

# Chemical Safety Technical Data Sheet

**Product Name:**Anhydrous Piperazine

Developed in accordance with GB/T 16483 and GB/T 17519

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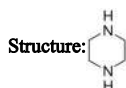
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## Part I: Identification of Chemicals and Enterprises

**Chinese name of the chemical:**Anhydrous piperazine; Piperazine; Para-diazepine

**Chemical name in English:**piperazine anhydrous; piperazine; diethylenediamine

**Molecular formula:**C<sub>4</sub>H<sub>10</sub>N<sub>2</sub> **Relative molecular mass:**86.14



**Recommended and restricted uses of chemicals:**For the manufacture of resins and polymers, and for pharmaceuticals.

## Part II Overview of Hazards

**Emergency Overview:**Causes severe skin burns and eye injuries; inhalation may lead to allergic or asthma symptoms, breathing difficulties, or skin allergic reactions.**GHS Hazard Category:**

**Skin corrosion/irritation:**Category 1B **Severe ocular injury/irritation:**Category 1 **Respiratory allergen:**Category 1

**Skin allergens:**Category 1

**Reproductive toxicity:**Category 2

**Hazard to aquatic environment – Acute hazard:**Category 3

**Tag Elements:**

**figurative graph :**



**Warning phrase:**Hazard

**Hazard Description:**Causes severe skin burns and eye injuries; inhalation may lead to allergic or asthma symptoms or breathing difficulties; may cause skin allergic reactions; suspected harm to fertility or fetal development; harmful to aquatic organisms.

**Protection Explanation:**

### 【 preventive measure 】

- Avoid contact with eyes and skin; thoroughly rinse after use.
- Wear protective gloves, protective clothing, protective goggles, and a face shield.
- Avoid inhalation of dust.
- Contaminated workwear must not be taken outside the workplace.
- Operate only after receiving specific instructions. Do not operate until you have read and understood all safety precautions. Use personal protective equipment as required.
- Do not discharge into the environment.

### [Accident Response]

·For inhalation poisoning: Move the patient to a well-ventilated area, have them rest in a position that facilitates breathing, and immediately call the poison control center or seek medical attention.

- Skin (or hair) contact: Immediately remove all contaminated clothing, rinse the skin with water, and take a shower. Contaminated clothing must be thoroughly washed before reuse. If skin irritation or rash occurs, seek medical attention.
- Eye contact: Rinse carefully with water for several minutes, and immediately call the poison control center or seek medical attention. If contact lenses are worn and can be easily removed, remove them and continue rinsing.
- Administration: Rinse the mouth; do not induce vomiting.
- Seek medical attention if you come into contact with the substance or have concerns.

【 safe storage 】

- Lock and store securely.

[Disposal of Waste]

- This product, its contents, and the container shall be disposed of in accordance with national and local regulations.

**Physical and chemical hazards:**Flammable; its powder, when mixed with air, can form an explosive mixture.

**Health hazards:**Excessive exposure to this substance, whether by inhalation or transdermal absorption, may cause weakness, blurred vision, ataxia, tremors, and epileptic seizures. Eye contact can lead to severe irritation and burns. It is irritating to the skin and may cause burns.

Chronic effects: The dust or liquid of this product can cause sensitization to the skin and lungs, leading to skin itching, rashes, and asthma.

**Environmental hazards:**Harmful to aquatic organisms.

Part III: Composition/Composition Information

| √matter    |               | Mixture  |
|------------|---------------|----------|
| Component  | Concentration | CAS No.  |
| Piperazine | ≥99.0%        | 110-85-0 |

Part IV Emergency Management Measures

**Inhalation:**Immediately remove the individual from the area to fresh air. Keep the airway clear. If breathing is difficult, administer oxygen. In case of respiratory or cardiac arrest, perform cardiopulmonary resuscitation (CPR) immediately. Seek medical attention.

**Skin contact:**Immediately remove contaminated clothing and rinse thoroughly with plenty of running water for at least 15 minutes. Seek medical attention.

**Eye contact:**Immediately open the eyelids and rinse thoroughly with running water or saline solution for 5–10 minutes. Seek medical attention.

