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: -


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**

<table>
<thead>
<tr>
<th>Ingredient name</th>
<th>%</th>
<th>CAS number</th>
</tr>
</thead>
<tbody>
<tr>
<td>piperazine</td>
<td>100</td>
<td>110-85-0</td>
</tr>
</tbody>
</table>

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)**

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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

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

Not considered to be a product presenting a risk of explosion.

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

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

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.
Piperazine anhydrous, PIP

**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**

<table>
<thead>
<tr>
<th>Product/ingredient name</th>
<th>Result</th>
<th>Species</th>
<th>Dose</th>
<th>Exposure</th>
</tr>
</thead>
<tbody>
<tr>
<td>piperazine</td>
<td>LD50 Oral</td>
<td>Rat - Male, Female</td>
<td>2600 mg/kg</td>
<td>-</td>
</tr>
</tbody>
</table>

**Conclusion/Summary**

Based on available data, the classification criteria are not met.

**Irritation/Corrosion**

<table>
<thead>
<tr>
<th>Product/ingredient name</th>
<th>Result</th>
<th>Species</th>
<th>Score</th>
<th>Exposure</th>
<th>Observation</th>
</tr>
</thead>
<tbody>
<tr>
<td>piperazine</td>
<td>Skin - Visible necrosis</td>
<td>Rabbit</td>
<td>-</td>
<td>1 hours</td>
<td>14 hours</td>
</tr>
</tbody>
</table>

**Conclusion/Summary**

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

**Sensitization**

<table>
<thead>
<tr>
<th>Product/ingredient name</th>
<th>Route of exposure</th>
<th>Species</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>piperazine</td>
<td>skin</td>
<td>Guinea pig</td>
<td>Sensitizing</td>
</tr>
<tr>
<td></td>
<td>Respiratory</td>
<td>Human</td>
<td>Sensitizing</td>
</tr>
</tbody>
</table>

**Conclusion/Summary**

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

**Mutagenicity**

<table>
<thead>
<tr>
<th>Product/ingredient name</th>
<th>Test</th>
<th>Experiment</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>piperazine</td>
<td>OECD 471</td>
<td>Experiment: In vitro Subject: Bacteria</td>
<td>Negative</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Experiment: In vivo Subject: Mammalian-Animal</td>
<td>Negative (similar material)</td>
</tr>
</tbody>
</table>

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Section 11. Toxicological information

**Carcinogenicity**

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

**Reproductive toxicity**

<table>
<thead>
<tr>
<th>Product/ingredient name</th>
<th>Maternal toxicity</th>
<th>Fertility (similar material)</th>
<th>Developmental toxicity</th>
<th>Species</th>
<th>Dose</th>
<th>Exposure</th>
</tr>
</thead>
<tbody>
<tr>
<td>piperazine</td>
<td>-</td>
<td>Positive</td>
<td>-</td>
<td>Rat</td>
<td>Oral: 125 mg/kg NOAEL</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Positive (similar material)</td>
<td>-</td>
<td>Positive (similar material)</td>
<td>Rabbit</td>
<td>Oral: 42 mg/kg NOAEL</td>
<td>-</td>
</tr>
</tbody>
</table>

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

**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
  - 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

| Potential immediate effects | Sub-chronic NOAEL Oral (similar material) |
| Potential delayed effects | Rat - Male, Female |
| Dose | 627 mg/kg |
| Exposure | 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.

Potential chronic health effects

<table>
<thead>
<tr>
<th>Product/ingredient name</th>
<th>Result</th>
<th>Species</th>
<th>Dose</th>
<th>Exposure</th>
</tr>
</thead>
<tbody>
<tr>
<td>piperazine</td>
<td>Sub-chronic NOAEL Oral (similar material)</td>
<td>Rat - Male, Female</td>
<td>627 mg/kg</td>
<td>90 days; 7 days per week</td>
</tr>
</tbody>
</table>

Potential chronic health effects

Numerical measures of toxicity

Acute toxicity estimates

Not available.

Section 12. Ecological information

Toxicity

<table>
<thead>
<tr>
<th>Product/ingredient name</th>
<th>Result</th>
<th>Species</th>
<th>Exposure</th>
</tr>
</thead>
<tbody>
<tr>
<td>piperazine</td>
<td>Acute EC50 21 mg/l</td>
<td>Daphnia - Daphnia magna</td>
<td>48 hours</td>
</tr>
<tr>
<td></td>
<td>Acute LC50 &gt;1800 mg/l</td>
<td>Fish - Poecilia reticulata</td>
<td>96 hours</td>
</tr>
<tr>
<td></td>
<td>Chronic NOEC &gt;1000 mg/l</td>
<td>Algae</td>
<td>72 hours</td>
</tr>
<tr>
<td></td>
<td>Chronic NOEC 12.5 mg/l</td>
<td>Daphnia - Daphnia magna</td>
<td>21 days</td>
</tr>
</tbody>
</table>

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

Persistence and degradability

<table>
<thead>
<tr>
<th>Product/ingredient name</th>
<th>Test</th>
<th>Result</th>
<th>Dose</th>
<th>Inoculum</th>
</tr>
</thead>
<tbody>
<tr>
<td>piperazine</td>
<td>OECD 301F</td>
<td>70 % - Readily - 28 days</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

Conclusion/Summary: Readily biodegradable.

