.2016

Print Date 29.08.2016

GB / EN

SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

CAS-No. : 110-85-0

Hazardous substance

Chemical name	PBT vPvB OEL	CAS-No. EC-No. REACH No.	Classification (REGULATION (EC) No 1272/2008)	Concentration [%]
Piperazine		110-85-0 203-808-3 01-2119480384-35	Flam. Sol. 1; H228 Skin Corr. 1B; H314 Eye Dam. 1; H318 Resp. Sens. 1B; H334 Skin Sens. 1B; H317 Repr. 2; H361	90 - 100

For the full text of the H-Statements mentioned in this Section, see Section 16.

REACH - Candidate List of Substances of Very High Concern for Authorisation (Article 59).

Status : Not applicable

SECTION 4: FIRST AID MEASURES

4.1 Description of first aid measures

- General advice : Immediate medical attention is required.
Move out of dangerous area.
Show this safety data sheet to the doctor in attendance.
- If inhaled : Remove to fresh air.
Rinse nose and mouth with water.
- In case of skin contact : Take off contaminated clothing and shoes immediately.
Immediate medical treatment is necessary as untreated wounds from corrosion of the skin heal slowly and with difficulty.
If skin irritation persists, call a physician.
- In case of eye contact : Rinse with plenty of water.
Get medical attention immediately. Continue to rinse during transport.
Remove contact lenses.
Protect unharmed eye.
Keep eye wide open while rinsing.
Small amounts splashed into eyes can cause irreversible tissue damage and blindness.
- If swallowed : Clean mouth with water and drink afterwards plenty of water.

PIPERAZINE ANHYDROUS (PIP-ANH)

Version 2

Revision Date 29.06.2016

Print Date 29.08.2016

GB / EN

Never give anything by mouth to an unconscious person.
Take victim immediately to hospital.
Do not induce vomiting! May cause chemical burns in mouth and throat.

4.2 Most important symptoms and effects, both acute and delayed

- Symptoms : The symptoms and effects are as expected from the hazards as shown in section 2. No specific product related symptoms are known.
- Risks : May cause an allergic skin reaction.
Causes serious eye damage.
May cause allergy or asthma symptoms or breathing difficulties if inhaled.
Suspected of damaging fertility or the unborn child.
Causes severe burns.

4.3 Indication of any immediate medical attention and special treatment needed

- Treatment : Treat symptomatically.

SECTION 5: FIREFIGHTING MEASURES

5.1 Extinguishing media

- Suitable extinguishing media : Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture

- Specific hazards during firefighting / Specific hazards arising from the chemical : Water spray may be ineffective unless used by experienced firefighters.
Do not allow run-off from fire fighting to enter drains or water courses.
Risks of ignition followed by flame propagation or secondary explosions shall be prevented by avoiding accumulation of dust, e.g. on floors and ledges.
- Combustion products : Carbon oxides
Nitrogen oxides (NO_x)

5.3 Advice for firefighters

- Special protective equipment for firefighters : In the event of fire, wear self-contained breathing apparatus.
- Further information : Use water spray to cool unopened containers.
Collect contaminated fire extinguishing water separately. This must not be discharged into drains.
Fire residues and contaminated fire extinguishing water must be disposed of in accordance with local regulations.

PIPERAZINE ANHYDROUS (PIP-ANH)

Version 2

Revision Date 29.06.2016

Print Date 29.08.2016

GB / EN

SECTION 6: ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures

Personal precautions : Use personal protective equipment.
Wear respiratory protection.
Avoid dust formation.
Avoid breathing dust.
Ensure adequate ventilation.
Remove all sources of ignition.

6.2 Environmental precautions

Environmental precautions : Prevent product from entering drains.
If the product contaminates rivers and lakes or drains inform respective authorities.

6.3 Methods and materials for containment and cleaning up

Methods for cleaning up /
Methods for containment : Contain spillage, and then collect with an electrically protected vacuum cleaner or by wet-brushing and place in container for disposal according to local regulations (see section 13).
Keep in suitable, closed containers for disposal.

6.4 Reference to other sections

Additional advice : For personal protection see section 8.

SECTION 7: HANDLING AND STORAGE

7.1 Precautions for safe handling

Advice on safe handling : Persons with a history of skin sensitisation problems or asthma, allergies, chronic or recurrent respiratory disease should not be employed in any process in which this mixture is being used.

: For personal protection see section 8.
Avoid formation of respirable particles.
Do not breathe vapours/dust.
Avoid contact with skin.
Keep away from heat/sparks/open flames/hot surfaces. No smoking.
Smoking, eating and drinking should be prohibited in the application area.
Provide sufficient air exchange and/or exhaust in work rooms.
Dispose of rinse water in accordance with local and national regulations.

Advice on protection against fire and explosion : Provide appropriate exhaust ventilation at places where dust is formed.
Keep away from sources of ignition - No smoking.
No sparking tools should be used.

PIPERAZINE ANHYDROUS (PIP-ANH)

Version 2

Revision Date 29.06.2016

Print Date 29.08.2016

GB / EN

7.2 Conditions for safe storage, including any incompatibilities

Requirements for storage areas and containers : Prevent unauthorized access.
 No smoking.
 Keep in a dry place.
 Reacts with copper, aluminium, zinc and their alloys.
 Electrical installations / working materials must comply with the technological safety standards.
 Store at room temperature in the original container.
 Keep container tightly closed.

Other data : No decomposition if stored and applied as directed.

7.3 Specific end use(s)

Specific use(s) : Refer to attached exposure scenario Annex.

SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Components with workplace control parameters

Components	CAS-No.	Value	Control parameters	Update	Basis	Form of exposure
Piperazine	110-85-0	TWA	0.1 mg/m ³	2000-06-16	2000/39/EC	
	Further information	:	Indicative			
		STEL	0.3 mg/m ³	2000-06-16	2000/39/EC	
	Further information	:	Indicative			
		TWA	0.1 mg/m ³	2007-08-01	GB EH40	
	Further information	:	<p>53+54: Substances that can cause occupational asthma (also known as asthmagens and respiratory sensitizers) can induce a state of specific airway hyper-responsiveness via an immunological, irritant or other mechanism. Once the airways have become hyper-responsive, further exposure to the substance, sometimes even to tiny quantities, may cause respiratory symptoms. These symptoms can range in severity from a runny nose to asthma. Not all workers who are exposed to a sensitizer will become hyper-responsive and it is impossible to identify in advance those who are likely to become hyper-responsive. 54 Substances that can cause occupational asthma should be distinguished from substances which may trigger the symptoms of asthma in people with pre-existing airway hyper-responsiveness, but which do not include the disease themselves. The latter substances are not classified asthmagens or respiratory sensitizers.</p> <p>55: Wherever it is reasonably practicable, exposure to substances that can cause occupational asthma should be prevented. Where this is not possible, the primary aim is to apply adequate standards of control to prevent workers from becoming hyper-responsive. For substances that can cause occupational asthma, COSHH requires that exposure be reduced as low as is reasonably practicable. Activities giving rise to short-term peak concentrations should receive particular attention when risk management is being considered. Health surveillance is appropriate for all employees exposed or liable to be exposed to a substance which may cause occupational asthma and there should be appropriate consultation with an occupational health professional over the degree of risk and level of surveillance.</p> <p>Sen: Capable of causing occupational asthma. The identified substances are those which: - are assigned the risk phrase 'R42: May cause sensitisation</p>			

