

SAFETY DATA SHEETS

According to the UN GHS revision 9

Version: 1.2
Creation Date: July 15, 2019
Revision Date: August 08, 2025

SECTION 1: Identification

1.1 GHS Product identifier

Product name 1,4-Phenylenediamine

1.2 Other means of identification

Product number CAZO111425

Other names p-Phenylenediamine; benzene-1,4-diamine; para-Phenylenediamine (PPD)

1.3 Recommended use of the chemical and restrictions on use

Identified uses For laboratory and Industrial use only.

Uses advised against no data available

1.4 Supplier's details

Company CATO Research Chemicals Inc.

Address 3/F,Building B,No.179 BASIGO, Guangpu Rd East,Huangpu Dist,Guangzhou

Telephone +86-20-81960175

1.5 Emergency phone number

Emergency phone number +86-20-81960175

Service hours 'Monday to Friday, 9am-5pm (Standard time zone: UTC/GMT +8 hours).

SECTION 2: Hazard identification

2.1 Classification of the substance or mixture

Acute toxicity - Category 3, Oral

Acute toxicity - Category 3, Dermal

Eye irritation, Category 2

Skin sensitization, Category 1

Acute toxicity - Category 3, Inhalation

Hazardous to the aquatic environment, short-term (Acute) - Category Acute 1

Hazardous to the aquatic environment, long-term (Chronic) - Category Chronic 1

2.2 GHS label elements, including precautionary statements

Pictogram(s)



Signal word

Danger

Hazard statement(s)

H301 Toxic if swallowed

H311 Toxic in contact with skin

H319 Causes serious eye irritation

H317 May cause an allergic skin reaction

H331 Toxic if inhaled

H410 Very toxic to aquatic life with long lasting effects

Precautionary statement(s)

Prevention

P264 Wash ... thoroughly after handling.

P270 Do not eat, drink or smoke when using this product.

P280 Wear protective gloves/protective clothing/eye protection/face protection/hearing protection/...

P261 Avoid breathing dust/fume/gas/mist/vapours/spray.

P272 Contaminated work clothing should not be allowed out of the workplace.

P271 Use only outdoors or in a well-ventilated area.

P273 Avoid release to the environment.

Response	P301+P316 IF SWALLOWED: Get emergency medical help immediately. P321 Specific treatment (see ... on this label). P330 Rinse mouth. P302+P352 IF ON SKIN: Wash with plenty of water/... P316 Get emergency medical help immediately. P361+P364 Take off immediately all contaminated clothing and wash it before reuse. P305+P351+P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. P333+P317 If skin irritation or rash occurs: Get medical help. P362+P364 Take off contaminated clothing and wash it before reuse. P304+P340 IF INHALED: Remove person to fresh air and keep comfortable for breathing. P391 Collect spillage.
Storage	P405 Store locked up. P403+P233 Store in a well-ventilated place. Keep container tightly closed.
Disposal	P501 Dispose of contents/container to an appropriate treatment and disposal facility in accordance with applicable laws and regulations, and product characteristics at time of disposal.

2.3 Other hazards which do not result in classification

no data available

SECTION 3: Composition/information on ingredients

3.1 Substances

Chemical name	Common names and synonyms	CAS number	EC number	Concentration
1,4-Phenylenediamine	p-phenylenediamine	106-50-3	203-404-7	100%

SECTION 4: First-aid measures

4.1 Description of necessary first-aid measures

If inhaled

Fresh air, rest. Half-upright position. Refer for medical attention.

Following skin contact

First rinse with plenty of water for at least 15 minutes, then remove contaminated clothes and rinse again. Refer for medical attention .

Following eye contact

First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then refer for medical attention.

Following ingestion

Rinse mouth. Give a slurry of activated charcoal in water to drink. Refer for medical attention .

4.2 Most important symptoms/effects, acute and delayed

Exposure Routes: inhalation, skin absorption, ingestion, skin and/or eye contact Symptoms: Irritation pharynx, larynx; bronchial asthma; sensitization dermatitis Target Organs: respiratory system, skin (NIOSH, 2016)

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

Flush eyes with water. Wash contaminated areas of body with soap and water.

SECTION 5: Fire-fighting measures

5.1 Suitable extinguishing media

Water, carbon dioxide, dry chem .

5.2 Specific hazards arising from the chemical

Excerpt from ERG Guide 153 [Substances - Toxic and/or Corrosive (Combustible)]: Combustible material: may burn but does not ignite readily. When heated, vapors may form explosive mixtures with air; indoors, outdoors and sewers explosion hazards. Those substances designated with a (P) may polymerize explosively when heated or involved in a fire. Contact with metals may evolve flammable hydrogen gas. Containers may explode when heated. Runoff may pollute waterways. Substance may be transported in a molten form. (ERG, 2016)

5.3 Special protective actions for fire-fighters

Use water spray, powder.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

Personal protection: particulate filter respirator adapted to the airborne concentration of the substance. Do NOT let this chemical enter the environment. Sweep spilled substance into covered containers. If appropriate, moisten first to prevent dusting. Carefully collect remainder. Then store and dispose of according to local regulations. Do NOT absorb in saw-dust or other combustible absorbents.

