

SAFETY DATA SHEET



Piperazine anhydrous, PIP

Section 1. Identification

GHS product identifier : Piperazine anhydrous, PIP
Chemical name : piperazine
CAS number : 110-85-0
Other means of identification : -

Product use : Intermediate. Chemical synthesis. Pharmaceuticals.

Supplier's details : Delamine B.V.
 Barchman Wuytierslaan 10
 3818 LH Amersfoort
 Netherlands
 Telephone number: +31-334224600

e-mail address of person responsible for this SDS : sds.delamine@delamine.com

Emergency telephone number (with hours of operation) : GBK/Infotrac ID 104075 : International (001) 352 323 3500 (24 h)

Section 2. Hazards identification

OSHA/HCS status : This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).

Classification of the substance or mixture : FLAMMABLE SOLIDS - Category 1
 SKIN CORROSION - Category 1B
 SERIOUS EYE DAMAGE - Category 1
 RESPIRATORY SENSITIZATION - Category 1B
 SKIN SENSITIZATION - Category 1B
 TOXIC TO REPRODUCTION (Fertility) - Category 2
 TOXIC TO REPRODUCTION (Unborn child) - Category 2

GHS label elements

Hazard pictograms :



Signal word : Danger

Hazard statements : Flammable solid.
 Causes severe skin burns and eye damage.
 May cause allergy or asthma symptoms or breathing difficulties if inhaled.
 May cause an allergic skin reaction.
 Suspected of damaging fertility or the unborn child.

Precautionary statements

Prevention : Obtain special instructions before use.
 Do not handle until all safety precautions have been read and understood.
 Wear protective gloves. Wear eye or face protection. Wear protective clothing.
 Wear respiratory protection.
 Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
 Avoid breathing dust.
 Wash hands thoroughly after handling.

Section 2. Hazards identification

- Contaminated work clothing must not be allowed out of the workplace.
- Response** : IF exposed or concerned: Get medical attention.
 IF INHALED: If breathing is difficult, remove person to fresh air and keep comfortable for breathing. Immediately call a POISON CENTER or physician.
 If experiencing respiratory symptoms: Call a POISON CENTER or physician.
 IF SWALLOWED: Immediately call a POISON CENTER or physician. Rinse mouth.
 Do NOT induce vomiting.
 IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water or shower. Wash contaminated clothing before reuse. Immediately call a POISON CENTER or physician.
 If skin irritation or rash occurs: Get medical attention.
 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 or physician.
- Storage** : Store locked up.
- Disposal** : Dispose of contents and container in accordance with all local, regional, national and international regulations.
- Hazards not otherwise classified** : None known.

Section 3. Composition/information on ingredients

- Substance/mixture** : Substance
- Chemical name** : piperazine
- Other means of identification** : -

CAS number/other identifiers

- CAS number** : 110-85-0

Ingredient name	%	CAS number
piperazine	100	110-85-0

Any concentration shown as a range is to protect confidentiality or is due to batch variation.

There are no additional ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health or the environment and hence require reporting in this section.

Occupational exposure limits, if available, are listed in Section 8.

Section 4. First aid measures

Description of necessary first aid measures

- Eye contact** : Get medical attention immediately. Call a poison center or physician. Immediately flush eyes with plenty of water, occasionally lifting the upper and lower eyelids. Check for and remove any contact lenses. Continue to rinse for at least 10 minutes. Chemical burns must be treated promptly by a physician.
- Inhalation** : Get medical attention immediately. Call a poison center or physician. Remove victim to fresh air and keep at rest in a position comfortable for breathing. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband. In case of inhalation of decomposition products in a fire, symptoms may be delayed. The exposed person may need to be kept under medical surveillance for 48 hours. In the event of any complaints or symptoms, avoid further exposure.