PIPERAZINE ANHYDROUS (PIP-ANH)

Version 2

Revision Date 29.06.2016

Print Date 29.08.2016

GB / EN

			by inhalation'; or 'R42/43: May cause sensitisation by inhalation and skin contact' or - are listed in section C of HSE publication 'Asthmagens? Critical assessments of the evidence for agents implicated in occupational asthma' as updated from time to time, or any other substance which the risk assessment has shown to be a potential cause of occupational asthma. 56: The 'Sen' notation in the list of WELs has been assigned only to those substances which may cause occupational asthma.			
		STEL	0.3 mg/m3	2007-08-01	GB EH40	
	Further information	:	<p>53+54: Substances that can cause occupational asthma (also known as asthmagens and respiratory sensitisers) can induce a state of specific airway hyper-responsiveness via an immunological, irritant or other mechanism. Once the airways have become hyper-responsive, further exposure to the substance, sometimes even to tiny quantities, may cause respiratory symptoms. These symptoms can range in severity from a runny nose to asthma. Not all workers who are exposed to a sensitiser will become hyper-responsive and it is impossible to identify in advance those who are likely to become hyper-responsive. 54 Substances that can cause occupational asthma should be distinguished from substances which may trigger the symptoms of asthma in people with pre-existing airway hyper-responsiveness, but which do not include the disease themselves. The latter substances are not classified asthmagens or respiratory sensitisers.</p> <p>55: Wherever it is reasonably practicable, exposure to substances that can cause occupational asthma should be prevented. Where this is not possible, the primary aim is to apply adequate standards of control to prevent workers from becoming hyper-responsive. For substances that can cause occupational asthma, COSHH requires that exposure be reduced as low as is reasonably practicable. Activities giving rise to short-term peak concentrations should receive particular attention when risk management is being considered. Health surveillance is appropriate for all employees exposed or liable to be exposed to a substance which may cause occupational asthma and there should be appropriate consultation with an occupational health professional over the degree of risk and level of surveillance.</p> <p>Sen: Capable of causing occupational asthma. The identified substances are those which: - are assigned the risk phrase 'R42: May cause sensitisation by inhalation'; or 'R42/43: May cause sensitisation by inhalation and skin contact' or - are listed in section C of HSE publication 'Asthmagens? Critical assessments of the evidence for agents implicated in occupational asthma' as updated from time to time, or any other substance which the risk assessment has shown to be a potential cause of occupational asthma. 56: The 'Sen' notation in the list of WELs has been assigned only to those substances which may cause occupational asthma.</p>			
Piperazine	110-85-0	TWA	0.03 ppm	2014-03-01	ACGIH	
	Further information	:	<p>DSEN: Dermal Sensitization RSEN: Respiratory sensitization asthma: Asthma resp sens: Respiratory sensitization A4: Not classifiable as a human carcinogen</p> <p>piperazine</p>			
Dust		TWA	10 mg/m3	2011-12-01	GB EH40	Inhalable
	Further information	:	<p>44: The COSHH definition of a substance hazardous to health includes dust of any kind when present at a concentration in air equal to or greater than 10 mg.m-3 8-hour TWA of inhalable dust or 4 mg.m-3 8-hour TWA of respirable dust. This means that any dust will be subject to COSHH if people are exposed above these levels. Some dusts have been assigned specific WELs and exposure to these must comply with the appropriate limit. 2: Where no specific short-term exposure limit is listed, a figure three times the long-term exposure should be used</p>			
Dust		TWA	4 mg/m3	2011-12-01	GB EH40	Respirable
	Further information	:	<p>44: The COSHH definition of a substance hazardous to health includes dust of any kind when present at a concentration in air equal to or greater than 10</p>			

PIPERAZINE ANHYDROUS (PIP-ANH)

Version 2

Revision Date 29.06.2016

Print Date 29.08.2016

GB / EN

		mg.m-3 8-hour TWA of inhalable dust or 4 mg.m-3 8-hour TWA of respirable dust. This means that any dust will be subject to COSHH if people are exposed above these levels. Some dusts have been assigned specific WELs and exposure to these must comply with the appropriate limit. 2: Where no specific short-term exposure limit is listed, a figure three times the long-term exposure should be used
--	--	--

- ACGIH: American Conference of Governmental Industrial Hygienists
 AGW: Arbeitsplatzgrenzwert
 BEI: Biological Exposure Index
 MAC: Maximum Allowable Concentration
 NIOSH: National Institute for Occupational Safety and Health
 OEL: OEL: Occupational exposure limit.
 STEL: Short term exposure limit
 TRGS: Technische Regel für Gefahrstoffe
 TWA: Time Weighted Average

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

Substance name	End Use	Exposure routes	Potential health effects	Value
Piperazine	Workers	Inhalation	Long-term systemic effects	0.1 mg/m ³
	Workers	Inhalation	Acute systemic effects	0.3 mg/m ³
	Workers	Inhalation	Long-term local effects	0.1 mg/m ³
	Workers	Inhalation	Acute local effects	0.3 mg/m ³
	Workers	Dermal	Long-term systemic effects	0.014 mg/kg bw /day
	Workers	Dermal	Acute systemic effects	0.042 mg/kg bw /day
	Workers	Dermal	Acute local effects	2 %
	Consumers	Ingestion	Long-term systemic effects	1.5 mg/kg bw /day

Predicted No Effect Concentration (PNEC) according to Regulation (EC) No. 1907/2006

Substance name	Environmental Compartment	Value
Piperazine	Fresh water	1.25 mg/l
	Marine water	0.125 mg/l
	Fresh water sediment	4.5 mg/kg dry weight (d.w.)
	Marine sediment	0.45 mg/kg dry weight (d.w.)
	Soil	11.5 mg/kg dry weight (d.w.)
	Sewage treatment plant	54 mg/l
	Intermittent water	1.25 mg/l
	Secondary Poisoning	4.6 mg/kg food

8.2 Exposure controls

Engineering controls

PIPERAZINE ANHYDROUS (PIP-ANH)

Version 2

Revision Date 29.06.2016

Print Date 29.08.2016

GB / EN

Provide appropriate exhaust ventilation at places where dust is formed.
Ensure that eyewash stations and safety showers are close to the workstation location.

