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
3600 Gantz Road
Grove City, OH 43123
Telephone Number: +1 614-2774348

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

Emergency telephone number (with hours of operation) : +1 352 323 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 - Category 2

GHS label elements

Hazard pictograms :

Signal word : Danger

Hazard statements : Flammable solid.
Causes severe skin burns and eye damage.
May cause an allergic skin reaction.
May cause allergy or asthma symptoms or breathing difficulties if inhaled.
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, protective clothing and eye or face protection. Wear respiratory protection. Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking. Do not breathe dust. Wash hands thoroughly after handling. Contaminated work clothing must not be allowed out of the workplace.

Section 2. Hazards identification

Response : IF exposed or concerned: Get medical advice or attention. IF INHALED: Remove person to fresh air and keep comfortable for breathing. Immediately call a POISON CENTER or doctor. If experiencing respiratory symptoms: Call a POISON CENTER or doctor. IF SWALLOWED: Immediately call a POISON CENTER or doctor. 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. If skin irritation or rash occurs: Get medical advice or 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 doctor.

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 : -

Ingredient name	%	Identifiers
piperazine	100	CAS: 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 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.

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.

Section 4. First aid measures

Ingestion : Get medical attention immediately. Call a poison center or physician. Wash out mouth with water. Remove dentures if any. 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.

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 breathe dust or mist. 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. See Section 10 for incompatible materials before handling or use.

Section 8. Exposure controls/personal protection

Control parameters

Occupational exposure limits

Ingredient name	Exposure limits
piperazine	**ACGIH TLV (United States, 1/2024) [Piperazine and salts]** A4. Skin sensitizer , Inhalation sensitizer. TWA 8 hours: 0.03 ppm (as piperazine). Form: Inhalable fraction and vapor. TWA 8 hours: 0.1 mg/m³ (as piperazine). Form: Inhalable fraction and vapor.

Biological exposure indices

None known.

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

Section 8. Exposure controls/personal protection

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.

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 : Based on the hazard and potential for exposure, select a respirator that meets the appropriate standard or certification. Respirators must be used according to a respiratory protection program to ensure proper fitting, training, and other important aspects of use.
Recommended: Ensure an MSHA/NIOSH-approved respirator or equivalent is used.

SECTION 9: Physical and chemical properties and safety characteristics

The conditions of measurement of all properties are at standard temperature and pressure unless otherwise indicated.

Appearance

Physical state : Solid. [Deliquescent crystals.]

Color : Colorless.

Odor : Amine-like. [Slight]

Odor threshold : Not available.

pH : 12 [Conc. (% w/w): 1%]

Melting point/freezing point : 106°C (222.8°F)

Boiling point or initial boiling point and boiling range : 147°C (296.6°F)

Flash point : Not applicable.

Flammability : Highly flammable.

Lower and upper explosion limit/flammability limit : Lower: 4%
Upper: 14%

Vapor pressure : 0.039 kPa (0.292525 mm Hg)

Relative vapor density : 3 [Air = 1]

Relative density : Not available.

SECTION 9: Physical and chemical properties and safety characteristics

Density : 1.1 g/cm³

Solubility in water : 150 g/l

Miscible with water : Yes.

Partition coefficient: n-octanol/water : -1.24

Auto-ignition temperature : 320°C (608°F)

Decomposition temperature : Not available.

Viscosity : Dynamic (room temperature): Not available.
Kinematic (room temperature): Not available.
Kinematic (40°C (104°F)): Not available.

Explosive properties : Not considered to be a product presenting a risk of explosion.

Oxidizing properties : None.

Particle characteristics

Median particle size : Not available.

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.

Respiratory : Not available.

Respiratory or skin sensitization

Section 11. Toxicological information

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

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

Section 11. Toxicological information

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

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.

Reproductive toxicity : Suspected of damaging fertility or the unborn child.