Section 4. First aid measures

- Skin contact** : Get medical attention immediately. Call a poison center or physician. Wash with plenty of soap and water. Remove contaminated clothing and shoes. Wash contaminated clothing thoroughly with water before removing it, or wear gloves. Continue to rinse for at least 10 minutes. Chemical burns must be treated promptly by a physician. In the event of any complaints or symptoms, avoid further exposure. Wash clothing before reuse. Clean shoes thoroughly before reuse.
- Ingestion** : Get medical attention immediately. Call a poison center or physician. Wash out mouth with water. Remove dentures if any. Remove victim to fresh air and keep at rest in a position comfortable for breathing. If material has been swallowed and the exposed person is conscious, give small quantities of water to drink. Stop if the exposed person feels sick as vomiting may be dangerous. Do not induce vomiting unless directed to do so by medical personnel. If vomiting occurs, the head should be kept low so that vomit does not enter the lungs. Chemical burns must be treated promptly by a physician. Never give anything by mouth to an unconscious person. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.

Most important symptoms/effects, acute and delayed

Potential acute health effects

- Eye contact** : Causes serious eye damage.
- Inhalation** : May cause allergy or asthma symptoms or breathing difficulties if inhaled.
- Skin contact** : Causes severe burns. May cause an allergic skin reaction.
- Ingestion** : No known significant effects or critical hazards.

Over-exposure signs/symptoms

- Eye contact** : Adverse symptoms may include the following:
pain
watering
redness
- Inhalation** : Adverse symptoms may include the following:
wheezing and breathing difficulties
asthma
reduced fetal weight
increase in fetal deaths
skeletal malformations
- Skin contact** : Adverse symptoms may include the following:
pain or irritation
redness
blistering may occur
reduced fetal weight
increase in fetal deaths
skeletal malformations
- Ingestion** : Adverse symptoms may include the following:
stomach pains
reduced fetal weight
increase in fetal deaths
skeletal malformations

Indication of immediate medical attention and special treatment needed, if necessary

- Notes to physician** : In case of inhalation of decomposition products in a fire, symptoms may be delayed. The exposed person may need to be kept under medical surveillance for 48 hours.
- Specific treatments** : No specific treatment.
- Protection of first-aiders** : No action shall be taken involving any personal risk or without suitable training. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Wash contaminated clothing thoroughly with water before removing it, or wear gloves.

See toxicological information (Section 11)

Section 5. Fire-fighting measures

Extinguishing media

Suitable extinguishing media : Use dry chemical, CO₂, water spray (fog) or foam. Dry sand or other suitable absorbent. Use an extinguishing agent suitable for the surrounding fire.

Unsuitable extinguishing media : Do not use water jet.

Specific hazards arising from the chemical : Flammable solid.

Hazardous thermal decomposition products : Decomposition products may include the following materials:
carbon dioxide
carbon monoxide
nitrogen oxides

Special protective actions for fire-fighters : Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training. Move containers from fire area if this can be done without risk. Use water spray to keep fire-exposed containers cool.

Special protective equipment for fire-fighters : Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

Remark : Highly flammable.

Remark (Explosibility) : Not considered to be a product presenting a risk of explosion.

Section 6. Accidental release measures

Personal precautions, protective equipment and emergency procedures

For non-emergency personnel : No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilled material. Shut off all ignition sources. No flares, smoking or flames in hazard area. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment.

For emergency responders : If specialized clothing is required to deal with the spillage, take note of any information in Section 8 on suitable and unsuitable materials. See also the information in "For non-emergency personnel".

Environmental precautions : Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air).

Methods and materials for containment and cleaning up

Small spill : Move containers from spill area. Use spark-proof tools and explosion-proof equipment. Avoid dust generation. Do not dry sweep. Vacuum dust with equipment fitted with a HEPA filter and place in a closed, labeled waste container. Place spilled material in a designated, labeled waste container. Dispose of via a licensed waste disposal contractor.

Large spill : Move containers from spill area. Use spark-proof tools and explosion-proof equipment. Approach release from upwind. Prevent entry into sewers, water courses, basements or confined areas. Avoid dust generation. Do not dry sweep. Vacuum dust with equipment fitted with a HEPA filter and place in a closed, labeled waste container. Dispose of via a licensed waste disposal contractor. Note: see Section 1 for emergency contact information and Section 13 for waste disposal.