Personal protective equipment

- Respiratory protection : In the case of dust or aerosol formation use respirator with an approved filter.
Wear full face mask supplied with:
Gas cartridge K (ammonia, green).
Suitable mask with particle filter P3 (European Norm 143)
- Hand protection : butyl-rubber
- Eye protection : Safety glasses with side-shields conforming to EN166
- Skin and body protection : Protective suit
- Hygiene measures : Handle in accordance with good industrial hygiene and safety practice.
When using do not eat or drink.
When using do not smoke.
Wash hands before breaks and at the end of workday.
Wash contaminated clothing before re-use.

Environmental exposure controls

- General advice : Prevent product from entering drains.
If the product contaminates rivers and lakes or drains inform respective authorities.

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

Appearance

- Form : flakes
- Colour : white
- Odour : amine-like
- Odour Threshold : No data available

Safety data

- pH : 12 at 15 % solution
- Melting point/freezing point : 106 °C
at 1,013 hPa
- Boiling point/boiling range : 147 °C
at 1,013 hPa
- Flash point : Not applicable

PIPERAZINE ANHYDROUS (PIP-ANH)

Version 2

Revision Date 29.06.2016

Print Date 29.08.2016

GB / EN

Ignition temperature	: 320 °C at 1,013 hPa
Evaporation rate	: Not applicable
Flammability (solid, gas)	: The substance or mixture is a flammable solid with the category 1.
Flammability (liquids)	: Not applicable
Lower explosion limit	: 4 %(V)
Upper explosion limit	: 12 %(V)
Vapour pressure	: 0.4 hPa at 22.5 °C
Relative vapour density	: 3.0
Density	: 1,110 kg/m ³ at 20 °C
Relative density	: 1.1 at 20 °C
Bulk density	: 500 kg/m ³
Water solubility	: 150 g/l at 20 °C
Solubility in other solvents	: No data available
Partition coefficient: n-octanol/water	: log Pow: -1.24 at 25 °C
Auto-ignition temperature	: No data available
Decomposition temperature	: No data available
Viscosity, dynamic	: 0.96 mPa.s at 110 °C
Viscosity, kinematic	: Not applicable
Explosive properties	: Not explosive
Oxidizing properties	: The substance or mixture is not classified as oxidizing.

9.2 Other information

This safety datasheet only contains information relating to safety and does not replace any product information or product specification.

SECTION 10: STABILITY AND REACTIVITY

10.1 Reactivity

Stable under normal conditions.

10.2 Chemical stability

PIPERAZINE ANHYDROUS (PIP-ANH)

Version 2

Revision Date 29.06.2016

Print Date 29.08.2016

GB / EN

Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions

Heating can release hazardous gases.
Dust may form explosive mixture in air.

10.4 Conditions to avoid

Conditions to avoid : Heat, flames and sparks.

10.5 Incompatible materials

Materials to avoid : Reacts with copper, aluminium, zinc and their alloys.
Strong acids and oxidizing agents
Halogenated compounds

10.6 Hazardous decomposition products

Hazardous decomposition products : Nitrogen oxides (NO_x)

Thermal decomposition : No data available

SECTION 11: TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Product information:

- Acute toxicity : Not classified based on available information.
- Skin corrosion/irritation : Causes severe burns.
- Serious eye damage/eye irritation : Causes serious eye damage.
- Respiratory or skin sensitisation : Respiratory sensitisation: May cause allergy or asthma symptoms or breathing difficulties if inhaled.
Skin sensitisation: May cause an allergic skin reaction.
- Germ cell mutagenicity : Not classified based on available information.
- Carcinogenicity : Not classified based on available information.
- Reproductive toxicity : Suspected of damaging fertility or the unborn child.
- STOT - single exposure : Not classified based on available information.
- STOT - repeated exposure : Not classified based on available information.
- Aspiration hazard : Not classified based on available information.
- Further information : Suspected of damaging fertility or the unborn child.

Toxicology data for the components:

Piperazine

Acute toxicity:

PIPERAZINE ANHYDROUS (PIP-ANH)

Version 2

Revision Date 29.06.2016

Print Date 29.08.2016

GB / EN

Acute oral toxicity	: LD50: ca. 2,600 mg/kg Species: Rat Method: OECD Test Guideline 401 Literature data.
Acute inhalation toxicity	: Based on available data, the classification criteria are not met.
Acute dermal toxicity	: LD50: > 5,000 mg/kg Species: Rabbit Method: OECD Test Guideline 402 Literature data.
Skin corrosion/irritation	: Result: Causes burns.
Serious eye damage/eye irritation	: Result: Risk of serious damage to eyes.
Respiratory or skin sensitisation	: Maximisation Test Species: Guinea pig Result: The product is a skin sensitiser, sub-category 1B. Method: OECD Test Guideline 406 Literature data. Result: The product is a respiratory sensitiser, sub-category 1B.
Germ cell mutagenicity	
Genotoxicity in vitro	: Ames test Salmonella typhimurium Result: negative Method: OECD Test Guideline 471 Literature data.
Genotoxicity in vivo	: In vivo micronucleus test Species: Mouse Result: negative Literature data.
Carcinogenicity	: No data available
CMR effectsReproductive toxicity	: Suspected human reproductive toxicant
STOT - single exposure	: Not classified due to data which are conclusive although insufficient for classification.
STOT - repeated exposure	: Not classified due to data which are conclusive although insufficient for classification.
Aspiration hazard	: No data available

PIPERAZINE ANHYDROUS (PIP-ANH)

Version 2

Revision Date 29.06.2016

Print Date 29.08.2016

GB / EN

SECTION 12: ECOLOGICAL INFORMATION

Product information:

Ecotoxicology Assessment

Additional ecological information : An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.
Harmful to aquatic life.

12.1 Toxicity

Components:

Ecotoxicology Assessment

Piperazine

Additional ecological information : None known.

Test result

Piperazine

Toxicity to fish : LC50: > 1,800 mg/l
Exposure time: 96 h
Species: *Poecilia reticulata* (guppy)
Literature data.