Bioaccumulative potential

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Section 12. Ecological information

<table>
<thead>
<tr>
<th>Product/ingredient name</th>
<th>LogP_{ow}</th>
<th>BCF</th>
<th>Potential</th>
</tr>
</thead>
<tbody>
<tr>
<td>piperazine</td>
<td>-1.24</td>
<td>-</td>
<td>low</td>
</tr>
</tbody>
</table>

**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

<table>
<thead>
<tr>
<th>DOT Classification</th>
<th>TDG Classification</th>
<th>Mexico Classification</th>
<th>ADR/RID</th>
<th>IMDG</th>
<th>IATA</th>
</tr>
</thead>
<tbody>
<tr>
<td>UN number</td>
<td>UN2579</td>
<td>UN2579</td>
<td>UN2579</td>
<td>UN2579</td>
<td>UN2579</td>
</tr>
<tr>
<td>UN proper shipping name</td>
<td>Piperazine</td>
<td>PIPERAZINE</td>
<td>PIPERAZINA</td>
<td>PIPERAZINE</td>
<td>PIPERAZINE</td>
</tr>
<tr>
<td>Transport hazard class(es)</td>
<td>8</td>
<td>8</td>
<td>8</td>
<td>8</td>
<td>8</td>
</tr>
</tbody>
</table>

**Label**

- Explosive
- Product classified as per the following sections of the Transportation of Dangerous Goods Regulations: 2.40-2.42 (Class 8).

**Packing group**

- III

**Environmental hazards**

- No.

**Additional information**

- **Limited quantity**: Yes.
- **Packaging instruction**: Passenger aircraft
  - Quantity limitation: 25 kg
- **Cargo aircraft**: Quantity limitation: 100
- **Explosive Limit and**
- **Hazard identification number**: 80
- **Limited quantity**: 5 kg
- **Tunnel code**: (E)
- **Emergency schedules (EmS)**: F-A, S-B

**Passenger and Cargo Aircraft**

- Quantity limitation: 25 kg
- Packaging instructions: 860
- **Cargo Aircraft Only**
  - Quantity limitation: 100 kg
  - Packaging instructions:

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## Section 14. Transport information

<table>
<thead>
<tr>
<th>kg</th>
<th>Limited Quantity Index</th>
<th>864 Limited Quantities - Passenger Aircraft</th>
</tr>
</thead>
<tbody>
<tr>
<td>IB8, IP3, T1, TP33</td>
<td>5</td>
<td>Quantity limitation: 5 kg</td>
</tr>
<tr>
<td>Passenger Carrying Road or Rail Index</td>
<td>25</td>
<td>Packaging instructions: Y845</td>
</tr>
</tbody>
</table>

**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

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

### SARA 304 RQ

No products were found.

### SARA 311/312 Classification

- **Fire hazard**: Immediate (acute) health hazard
- **Delayed (chronic) health hazard**: No.

### Composition/information on ingredients

<table>
<thead>
<tr>
<th>Name</th>
<th>%</th>
<th>Fire hazard</th>
<th>Sudden release of pressure</th>
<th>Reactive</th>
<th>Immediate (acute) health hazard</th>
<th>Delayed (chronic) health hazard</th>
</tr>
</thead>
<tbody>
<tr>
<td>piperazine</td>
<td>100</td>
<td>Yes.</td>
<td>No.</td>
<td>No.</td>
<td>Yes.</td>
<td>Yes.</td>
</tr>
</tbody>
</table>

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

**Date of previous issue**: 05/15/2015

**Version**: 2
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.)

Flammability

Health

Instability/Reactivity

Special

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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

<table>
<thead>
<tr>
<th>Classification</th>
<th>Justification</th>
</tr>
</thead>
<tbody>
<tr>
<td>FLAMMABLE SOLIDS - Category 1</td>
<td>On basis of test data</td>
</tr>
<tr>
<td>SKIN CORROSION - Category 1B</td>
<td>On basis of test data</td>
</tr>
<tr>
<td>SERIOUS EYE DAMAGE - Category 1</td>
<td>On basis of test data</td>
</tr>
<tr>
<td>RESPIRATORY SENSITIZATION - Category 1B</td>
<td>On basis of test data</td>
</tr>
<tr>
<td>SKIN SENSITIZATION - Category 1B</td>
<td>On basis of test data</td>
</tr>
<tr>
<td>TOXIC TO REPRODUCTION (Fertility) - Category 2</td>
<td>On basis of test data</td>
</tr>
<tr>
<td>TOXIC TO REPRODUCTION (Unborn child) - Category 2</td>
<td>On basis of test data</td>
</tr>
</tbody>
</table>

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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
UN = United Nations

References : Not available.

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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.