Section 7. Handling and storage

Precautions for safe handling

- Protective measures** : Put on appropriate personal protective equipment (see Section 8). Persons with a history of skin sensitization problems or asthma, allergies or chronic or recurrent respiratory disease should not be employed in any process in which this product is used. Avoid exposure - obtain special instructions before use. Avoid exposure during pregnancy. Do not handle until all safety precautions have been read and understood. Do not get in eyes or on skin or clothing. Do not ingest. Use only with adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Do not enter storage areas and confined spaces unless adequately ventilated. Keep in the original container or an approved alternative made from a compatible material, kept tightly closed when not in use. Store and use away from heat, sparks, open flame or any other ignition source. Use only non-sparking tools. Empty containers retain product residue and can be hazardous. Do not reuse container.
- Advice on general occupational hygiene** : Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. See also Section 8 for additional information on hygiene measures.
- Conditions for safe storage, including any incompatibilities** : Store in accordance with local regulations. Store in a segregated and approved area. Store in original container protected from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see Section 10) and food and drink. Store locked up. Eliminate all ignition sources. Separate from oxidizing materials. Keep container tightly closed and sealed until ready for use. Containers that have been opened must be carefully resealed and kept upright to prevent leakage. Do not store in unlabeled containers. Use appropriate containment to avoid environmental contamination.

Section 8. Exposure controls/personal protection

Control parameters

Occupational exposure limits

Ingredient name	Exposure limits
piperazine	ACGIH TLV (United States, 3/2017). Skin sensitizer. Inhalation sensitizer. TWA: 0.03 ppm, (as piperazine) 8 hours. Form: Inhalable fraction and vapor TWA: 0.1 mg/m ³ , (as piperazine) 8 hours. Form: Inhalable fraction and vapor

- Appropriate engineering controls** : Use only with adequate ventilation. If user operations generate dust, fumes, gas, vapor or mist, use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits. The engineering controls also need to keep gas, vapor or dust concentrations below any lower explosive limits. Use explosion-proof ventilation equipment.
- Environmental exposure controls** : Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.

Individual protection measures

- Hygiene measures** : 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. Contaminated work clothing should not be allowed out of the workplace. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.

Section 8. Exposure controls/personal protection

- Eye/face protection** : Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists, gases or dusts. If contact is possible, the following protection should be worn, unless the assessment indicates a higher degree of protection: chemical splash goggles and/or face shield. If inhalation hazards exist, a full-face respirator may be required instead.
- Skin protection**
- Hand protection** : Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary. Considering the parameters specified by the glove manufacturer, check during use that the gloves are still retaining their protective properties. It should be noted that the time to breakthrough for any glove material may be different for different glove manufacturers. In the case of mixtures, consisting of several substances, the protection time of the gloves cannot be accurately estimated.
- Recommended: > 8 hours (breakthrough time): butyl rubber (thickness ≥ 0.3 mm), nitrile rubber (thickness ≥ 0.4 mm), Chloroprene (thickness ≥ 0.65 mm).
- Body protection** : Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product. When there is a risk of ignition from static electricity, wear anti-static protective clothing. For the greatest protection from static discharges, clothing should include anti-static overalls, boots and gloves.
- Other skin protection** : Appropriate footwear and any additional skin protection measures should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.
- Respiratory protection** : Use a properly fitted, particulate filter respirator complying with an approved standard if a risk assessment indicates this is necessary. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator.

Recommended: Ensure an MSHA/NIOSH-approved respirator or equivalent is used.

Section 9. Physical and chemical properties

Appearance

- Physical state** : Solid. [Deliquescent crystals.]
- Color** : Colorless.
- Odor** : Amine-like. [Slight]
- Odor threshold** : Not available.
- pH** : 12 [Conc. (% w/w): 1%]
- Melting point** : 106°C (222.8°F)
- Boiling point** : 147°C (296.6°F)
- Flash point** : Not applicable.
- Evaporation rate** : Not available.
- Flammability (solid, gas)** : Highly flammable.
- Lower and upper explosive (flammable) limits** : Lower: 4%
Upper: 14%
- Vapor pressure** : 0.039 kPa (0.292525 mm Hg) [room temperature]
- Vapor density** : 3 [Air = 1]
- Relative density** : Not available.
- Density** : 1.1 g/cm³
- Solubility** : Not available.
- Solubility in water** : 150 g/l
- Partition coefficient: n-octanol/water** : -1.24
- Auto-ignition temperature** : 320°C (608°F)
- Decomposition temperature** : Not available.