Toxicity to daphnia and other aquatic invertebrates : EC50: 21 mg/l
Exposure time: 48 h
Species: *Daphnia magna* (Water flea)
Literature data.

Toxicity to algae : EC10: > 1,000 mg/l
Exposure time: 72 h
Species: *Pseudokirchneriella subcapitata* (green algae)
Method: OECD Test Guideline 201
Literature data.

Toxicity to daphnia and other aquatic invertebrates (Chronic toxicity) : NOEC: 25 mg/l
Exposure time: 21 d
Species: *Daphnia magna* (Water flea)
Method: OECD Test Guideline 211
Literature data.

12.2 Persistence and degradability

Product information:

Biodegradability : Result: Readily biodegradable

Components:

Piperazine

Biodegradability : Result: Readily biodegradable
Method: OECD Test Guideline 301F

12.3 Bioaccumulative potential

Product information:

Bioaccumulation : Bioaccumulation is unlikely.

PIPERAZINE ANHYDROUS (PIP-ANH)

Version 2

Revision Date 29.06.2016

Print Date 29.08.2016

GB / EN

Components:

Piperazine

Bioaccumulation : Not expected considering the low log Pow value.

12.4 Mobility in soil

Product information:

Mobility : The product is miscible in water and readily biodegradable in both water and soil. Accumulation is not expected.

Components:

Piperazine

Mobility : The product is miscible in water and readily biodegradable in both water and soil. Accumulation is not expected.

12.5 Results of PBT and vPvB assessment

Product information:

PBT and vPvB assessment : This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

Components:

Piperazine

PBT and vPvB assessment : This substance is not considered to be a PBT (Persistent, Bioaccumulation, Toxic)
This substance is not considered to be vPvB (very Persistent nor very Bioaccumulating)

12.6 Other adverse effects

Product information:

Biochemical Oxygen Demand (BOD) : No data available

Components:

Piperazine

Biochemical Oxygen Demand (BOD) : No data available

SECTION 13: DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product : The product should not be allowed to enter drains, water courses or the soil.
Do not contaminate ponds, waterways or ditches with chemical or used container.
Hazardous waste
Dispose of contents/container in accordance with local regulation.

Contaminated packaging : Empty remaining contents.
Dispose of as unused product.
Do not burn, or use a cutting torch on, the empty drum.

PIPERAZINE ANHYDROUS (PIP-ANH)

Version 2

Revision Date 29.06.2016

Print Date 29.08.2016

GB / EN

SECTION 14: TRANSPORT INFORMATION

14.1 UN number

ADR : UN 2579
RID : UN 2579
IMDG-Code : UN 2579
IATA-DGR : UN 2579

14.2 Proper shipping name

ADR : PIPERAZINE
RID : PIPERAZINE
IMDG-Code : PIPERAZINE
IATA-DGR : Piperazine

14.3 Transport hazard class

ADR : 8
RID : 8
IMDG-Code : 8
IATA-DGR : 8

14.4 Packing group

ADR
Packing group : III
Classification Code : C8
Hazard Identification Number : 80
Labels : 8
Tunnel restriction code : (E)

RID
Packing group : III
Classification Code : C8
Hazard Identification Number : 80
Labels : 8

IMDG-Code
Packing group : III
Labels : 8
EmS Code : F-A, S-B

IATA-DGR
Packing instruction (cargo aircraft) : 864
Packing instruction (passenger aircraft) : 860
Packing instruction (LQ) : Y845
Packing group : III
Labels : 8

14.5 Environmental hazards

ADR
Environmentally hazardous : no

RID
Environmentally hazardous : no

IMDG-Code
Marine pollutant : no

PIPERAZINE ANHYDROUS (PIP-ANH)

Version 2

Revision Date 29.06.2016

Print Date 29.08.2016

GB / EN

IATA-DGR

Environmentally hazardous : no

14.6 Special precautions for user

Not applicable

14.7 Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code

Not applicable for product as supplied.

SECTION 15: REGULATORY INFORMATION

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

Major Accident Hazard Legislation : Seveso Directive
2012/18/EU
Not applicable

Water contaminating class (Germany) : WGK 1 slightly water endangering

Notification status

TSCA : YES. All chemical substances in this product are either listed on the TSCA Inventory or in compliance with a TSCA Inventory exemption.
DSL : YES. All components of this product are on the Canadian DSL
AICS : YES. On the inventory, or in compliance with the inventory
NZIoC : YES. On the inventory, or in compliance with the inventory
ENCS : YES. On the inventory, or in compliance with the inventory
ISHL : YES. On the inventory, or in compliance with the inventory
KECI : YES. On the inventory, or in compliance with the inventory
PICCS : YES. On the inventory, or in compliance with the inventory
IECSC : YES. On the inventory, or in compliance with the inventory

For explanation of abbreviation see section 16.

Further information

This product is to be considered as a substance according to EU-legislation.

15.2 Chemical safety assessment

Piperazine : A Chemical Safety Assessment has been carried out for this substance.

SECTION 16: OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

H228 : Flammable solid.
H314 : Causes severe skin burns and eye damage.
H317 : May cause an allergic skin reaction.
H318 : Causes serious eye damage.
H334 : May cause allergy or asthma symptoms or breathing

PIPERAZINE ANHYDROUS (PIP-ANH)

Version 2

Revision Date 29.06.2016

Print Date 29.08.2016

GB / EN

difficulties if inhaled.

H361

: Suspected of damaging fertility or the unborn child.