**Ingestion:**Rinse the mouth with water; do not induce vomiting. Administer milk or egg white. Seek medical attention.

**Advice for rescuers:**Use personal protective equipment as needed.

**Special note for physicians:**Provide symptomatic treatment.

Part V Fire Safety Measures

**Fire extinguishing agents:**Use water mist, foam, dry powder, carbon dioxide, or sand to extinguish fires.

**Special hazards:**Combustible when exposed to open flames or high temperatures. During combustion, toxic nitrogen oxide gases are released; thermal decomposition produces toxic gases. Corrosive properties.

**Fire suppression precautions and protective measures:**Firefighters must wear respirators and full-body fire-resistant and chemical-proof suits, and approach the fire from downwind. Move containers to an open area whenever possible. Spray water to keep containers cool until the fire is fully extinguished.

Part VI: Emergency Response to Leaks

**Protective measures, protective equipment, and emergency response procedures for personnel:**Isolate the contaminated leakage area and restrict access. Eliminate all ignition sources. Emergency responders are advised to wear acid/alkali-resistant clothing. Do not handle ruptured containers or leaked materials before wearing appropriate protective gear. Cut off the leakage source whenever possible.

**Environmental protection measures:**Cover the spill with plastic sheeting to minimize scattering.

**Methods for containing, cleaning up leaked chemicals and the disposal materials used:**Do not allow water to enter the packaging container. Collect the spill using a clean shovel and place it in a clean, dry container with a loose lid; then move the container away from the spill area.

Part VII: Handling, Storage and Disposal

**Operating Precautions:**Perform operations in a sealed environment with local exhaust ventilation. Operators must receive specialized training and strictly adhere to operating procedures. It is recommended that operators wear self-suction filtering dust masks, chemical safety goggles, rubber acid/alkali-resistant clothing, and rubber acid/alkali-resistant gloves. Keep away from sources of ignition and heat; smoking is strictly prohibited in the workplace. Use explosion-proof ventilation systems and equipment. Prevent dust generation. Avoid contact with oxidizers and acids. Handle with care during transportation to prevent damage to packaging and containers. Equip with appropriate types and quantities of fire extinguishers and leak response equipment. Empty containers may contain residual hazardous substances.

**Storage Precautions:**Store in a cool, dry, and well-ventilated warehouse. Keep away from sources of ignition and heat. Maintain container integrity. Store separately from oxidizers and acids; avoid mixing. Equip with appropriate firefighting equipment in adequate quantities. The storage area should have suitable materials for containing spills.

**Part VIII Contact Control/Personal Protection**

**Occupational exposure limits:**China: No standards established.

United States (ACGIH): TLV-TWA: 0.03 mg/m<sup>3</sup>(inhalable particulate matter and vapors) [skin].

**Biological contact limit:**No standard established.

**Monitoring methods:**Methods for determining toxic substances in the air: No standards have been established. Methods for biological monitoring tests: No standards have been established.

**Process Control:**Hermetically sealed operation with local exhaust ventilation. Safety shower and eye-wash facilities provided.

**Personal Protective Equipment:**

**Respiratory protection:**When airborne dust concentrations exceed permissible limits, a filtered respirator must be worn. During emergency rescue or evacuation operations, an air respirator should be used.

**Eye protection:**Wear chemical safety goggles.

**Skin and body protection:**Wear rubber acid-and alkali-resistant clothing.

**Hand protection:**Wear rubber gloves resistant to acids and alkalis.

**Part IX: Physical and Chemical Properties**

**Appearance and Characteristics:**Colorless crystals with strong hygroscopicity

**Odor:**Has a ammonia odor

**pH:**Not applicable

**Melting point (°C):**104–107

**Boiling point (°C):**145

**Relative Density (water = 1):**No data

**Relative vapor density (air = 1):**No data

**Saturation vapor pressure (kPa):**30.3 (111°C)

**Critical pressure (MPa):**No data

**Octanol/water partition coefficient:**No data

**Flash point (°C):**109.4

**Self-ignition temperature (°C):**No data

**Lower explosive limit (%):**No data

**Explosion Limit (%):**No data

**Decomposition temperature (°C):**No data available

**Viscosity (mPa·s):**No data available

**Combustion heat (kJ/mol):** -2738

**Critical temperature (°C):**364.85

**Solubility:**Soluble in water, methanol, and ethanol; slightly soluble in benzene and ether

**Part 10: Stability and Reactivity**

**Stability:**Stable.

**Hazardous reaction:**Reacts with incompatible substances such as strong oxidizing agents, strong acids, acyl chlorides, and anhydrides.