Section 9. Physical and chemical properties

- Viscosity** : Not available.
- Explosive properties** : Not considered to be a product presenting a risk of explosion.
- Oxidizing properties** : None.

Section 10. Stability and reactivity

- Reactivity** : No specific test data related to reactivity available for this product or its ingredients.
- Chemical stability** : The product is stable.
- Possibility of hazardous reactions** : Under normal conditions of storage and use, hazardous reactions will not occur.
Under normal conditions of storage and use, hazardous polymerization will not occur.
- Conditions to avoid** : Avoid dust generation.
Keep away from heat, sparks and flame. Do not smoke.
- Incompatible materials** : Reactive or incompatible with the following materials: oxidizing materials, metals, acids.
Chlorinated hydrocarbon.
- Hazardous decomposition products** : Under normal conditions of storage and use, hazardous decomposition products should not be produced.

Section 11. Toxicological information

Information on toxicological effects

Acute toxicity

Product/ingredient name	Result	Species	Dose	Exposure
piperazine	LD50 Oral	Rat - Male, Female	2600 mg/kg	-

- Conclusion/Summary** : Based on available data, the classification criteria are not met.

Irritation/Corrosion

Product/ingredient name	Result	Species	Score	Exposure	Observation
piperazine	Skin - Visible necrosis	Rabbit	-	1 hours	14 hours

Conclusion/Summary

- Skin** : Causes severe burns.
- Eyes** : Causes serious eye damage.

Sensitization

Product/ingredient name	Route of exposure	Species	Result
piperazine	skin	Guinea pig	Sensitizing
	Respiratory	Human	Sensitizing

Conclusion/Summary

- Skin** : May cause an allergic skin reaction.
- Respiratory** : May cause allergy or asthma symptoms or breathing difficulties if inhaled.

Mutagenicity

Product/ingredient name	Test	Experiment	Result
piperazine	OECD 471	Experiment: In vitro Subject: Bacteria	Negative
	-	Experiment: In vivo Subject: Mammalian-Animal	Negative (similar material)

Section 11. Toxicological information

Conclusion/Summary : Based on available data, the classification criteria are not met.

Carcinogenicity

Conclusion/Summary : No known significant effects or critical hazards.

Reproductive toxicity

Product/ingredient name	Maternal toxicity	Fertility	Developmental toxin	Species	Dose	Exposure
piperazine	-	Positive (similar material)	-	Rat	Oral: 125 mg/kg NOAEL	-
	Positive (similar material)	-	Positive (similar material)	Rabbit	Oral: 42 mg/kg NOAEL	-

Conclusion/Summary : Suspected of damaging fertility or the unborn child.

Teratogenicity

Conclusion/Summary : No known significant effects or critical hazards.

Specific target organ toxicity (single exposure)

Not available.

Specific target organ toxicity (repeated exposure)

Not available.

Aspiration hazard

Not available.

Information on the likely routes of exposure : Not available.

Potential acute health effects

- Eye contact** : Causes serious eye damage.
- Inhalation** : May cause allergy or asthma symptoms or breathing difficulties if inhaled.
- Skin contact** : Causes severe burns. May cause an allergic skin reaction.
- Ingestion** : No known significant effects or critical hazards.

Symptoms related to the physical, chemical and toxicological characteristics

- Eye contact** : Adverse symptoms may include the following:
pain
watering
redness
- Inhalation** : Adverse symptoms may include the following:
wheezing and breathing difficulties
asthma
reduced fetal weight
increase in fetal deaths
skeletal malformations
- Skin contact** : Adverse symptoms may include the following:
pain or irritation
redness
blistering may occur
reduced fetal weight
increase in fetal deaths
skeletal malformations
- Ingestion** : Adverse symptoms may include the following:
stomach pains
reduced fetal weight
increase in fetal deaths
skeletal malformations

Section 11. Toxicological information

Delayed and immediate effects and also chronic effects from short and long term exposure

Short term exposure

Potential immediate effects : Not available.

Potential delayed effects : Not available.

Long term exposure

Potential immediate effects : Not available.

Potential delayed effects : Not available.