Full text of other abbreviations

ADN - European Agreement concerning the International Carriage of Dangerous Goods by Inland Waterways; ADR - European Agreement concerning the International Carriage of Dangerous Goods by Road; AICS - Australian Inventory of Chemical Substances; ASTM - American Society for the Testing of Materials; bw - Body weight; CLP - Classification Labelling Packaging Regulation; Regulation (EC) No 1272/2008; CMR - Carcinogen, Mutagen or Reproductive Toxicant; DIN - Standard of the German Institute for Standardisation; DSL - Domestic Substances List (Canada); ECHA - European Chemicals Agency; EC-Number - European Community number; ECx - Concentration associated with x% response; ELx - Loading rate associated with x% response; EmS - Emergency Schedule; ENCS - Existing and New Chemical Substances (Japan); ErCx - Concentration associated with x% growth rate response; GHS - Globally Harmonized System; GLP - Good Laboratory Practice; IARC - International Agency for Research on Cancer; IATA - International Air Transport Association; IBC - International Code for the Construction and Equipment of Ships carrying Dangerous Chemicals in Bulk; IC50 - Half maximal inhibitory concentration; ICAO - International Civil Aviation Organization; IECSC - Inventory of Existing Chemical Substances in China; IMDG - International Maritime Dangerous Goods; IMO - International Maritime Organization; ISHL - Industrial Safety and Health Law (Japan); ISO - International Organisation for Standardization; KECI - Korea Existing Chemicals Inventory; LC50 - Lethal Concentration to 50 % of a test population; LD50 - Lethal Dose to 50% of a test population (Median Lethal Dose); MARPOL - International Convention for the Prevention of Pollution from Ships; n.o.s. - Not Otherwise Specified; NO(A)EC - No Observed (Adverse) Effect Concentration; NO(A)EL - No Observed (Adverse) Effect Level; NOELR - No Observable Effect Loading Rate; NZIoC - New Zealand Inventory of Chemicals; OECD - Organization for Economic Co-operation and Development; OPPTS - Office of Chemical Safety and Pollution Prevention; PBT - Persistent, Bioaccumulative and Toxic substance; PICCS - Philippines Inventory of Chemicals and Chemical Substances; (Q)SAR - (Quantitative) Structure Activity Relationship; REACH - Regulation (EC) No 1907/2006 of the European Parliament and of the Council concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals; RID - Regulations concerning the International Carriage of Dangerous Goods by Rail; SADT - Self-Accelerating Decomposition Temperature; SDS - Safety Data Sheet; TCSI - Taiwan Chemical Substance Inventory; TRGS - Technical Rule for Hazardous Substances; TSCA - Toxic Substances Control Act (United States); UN - United Nations; vPvB - Very Persistent and Very Bioaccumulative

Further information

AkzoNobel, Tomorrow's Answers Today are trademarks of the AkzoNobel N.V. For more information on our brands and products please visit: www.akzonobel.com/brands_products

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

PIPERAZINE ANHYDROUS (PIP-ANH)

Version 2

Revision Date 29.06.2016

Print Date 29.08.2016

GB / EN

Annex :

Use as an intermediate and in polymerisation

Industrial formulation

Gas-washer formulations, gas sweetening, scrubber

PIPERAZINE ANHYDROUS (PIP-ANH)

Version 2

Revision Date 29.06.2016

Print Date 29.08.2016

GB / EN

1. Short title of Exposure Scenario: Use as an intermediate and in polymerisation

Main User Groups	: SU 3: Industrial uses: Uses of substances as such or in preparations at industrial sites
Environmental Release Categories	: ERC6a, ERC6c: Industrial use resulting in manufacture of another substance (use of intermediates), Industrial use of monomers for manufacture of thermoplastics
Process categories	: PROC1: Use in closed process, no likelihood of exposure PROC8a: Transfer of substance or preparation (charging/discharging) from/ to vessels/ large containers at non-dedicated facilities PROC8b: Transfer of substance or preparation (charging/discharging) from/ to vessels/ large containers at dedicated facilities PROC15: Use as laboratory reagent

2.1 Contributing scenario controlling environmental exposure for: ERC6a, ERC6c: Industrial use resulting in manufacture of another substance (use of intermediates), Industrial use of monomers for manufacture of thermoplastics

Amount used

Regional use tonnage (tonnes/year):	: 15000 ton(s)/year
Fraction of EU tonnage used in region:	: 20 %
Fraction of Regional tonnage used locally:	: 100 %

Environment factors not influenced by risk management

Flow rate	: 18,000 m ³ /day
Dilution Factor (River)	: 10

Other given operational conditions affecting environmental exposure

Number of emission days per year	: 220
Emission or Release Factor: Air	: 0.01 %
Emission or Release Factor: Water	: 0.7 %
Emission or Release Factor: Soil	: 0.01 %
Remarks	: EU ESD
Remarks	: All industrial surfaces are hard surfaces, and run-off is led to waste., Vent-gases are assumed to be led via scrubbers and scrubber water is led to waste.

Technical conditions and measures / Organizational measures

Exposure time	: Continuous use/release
Water	: Incineration, ion exchange processes

PIPERAZINE ANHYDROUS (PIP-ANH)

Version 2

Revision Date 29.06.2016

Print Date 29.08.2016

GB / EN

Conditions and measures related to municipal sewage treatment plant

Type of Sewage Treatment Plant : Municipal sewage treatment plant
Flow rate of sewage treatment plant effluent : 2,000 m3/day
Percentage removed from waste water : 87 %

2.2 Contributing scenario controlling worker exposure for: PROC1: Use in closed process, no likelihood of exposure

Activity : General exposures, Continuous process, Bulk product storage, (closed systems)

Product characteristics

Concentration of the Substance in Mixture/Article : Covers the percentage of the substance in the product up to 100 % (unless stated differently).
Physical Form (at time of use) : Liquid, vapour pressure < 0.5 kPa

Frequency and duration of use

Exposure duration : > 240 min
Remarks : Inhalation, Dermal
Frequency of use : <= 240 days/year

Human factors not influenced by risk management

Dermal exposure : Palm of one hand (240 cm2)

Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor
Outdoor / Indoor : Outdoor

Technical conditions and measures

Local exhaust ventilation is required at any step if there is opportunity for significant exposure. (Effectiveness (of a measure): 90 %)

Organisational measures to prevent /limit releases, dispersion and exposure

Assumes a good basic standard of occupational hygiene is implemented.

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

Wear chemically resistant gloves (tested to EN374) in combination with intensive management supervision controls. (Effectiveness (of a measure): 99 %)
Wear suitable protective clothing.

2.3 Contributing scenario controlling worker exposure for: PROC8a: Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at non-dedicated facilities

Activity : Equipment maintenance

Product characteristics

Concentration of the Substance in Mixture/Article : Covers the percentage of the substance in the product up to 100 % (unless stated differently).

PIPERAZINE ANHYDROUS (PIP-ANH)

Version 2

Revision Date 29.06.2016

Print Date 29.08.2016

GB / EN

Physical Form (at time of use) : liquid

Amount used

Dermal : 0.2 L/min

Frequency and duration of use

Exposure duration : < 15 min

Remarks : Inhalation

Exposure duration : < 5 min

Remarks : Dermal

Frequency of use : <= 240 days/year

Human factors not influenced by risk management

Dermal exposure : Palms of both hands (480 cm²)

Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

Outdoor / Indoor : Outdoor

Technical conditions and measures

Provide extraction ventilation at points where emissions occur. (Effectiveness (of a measure): 90 %)

Organisational measures to prevent /limit releases, dispersion and exposure

Assumes a good basic standard of occupational hygiene is implemented.