**Conditions to avoid exposure to:**heat, light, and humid air.

**Incompatible substances:**strong oxidizing agents, strong acids, acyl chlorides, anhydrides.

**Dangerous decomposition products:**nitrogen oxides.

**Part XI Toxicological Information**

**Acute toxicity:**LD<sub>50</sub>:1900 mg/kg (oral administration in rats), 600 mg/kg (oral administration in mice); 4000 mg/kg (percutaneous administration in rabbits).

LC<sub>50</sub>: 5400 mg/m<sup>3</sup>(inhaled in rats over 2 hours)

**Skin irritation or corrosion:** non-avaible .

**Eye irritation or corrosion:** non-avaible .

**Respiratory or skin allergy:** It is allergenic to the skin and respiratory system.

**Mutability of germ cells:** non-avaible .

**Carcinogenicity:**No data available.

**Reproductive toxicity:**No data available.

**Specific target organ system toxicity – single exposure:**No data available.

**Specific target organ system toxicity–Repeated exposure:**Administration of the product at concentrations of 10%–30% in rats for 90 days can cause hepatorenal injury; no adverse effects were observed at a concentration of 0.1%. High concentrations of the product severely irritate the exposed site.

**Inhalation hazards:**No data available.

**Part XII: Ecological Information**

**Ecotoxicity:**EC<sub>50</sub>= 21 mg/L (48 h) (Danae leuveni).

**Durability and Degradability:**

Biodegradability: No data available.

Non-biodegradability: No data available.

**Potential bioaccumulation:**No data available.

**Mobility in soil:**No data available.

### Part 13: Waste Disposal

**Waste chemicals:**Incineration is recommended for disposal. Nitrogen oxides emitted from the incinerator are removed using a scrubber.

**Contaminated packaging:**Return the container to the manufacturer or dispose of it in accordance with national and local regulations.

**Disposal precautions:**Refer to relevant national and local regulations before disposal.

### Part 14: Transportation Information

**United Nations Dangerous Goods Number (UN Number):**2579

**United Nations Transport Name:**Piperazine

**UN Hazard Classification:**8

**Packaging category:**Class III packaging



**packing mark :**

**Marine pollutants:**No

**Transportation Precautions:**The packaging must remain intact during shipment, and loading should be secure. During transportation, ensure containers are leak-proof, stable, free from collapse or falling, and undamaged. Mixing with oxidizers, acids, food-grade chemicals, or similar substances is strictly prohibited. Protect against direct sunlight, rain, and high temperatures during transit.

### Part 15: Regulatory Information

The following laws, regulations, rules, and standards contain corresponding provisions for the management of this chemical substance.

**Law of the People's Republic of China on the Prevention and Treatment of Occupational Diseases:**Classification and catalog of occupational diseases: Not listed

**Regulations on the Safety Management of Hazardous Chemicals:**List of hazardous chemicals: Included. List of explosive-prone hazardous chemicals: Not included. List of key hazardous chemicals under supervision:Not included. GB18218-2018 "Identification of Major Hazard Sources for Hazardous Chemicals" (Table 1):Not included.

**Regulations on Labor Protection in Workplaces Where Toxic Substances Are Used:**List of highly toxic substances: Not included.

**Regulations on the Management of Chemicals Susceptible to Drug Manufacturing:**Classification and list of types of chemicals susceptible to drug manufacturing: Not included.

**International Conventions:**Stockholm Convention: Not included; Rotterdam Convention: Not included; Montreal Protocol: Not included.

### Part 16: Other Information

**Writing and Revision Information:**

**Changes in this version:**Compared to the previous version, new sections on molecular formulas, relative molecular masses, and structural formulas have been added; corresponding content has been incorporated in accordance with the "Comprehensive Book of Safety Technology for Hazardous Chemicals"; and the order of certain sections has been adjusted.

**Revision notes:**Updated every 5 years or when new relevant national laws and regulations are enacted.

**References:**Safety Culture Network

**Disclaimer:**The information in this SDS applies solely to the specified product. Unless otherwise stated, it does not apply to mixtures of this product with other substances. This SDS provides safety information only for properly trained users of the product. Users must independently assess the suitability of this SDS under specific usage conditions. The authors of this SDS shall not be liable for any injuries resulting from its use in exceptional circumstances.