Potential chronic health effects

Product/ingredient name	Result	Species	Dose	Exposure
piperazine	Sub-chronic NOAEL Oral (similar material)	Rat - Male, Female	627 mg/kg	90 days; 7 days per week

Conclusion/Summary : Based on available data, the classification criteria are not met.

General : Once sensitized, a severe allergic reaction may occur when subsequently exposed to very low levels.

Carcinogenicity : No known significant effects or critical hazards.

Mutagenicity : No known significant effects or critical hazards.

Teratogenicity : Suspected of damaging the unborn child.

Developmental effects : No known significant effects or critical hazards.

Fertility effects : Suspected of damaging fertility.

Numerical measures of toxicity

Acute toxicity estimates

Not available.

Section 12. Ecological information

Toxicity

Product/ingredient name	Result	Species	Exposure
piperazine	Acute EC50 21 mg/l	Daphnia - Daphnia magna	48 hours
	Acute LC50 >1800 mg/l	Fish - Poecilia reticulata	96 hours
	Chronic NOEC >1000 mg/l	Algae	72 hours
	Chronic NOEC 12.5 mg/l	Daphnia - Daphnia magna	21 days

Conclusion/Summary : Based on available data, the classification criteria are not met.

Persistence and degradability

Product/ingredient name	Test	Result	Dose	Inoculum
piperazine	OECD 301F	70 % - Readily - 28 days	-	-

Conclusion/Summary : Readily biodegradable.

Product/ingredient name	Aquatic half-life	Photolysis	Biodegradability
piperazine	-	-	Readily

Bioaccumulative potential

Section 12. Ecological information

Product/ingredient name	LogP _{ow}	BCF	Potential
piperazine	-1.24	-	low

Mobility in soil

Soil/water partition coefficient (K_{oc}) : 507 to 2233







Mobility : Low mobility in soil predicted, based on the log K_{oc} value.

Other adverse effects : No known significant effects or critical hazards.

Section 13. Disposal considerations

Disposal methods : The generation of waste should be avoided or minimized wherever possible. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Waste should not be disposed of untreated to the sewer unless fully compliant with the requirements of all authorities with jurisdiction. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible. This material and its container must be disposed of in a safe way. Care should be taken when handling emptied containers that have not been cleaned or rinsed out. Empty containers or liners may retain some product residues. Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.

Section 14. Transport information

	DOT Classification	TDG Classification	Mexico Classification	ADR/RID	IMDG	IATA
UN number	UN2579	UN2579	UN2579	UN2579	UN2579	UN2579
UN proper shipping name	Piperazine	PIPERAZINE	PIPERAZINA	PIPERAZINE	PIPERAZINE	Piperazine
Transport hazard class(es)	8	8	8	8	8	8
Label						
Packing group	III	III	III	III	III	III
Environmental hazards	No.	No.	No.	No.	Marine Pollutant: No	No.
Additional information	<p>Limited quantity Yes.</p> <p>Packaging instruction Passenger aircraft Quantity limitation: 25 kg</p> <p>Cargo aircraft Quantity limitation: 100</p>	<p>Product classified as per the following sections of the Transportation of Dangerous Goods Regulations: 2.40-2.42 (Class 8).</p> <p>Explosive Limit and</p>	-	<p>Hazard identification number 80</p> <p>Limited quantity 5 kg</p> <p>Tunnel code (E)</p>	<p>Emergency schedules (EmS) F-A, S-B</p>	<p>Passenger and Cargo Aircraft Quantity limitation: 25 kg Packaging instructions: 860</p> <p>Cargo Aircraft Only Quantity limitation: 100 kg Packaging instructions:</p>

Section 14. Transport information

	kg	Limited Quantity Index 5				864 Limited Quantities - Passenger Aircraft Quantity limitation: 5 kg Packaging instructions: Y845 Special provisions A803
	Special provisions IB8, IP3, T1, TP33	Passenger Carrying Road or Rail Index 25				

Special precautions for user : **Transport within user's premises:** always transport in closed containers that are upright and secure. Ensure that persons transporting the product know what to do in the event of an accident or spillage.

Transport in bulk according to Annex II of MARPOL and the IBC Code : Not available.