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

Wear chemically resistant gloves (tested to EN374) in combination with intensive management supervision controls. (Effectiveness (of a measure): 99 %)

Wear a respirator conforming to EN140 with Type A filter or better. (Effectiveness (of a measure): 90 %)

Use suitable eye protection., Wear suitable coveralls to prevent exposure to the skin.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice : Ensure that no significant amounts of aerosols or splashes are released during the process

2.4 Contributing scenario controlling worker exposure for: PROC8b: Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at dedicated facilities

Activity : Bulk transfers, Dedicated facility

Product characteristics

Concentration of the Substance : Covers the percentage of the substance in the product up to 100 % (unless stated differently).

Physical Form (at time of use) : liquid

Amount used

Application rate : 0.002 L/min

PIPERAZINE ANHYDROUS (PIP-ANH)

Version 2

Revision Date 29.06.2016

Print Date 29.08.2016

GB / EN

Remarks : Dermal
Application rate : 1000 L/min
Remarks : maximum, Inhalation

Frequency and duration of use

Exposure duration : < 8 h
Remarks : Inhalation
Exposure duration : < 10 min
Remarks : Dermal
Frequency of use : <= 240 days/year

Human factors not influenced by risk management

Dermal exposure : Palms of both hands (480 cm²)

Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor
Ventilation rate per hour : 1
Remarks : Use in large workrooms only.

Technical conditions and measures

Mechanical ventilation

Organisational measures to prevent /limit releases, dispersion and exposure

Assumes a good basic standard of occupational hygiene is implemented.

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

Wear chemically resistant gloves (tested to EN374) in combination with intensive management supervision controls. (Effectiveness (of a measure): 99 %)
Use suitable eye protection., Wear suitable coveralls to prevent exposure to the skin.

2.5 Contributing scenario controlling worker exposure for: PROC15: Use as laboratory reagent

Activity : Laboratory activities
Product characteristics
Concentration of the Substance : Covers the percentage of the substance in the product up to 100 % (unless stated differently).
in Mixture/Article
Physical Form (at time of use) : liquid

Frequency and duration of use

Exposure duration : 15 - 60 min
Remarks : Inhalation, Dermal
Frequency of use : <= 240 days/year

Human factors not influenced by risk management

Dermal exposure : Palm of one hand (240 cm²)

Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

Technical conditions and measures

PIPERAZINE ANHYDROUS (PIP-ANH)

Version 2

Revision Date 29.06.2016

Print Date 29.08.2016

GB / EN

Local exhaust ventilation is required at any step if there is opportunity for significant exposure. (Effectiveness (of a measure): 90 %)

Organisational measures to prevent /limit releases, dispersion and exposure
Assumes a good basic standard of occupational hygiene is implemented.

Conditions and measures related to personal protection, hygiene and health evaluation
Wear chemically resistant gloves (tested to EN374) in combination with intensive management supervision controls. (Effectiveness (of a measure): 99 %)
Use suitable eye protection., Wear suitable coveralls to prevent exposure to the skin.

3. Exposure estimation and reference to its source

Environment

Contributing Scenario	Exposure Assessment Method	Specific conditions	Compartment	Value	Level of Exposure	RCR
ERC6a	TGD Excel v. 1.24		Fresh water		0.604 mg/L	0.483
			Fresh water sediment		0.473 mg/kg wet weight	0.483
			Marine water		0.0604 mg/L	0.465
			Marine sediment		0.0473 mg/kg wet weight	0.473
			Sewage treatment plant		6.05 mg/L	0.112
			Soil		< 0.0001 mg/kg wet weight	< 0.0001
			Grassland		< 0.0001 mg/kg wet weight	< 0.0001

Workers

Contributing Scenario	Exposure Assessment Method	Specific conditions	Value	Level of Exposure	RCR
PROC1	ECETOC TRA		Long term inhalation	0.035 mg/m3	0.358
			Long term dermal	0.0003 mg/kg bw/day	0.024
PROC8a	ECETOC TRA	Product sampling.	Long term inhalation	0.045 mg/m3	0.45

PIPERAZINE ANHYDROUS (PIP-ANH)

Version 2

Revision Date 29.06.2016

Print Date 29.08.2016

GB / EN

	RISKOFDERM		Long term dermal	0.0013 mg/kg bw/day	0.098
PROC8b	ART		Long term inhalation	0.047 mg/m ³	0.47
	RISKOFDERM		Long term dermal	0.004 mg/kg bw/day	0.286
PROC15	Based on measurement s.		Long term inhalation	< 0.03 mg/m ³	< 0.3
	ECETOC TRA		Long term dermal	0.0003 mg/kg bw/day	0.024

ERC6a: Industrial use resulting in manufacture of another substance (use of intermediates)

ERC6c: Industrial use of monomers for manufacture of thermoplastics

PROC1: Use in closed process, no likelihood of exposure

PROC15: Use as laboratory reagent

PROC8a: Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at non-dedicated facilities

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

4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the Exposure Scenario

For further information, please also consult our Internet site: Downstream Users
http://guidance.echa.europa.eu/downstream_users_en.htm

PIPERAZINE ANHYDROUS (PIP-ANH)

Version 2

Revision Date 29.06.2016

Print Date 29.08.2016

GB / EN

1. Short title of Exposure Scenario: Industrial formulation

Main User Groups : SU 3: Industrial uses: Uses of substances as such or in preparations at industrial sites

Environmental Release Categories : ERC2: Formulation of preparations

Process categories : PROC1: Use in closed process, no likelihood of exposure
PROC8a: Transfer of substance or preparation (charging/discharging) from/ to vessels/ large containers at non-dedicated facilities
PROC8b: Transfer of substance or preparation (charging/discharging) from/ to vessels/ large containers at dedicated facilities
PROC15: Use as laboratory reagent

2.1 Contributing scenario controlling environmental exposure for: ERC1: Manufacture of substances

Amount used

Regional use tonnage (tonnes/year): : 1600 ton(s)/year

Fraction of EU tonnage used in region: : 100 %

Fraction of Regional tonnage used locally: : 100 %

Environment factors not influenced by risk management

Flow rate : 18,000 m³/day

Dilution Factor (River) : 10

Other given operational conditions affecting environmental exposure

Number of emission days per year : 220

Emission or Release Factor: Air : 2.5 %

Emission or Release Factor: Water : 2 %

Emission or Release Factor: Soil : 0.01 %

Technical conditions and measures / Organizational measures

Exposure time : Continuous use/release

Compartment : Fresh water, Fresh water sediment, Marine water, Marine sediment, Soil, Grassland, Sewage treatment plant