Numerical measures of toxicity

Acute toxicity estimates

Product/ingredient name	Oral (mg/kg)	Dermal (mg/kg)	Inhalation (gases) (ppm)	Inhalation (vapors) (mg/l)	Inhalation (dusts and mists) (mg/l)
piperazine	2600	N/A	N/A	N/A	N/A

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 (according to OECD criteria).

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

Bioaccumulative potential

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 Koc 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

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

DOT Classification : **Limited quantity** Yes.
Packaging instruction Exceptions: 154. Non-bulk: 213. Bulk: 240.
Quantity limitation Passenger aircraft/rail: 25 kg. Cargo aircraft: 100 kg.
Special provisions IB8, IP3, T1, TP33

TDG Classification : Product classified as per the following sections of the Transportation of Dangerous Goods Regulations: 2.40-2.42 (Class 8).
Explosive Limit and Limited Quantity Index 5
Passenger Carrying Road or Rail Index 25

ADR/RID : **Hazard identification number** 80
Limited quantity 5 kg
Tunnel code (E)

IMDG : **Emergency schedules** F-A, S-B

IATA : **Quantity limitation** Passenger and Cargo Aircraft: 25 kg. Packaging instructions: 860. Cargo Aircraft Only: 100 kg. Packaging instructions: 864. Limited Quantities - Passenger Aircraft: 5 kg. Packaging instructions: Y845.
Special provisions A803

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 IMO instruments : Not applicable.

Section 15. Regulatory information

U.S. Federal regulations : **TSCA 8(a) CDR Exempt/Partial exemption**: Not determined

TSCA 12(b) - Chemical export notification

Not applicable.

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

Section 15. Regulatory information

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 : FLAMMABLE SOLIDS - Category 1
SKIN CORROSION - Category 1B
SERIOUS EYE DAMAGE - Category 1
RESPIRATORY SENSITIZATION - Category 1B
SKIN SENSITIZATION - Category 1B
TOXIC TO REPRODUCTION - Category 2

Composition/information on ingredients

Name	%	Classification
piperazine	100	FLAMMABLE SOLIDS - Category 1 SKIN CORROSION - Category 1B SERIOUS EYE DAMAGE - Category 1 RESPIRATORY SENSITIZATION - Category 1B SKIN SENSITIZATION - Category 1B TOXIC TO REPRODUCTION - Category 2

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

This product does not require a Safe Harbor warning under California Prop. 65.

International regulations

Chemical Weapon Convention List Schedules I, II & III Chemicals

Not listed.

Montreal Protocol

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.

Inventory list

Australia : This material is listed or exempted.

Canada : This material is listed or exempted.

China : This material is listed or exempted.

Eurasian Economic Union : **Russian Federation inventory**: This material is listed or exempted.

Japan : **Japan inventory (CSCL):**
This material is listed or exempted.

Section 15. Regulatory information

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.

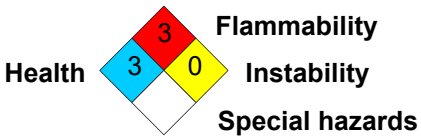
Thailand : This material is listed or exempted.

United States : This material is active or exempted.

Viet Nam : This material is listed or exempted.

Section 16. Other information

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



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 - Category 2	On basis of test data

History

Date of printing : 03/10/2025

Date of issue/Date of revision : 03/10/2025

Date of previous issue : 12/01/2022

Version : 5

Key to abbreviations : ADR = The European Agreement concerning the International Carriage of Dangerous Goods by Road
ATE = Acute Toxicity Estimate
BCF = Bioconcentration Factor
DOT = Department of Transportation
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)
N/A = Not available
RID = The Regulations concerning the International Carriage of Dangerous Goods by Rail
SGG = Segregation Group
TDG = Transportation of Dangerous Goods
UN = United Nations

References : Not available.

Indicates information that has changed from previously issued version.

Notice to reader

Section 16. Other information

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.