Section 15. Regulatory information

U.S. Federal regulations : **TSCA 8(a) CDR Exempt/Partial exemption:** Not determined
United States inventory (TSCA 8b): This material is listed or exempted.

Clean Air Act Section 112 (b) Hazardous Air Pollutants (HAPs) : Not listed

Clean Air Act Section 602 Class I Substances : Not listed

Clean Air Act Section 602 Class II Substances : Not listed

DEA List I Chemicals (Precursor Chemicals) : Not listed

DEA List II Chemicals (Essential Chemicals) : Not listed

SARA 302/304

Composition/information on ingredients

No products were found.

SARA 304 RQ : Not applicable.

SARA 311/312

Classification : Fire hazard
Immediate (acute) health hazard
Delayed (chronic) health hazard

Composition/information on ingredients

Name	%	Fire hazard	Sudden release of pressure	Reactive	Immediate (acute) health hazard	Delayed (chronic) health hazard
piperazine	100	Yes.	No.	No.	Yes.	Yes.

Section 15. Regulatory information

State regulations

- Massachusetts** : This material is listed.
New York : This material is not listed.
New Jersey : This material is listed.
Pennsylvania : This material is listed.
California Prop. 65

Not listed.

International regulations

Chemical Weapon Convention List Schedules I, II & III Chemicals

Not listed.

Montreal Protocol (Annexes A, B, C, E)

Not listed.

Stockholm Convention on Persistent Organic Pollutants

Not listed.

Rotterdam Convention on Prior Informed Consent (PIC)

Not listed.

UNECE Aarhus Protocol on POPs and Heavy Metals

Not listed.

International lists

National inventory

- Australia** : This material is listed or exempted.
Canada : This material is listed or exempted.
China : This material is listed or exempted.
Europe : This material is listed or exempted.
Japan : **Japan inventory (ENCS):**
This material is listed or exempted.
Japan inventory (ISHL):
This material is listed or exempted.
New Zealand : This material is listed or exempted.
Philippines : This material is listed or exempted.
Republic of Korea : This material is listed or exempted.
Taiwan : This material is listed or exempted.

Section 16. Other information

National Fire Protection Association (U.S.A.)



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Copyright ©2001, National Fire Protection Association, Quincy, MA 02269. This warning system is intended to be interpreted and applied only by properly trained individuals to identify fire, health and reactivity hazards of chemicals. The user is referred to certain limited number of chemicals with recommended classifications in NFPA 49 and NFPA 325, which would be used as a guideline only. Whether the chemicals are classified by NFPA or not, anyone using the 704 systems to classify chemicals does so at their own risk.

Section 16. Other information

Procedure used to derive the classification

Classification	Justification
FLAMMABLE SOLIDS - Category 1	On basis of test data
SKIN CORROSION - Category 1B	On basis of test data
SERIOUS EYE DAMAGE - Category 1	On basis of test data
RESPIRATORY SENSITIZATION - Category 1B	On basis of test data
SKIN SENSITIZATION - Category 1B	On basis of test data
TOXIC TO REPRODUCTION (Fertility) - Category 2	On basis of test data
TOXIC TO REPRODUCTION (Unborn child) - Category 2	On basis of test data

History

Date of printing : 10/02/2017

Date of issue/Date of revision : 10/02/2017

Date of previous issue : 05/15/2015

Version : 2

Key to abbreviations :

- ATE = Acute Toxicity Estimate
- BCF = Bioconcentration Factor
- GHS = Globally Harmonized System of Classification and Labelling of Chemicals
- IATA = International Air Transport Association
- IBC = Intermediate Bulk Container
- IMDG = International Maritime Dangerous Goods
- LogPow = logarithm of the octanol/water partition coefficient
- MARPOL = International Convention for the Prevention of Pollution From Ships, 1973 as modified by the Protocol of 1978. ("Marpol" = marine pollution)
- UN = United Nations

References : Not available.

✔ Indicates information that has changed from previously issued version.

Notice to reader

To the best of our knowledge, the information contained herein is accurate. However, neither the above-named supplier, nor any of its subsidiaries, assumes any liability whatsoever for the accuracy or completeness of the information contained herein.

Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.