Conditions and measures related to municipal sewage treatment plant

Type of Sewage Treatment Plant : Municipal sewage treatment plant

Flow rate of sewage treatment plant effluent : 2,000 m³/day

Percentage removed from waste : 87 %

PIPERAZINE ANHYDROUS (PIP-ANH)

Version 2

Revision Date 29.06.2016

Print Date 29.08.2016

GB / EN

water

2.2 Contributing scenario controlling worker exposure for: PROC1: Use in closed process, no likelihood of exposure

Activity	: General exposures, Continuous process, Bulk product storage, (closed systems)
Product characteristics	
Concentration of the Substance in Mixture/Article	: Covers the percentage of the substance in the product up to 100 % (unless stated differently).
Physical Form (at time of use)	: Liquid, vapour pressure < 0.5 kPa
Frequency and duration of use	
Exposure duration	: > 240 min
Remarks	: Inhalation, Dermal
Frequency of use	: <= 240 days/year
Human factors not influenced by risk management	
Dermal exposure	: Palm of one hand (240 cm ²)
Other operational conditions affecting workers exposure	
Outdoor / Indoor	: Indoor
Outdoor / Indoor	: Outdoor
Technical conditions and measures	
Local exhaust ventilation is required at any step if there is opportunity for significant exposure. (Effectiveness (of a measure): 90 %)	

Organisational measures to prevent /limit releases, dispersion and exposure
Assumes a good basic standard of occupational hygiene is implemented.

Conditions and measures related to personal protection, hygiene and health evaluation
Wear chemically resistant gloves (tested to EN374) in combination with intensive management supervision controls. (Effectiveness (of a measure): 99 %)
Wear suitable protective clothing.

2.3 Contributing scenario controlling worker exposure for: PROC8a: Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at non-dedicated facilities

Activity	: Equipment maintenance
Product characteristics	
Concentration of the Substance in Mixture/Article	: Covers the percentage of the substance in the product up to 100 % (unless stated differently).
Physical Form (at time of use)	: liquid
Amount used	
Dermal	: 0.2 L/min

PIPERAZINE ANHYDROUS (PIP-ANH)

Version 2

Revision Date 29.06.2016

Print Date 29.08.2016

GB / EN

Frequency and duration of use

Exposure duration : < 15 min
Remarks : Inhalation
Exposure duration : < 5 min
Remarks : Dermal
Frequency of use : <= 240 days/year

Human factors not influenced by risk management

Dermal exposure : Palms of both hands (480 cm²)

Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor
Outdoor / Indoor : Outdoor

Technical conditions and measures

Provide extraction ventilation at points where emissions occur. (Effectiveness (of a measure): 90 %)

Organisational measures to prevent /limit releases, dispersion and exposure

Assumes a good basic standard of occupational hygiene is implemented.

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

Wear chemically resistant gloves (tested to EN374) in combination with intensive management supervision controls. (Effectiveness (of a measure): 99 %)
Wear a respirator conforming to EN140 with Type A filter or better. (Effectiveness (of a measure): 90 %)
Use suitable eye protection., Wear suitable coveralls to prevent exposure to the skin.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice : Ensure that no significant amounts of aerosols or splashes are released during the process

2.4 Contributing scenario controlling worker exposure for: PROC8b: Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at dedicated facilities

Activity : Bulk transfers, Dedicated facility
Product characteristics
Concentration of the Substance in Mixture/Article : Covers the percentage of the substance in the product up to 100 % (unless stated differently).
Physical Form (at time of use) : liquid
Amount used
Application rate : 0.002 L/min
Remarks : Dermal
Application rate : 1000 L/min
Remarks : maximum, Inhalation

Frequency and duration of use

PIPERAZINE ANHYDROUS (PIP-ANH)

Version 2

Revision Date 29.06.2016

Print Date 29.08.2016

GB / EN

Exposure duration : < 8 h
Remarks : Inhalation
Exposure duration : < 10 min
Remarks : Dermal
Frequency of use : <= 240 days/year

Human factors not influenced by risk management

Dermal exposure : Palms of both hands (480 cm²)

Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor
Ventilation rate per hour : 1
Remarks : Use in large workrooms only.

Technical conditions and measures

Mechanical ventilation

Organisational measures to prevent /limit releases, dispersion and exposure

Assumes a good basic standard of occupational hygiene is implemented.

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

Wear chemically resistant gloves (tested to EN374) in combination with intensive management supervision controls. (Effectiveness (of a measure): 99 %)
Use suitable eye protection., Wear suitable coveralls to prevent exposure to the skin.

2.5 Contributing scenario controlling worker exposure for: PROC15: Use as laboratory reagent

Activity : Laboratory activities
Product characteristics
Concentration of the Substance : Covers the percentage of the substance in the product up to 100 % (unless stated differently).
Physical Form (at time of use) : liquid

Frequency and duration of use

Exposure duration : 15 - 60 min
Remarks : Inhalation, Dermal
Frequency of use : <= 240 days/year

Human factors not influenced by risk management

Dermal exposure : Palm of one hand (240 cm²)

Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

Technical conditions and measures

Local exhaust ventilation is required at any step if there is opportunity for significant exposure. (Effectiveness (of a measure): 90 %)

Organisational measures to prevent /limit releases, dispersion and exposure

PIPERAZINE ANHYDROUS (PIP-ANH)

Version 2

Revision Date 29.06.2016

Print Date 29.08.2016

GB / EN

Assumes a good basic standard of occupational hygiene is implemented.

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

Wear chemically resistant gloves (tested to EN374) in combination with intensive management supervision controls. (Effectiveness (of a measure): 99 %)

Use suitable eye protection., Wear suitable coveralls to prevent exposure to the skin.

3. Exposure estimation and reference to its source

Environment

Contributing Scenario	Exposure Assessment Method	Specific conditions	Compartment	Value	Level of Exposure	RCR
ERC2	TGD Excel v. 1.24		Fresh water		0.921 mg/L	0.737
			Fresh water sediment		0.72 mg/kg wet weight	0.735
			Marine water		0.0921 mg/L	0.708
			Marine sediment		0.072 mg/kg wet weight	0.72
			Sewage treatment plant		9.18 mg/L	0.17
			Soil		0.0058 mg/kg wet weight	0.0007
			Grassland		0.0111 mg/kg wet weight	0.0013

Workers

Contributing Scenario	Exposure Assessment Method	Specific conditions	Value	Level of Exposure	RCR
PROC1	ECETOC TRA		Long term inhalation	0.035 mg/m ³	0.358
			Long term dermal	0.0003 mg/kg bw/day	0.024
PROC8a	ECETOC TRA	Product sampling.	Long term inhalation	0.045 mg/m ³	0.45
	RISKOFDERM		Long term dermal	0.0013 mg/kg bw/day	0.098
PROC8b	ART		Long term inhalation	0.047 mg/m ³	0.47
	RISKOFDERM		Long term	0.004 mg/kg	0.286

PIPERAZINE ANHYDROUS (PIP-ANH)

Version 2

Revision Date 29.06.2016

Print Date 29.08.2016

GB / EN

PROC15	Based on measurement s.		dermal Long term inhalation	bw/day < 0.03 mg/m ³	< 0.3
	ECETOC TRA		Long term dermal	0.0003 mg/kg bw/day	0.024

ERC2: Formulation of preparations

PROC1: Use in closed process, no likelihood of exposure

PROC15: Use as laboratory reagent

PROC8a: Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at non-dedicated facilities

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

4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the Exposure Scenario

For further information, please also consult our Internet site: Downstream Users
http://guidance.echa.europa.eu/downstream_users_en.htm

PIPERAZINE ANHYDROUS (PIP-ANH)

Version 2

Revision Date 29.06.2016

Print Date 29.08.2016

GB / EN

1. Short title of Exposure Scenario: Gas-washer formulations, gas sweetening, scrubber

Main User Groups : SU 3: Industrial uses: Uses of substances as such or in preparations at industrial sites
Environmental Release Categories : ERC7: Industrial use of substances in closed systems
Process categories : PROC1: Use in closed process, no likelihood of exposure
PROC8b: Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at dedicated facilities

2.1 Contributing scenario controlling environmental exposure for: ERC7: Industrial use of substances in closed systems

Amount used

Regional use tonnage (tonnes/year) : 2000 ton(s)/year
Fraction of EU tonnage used in region: : 100 %
Fraction of Regional tonnage used locally: : 100 %

Environment factors not influenced by risk management

Flow rate : 18,000 m³/day
Dilution Factor (River) : 10

Other given operational conditions affecting environmental exposure

Number of emission days per year : 35
Emission or Release Factor: Air : 0.1 %
Emission or Release Factor: Water : 100 %
Emission or Release Factor: Soil : 0 %
Additional Risk Management : 99.8 %
Measures for water
Remarks : Incineration

Technical conditions and measures / Organizational measures

Exposure time : Continuous use/release
Compartment : Fresh water, Fresh water sediment, Marine water, Marine sediment, Soil, Grassland, Sewage treatment plant
Water : Incineration

Conditions and measures related to municipal sewage treatment plant

Type of Sewage Treatment Plant : Municipal sewage treatment plant
Flow rate of sewage treatment plant effluent : 2,000 m³/day

PIPERAZINE ANHYDROUS (PIP-ANH)

Version 2

Revision Date 29.06.2016

Print Date 29.08.2016

GB / EN

Percentage removed from waste : 87 %
water

2.2 Contributing scenario controlling worker exposure for: PROC1: Use in closed process, no likelihood of exposure

Activity : General exposures, Continuous process, Bulk product storage, (closed systems)

Product characteristics

Concentration of the Substance in Mixture/Article : Covers percentage substance in the product up to 60%

Physical Form (at time of use) : liquid

Frequency and duration of use

Exposure duration : > 240 min

Remarks : Inhalation, Dermal

Frequency of use : <= 240 days/year

Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

Outdoor / Indoor : Outdoor

Organisational measures to prevent /limit releases, dispersion and exposure
Assumes a good basic standard of occupational hygiene is implemented.

Conditions and measures related to personal protection, hygiene and health evaluation
Wear chemically resistant gloves (tested to EN374) in combination with intensive management supervision controls. (Effectiveness (of a measure): 99 %)
Use suitable eye protection., Wear suitable coveralls to prevent exposure to the skin.

2.3 Contributing scenario controlling worker exposure for: PROC8b: Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at dedicated facilities

Activity : Bulk transfers, Dedicated facility

Product characteristics

Concentration of the Substance in Mixture/Article : Covers the percentage of the substance in the product up to 100 % (unless stated differently).

Physical Form (at time of use) : liquid

Amount used

Application rate : 0.002 L/min

Remarks : Dermal

Application rate : 1000 L/min

Remarks : maximum, Inhalation

Frequency and duration of use

Exposure duration : < 8 h

Remarks : Inhalation

Exposure duration : < 10 min

PIPERAZINE ANHYDROUS (PIP-ANH)

Version 2

Revision Date 29.06.2016

Print Date 29.08.2016

GB / EN

Remarks : Dermal
Frequency of use : <= 240 days/year

Human factors not influenced by risk management

Dermal exposure : Palms of both hands (480 cm²)

Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor
Ventilation rate per hour : 1
Remarks : Use in large workrooms only.

Technical conditions and measures

Mechanical ventilation

Organisational measures to prevent /limit releases, dispersion and exposure

Assumes a good basic standard of occupational hygiene is implemented.

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

Wear chemically resistant gloves (tested to EN374) in combination with intensive management supervision controls. (Effectiveness (of a measure): 99 %)
Use suitable eye protection., Wear suitable coveralls to prevent exposure to the skin.

3. Exposure estimation and reference to its source

Environment

Contributing Scenario	Exposure Assessment Method	Specific conditions	Compartment	Value	Level of Exposure	RCR
ERC7	TGD Excel v. 1.24		Fresh water		0.69 mg/L	0.552
			Fresh water sediment		0.54 mg/kg wet weight	0.551
			Marine water		0.069 mg/L	0.551
			Marine sediment		0.054 mg/kg wet weight	0.54
			Sewage treatment plant		6.83 mg/L	0.127
			Soil		0.0003 mg/kg wet weight	< 0.0001
			Grassland		0.0006 mg/kg wet weight	< 0.0001

Workers

PIPERAZINE ANHYDROUS (PIP-ANH)

Version 2

Revision Date 29.06.2016

Print Date 29.08.2016

GB / EN

Contributing Scenario	Exposure Assessment Method	Specific conditions	Value	Level of Exposure	RCR
PROC1	ECETOC TRA		Long term inhalation	0.015 mg/m ³	0.15
			Long term dermal	0.002 mg/kg bw/day	0.147
PROC8b	ART		Long term inhalation	0.047 mg/m ³	0.47
	RISKOFDERM		Long term dermal	0.004 mg/kg bw/day	0.286

ERC7: Industrial use of substances in closed systems

PROC1: Use in closed process, no likelihood of exposure

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

4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the Exposure Scenario

For further information, please also consult our Internet site: Downstream Users
http://guidance.echa.europa.eu/downstream_users_en.htm