6.2 Environmental precautions

Sweep spilled substance into covered containers. If appropriate, moisten first to prevent dusting. Carefully collect remainder. Then store and dispose of according to local regulations. Do NOT absorb in saw-dust or other combustible absorbents. Do NOT let this chemical enter the environment. Personal protection: particulate filter respirator adapted to the airborne concentration of the substance.

6.3 Methods and materials for containment and cleaning up

Collect and arrange disposal. Keep the chemical in suitable and closed containers for disposal. Remove all sources of ignition. Use spark-proof tools and explosion-proof equipment. Adhered or collected material should be promptly disposed of, in accordance with appropriate laws and regulations.

SECTION 7: Handling and storage

7.1 Precautions for safe handling

NO open flames. Closed system, dust explosion-proof electrical equipment and lighting. Prevent deposition of dust. Handling in a well ventilated place. Wear suitable protective clothing. Avoid contact with skin and eyes. Avoid formation of dust and aerosols. Use non-sparking tools. Prevent fire caused by electrostatic discharge steam.

7.2 Conditions for safe storage, including any incompatibilities

Separated from strong oxidants, strong acids, acid anhydrides and food and feedstuffs. Keep in the dark. Well closed. Keep well closed and protected from light.

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Occupational Exposure limit values

TLV: 0.1 mg/m³, as TWA; A4 (not classifiable as a human carcinogen). MAK: (inhalable fraction): 0.1 mg/m³; carcinogen category: 3B; peak limitation category: II(2); pregnancy risk group: C; skin absorption (H); sensitization of skin (SH)

Biological limit values

no data available

8.2 Appropriate engineering controls

Ensure adequate ventilation. Handle in accordance with good industrial hygiene and safety practice. Set up emergency exits and the risk-elimination area.

8.3 Individual protection measures, such as personal protective equipment (PPE)

Eye/face protection

Wear safety spectacles, face shield or eye protection in combination with breathing protection.

Skin protection

Protective gloves. Protective clothing.

Respiratory protection

Use local exhaust or breathing protection.

Thermal hazards

no data available

SECTION 9: Physical and chemical properties and safety characteristics

Physical state	Solid. Flakes.
Colour	WHITE TO SLIGHTLY RED CRYSTALS
Odour	no data available
Melting point/freezing point	142 °C.
Boiling point or initial boiling point and boiling range	274 °C.
Flammability	Combustible Solid
Lower and upper explosion limit/flammability limit	no data available
Flash point	156 °C
Auto-ignition temperature	400 °C
Decomposition temperature	no data available
pH	no data available
Kinematic viscosity	no data available
Solubility	Partially miscible with water
Partition coefficient n-octanol/water	Pow = 0.151. Temperature: 21 °C.; log Pow = -0.839. Temperature: 21 °C.
Vapour pressure	0.01 Pa. Temperature: 20 °C.
Density and/or relative density	726 g/L. Temperature: 22 °C.

Relative vapour density	3.7 (vs air)
Particle characteristics	no data available

SECTION 10: Stability and reactivity

10.1 Reactivity

Decomposes on burning. This produces toxic fumes of nitrogen oxides. The substance is a strong reducing agent. It reacts violently with oxidants and strong bases.

10.2 Chemical stability

On standing in air, oxidizes to purple and black /color/.

10.3 Possibility of hazardous reactions

COMBUSTIBLE WHEN EXPOSED TO HEAT OR FLAME. Dust explosion possible if in powder or granular form, mixed with air. P-PHENYLENEDIAMINE is the strongest of the weak aromatic bases. It neutralizes acids in weak exothermic reactions to form salts. May be incompatible with isocyanates, halogenated organics, peroxides, phenols (acidic), epoxides, anhydrides, and acid halides. Reacts readily with oxidizing agents (NTP, 1992).

10.4 Conditions to avoid

no data available

10.5 Incompatible materials

Contact with strong oxidizers may cause fires and explosions.

10.6 Hazardous decomposition products

Toxic gases and vapors (such as oxides of nitrogen and carbon monoxide) may be released in a fire involving p-phenylenediamine.

SECTION 11: Toxicological information

Acute toxicity

- Oral: LDLo Rat oral 100 mg/kg
- Inhalation: LC50 - rat (male) - 0.92 mg/L air.
- Dermal: mortality - rabbit - 5 000 mg/kg bw.

Skin corrosion/irritation

no data available

Serious eye damage/irritation

no data available

Respiratory or skin sensitization

no data available

Germ cell mutagenicity

no data available

Carcinogenicity

No data are available in humans. Inadequate evidence of carcinogenicity in animals. OVERALL EVALUATION: Group 3: The agent is not classifiable as to its carcinogenicity to humans.

Reproductive toxicity

No information is available on the reproductive or developmental effects of p-phenylenediamine in humans. In one study of rats exposed via gavage, fetal evaluations showed no biological or statistically significant increase in malformations or developmental variations at any dose tested.

STOT-single exposure

The substance is irritating to the eyes. Inhalation of dust may cause asthmatic reactions. See Notes. Ingestion could cause swelling of mouth and throat. The substance may cause effects on the blood. This may result in the formation of methaemoglobin. Exposure could cause death.

STOT-repeated exposure

Repeated or prolonged contact may cause skin sensitization. Repeated or prolonged inhalation may cause asthma. The substance may have effects on the kidneys. This may result in kidney impairment.

Aspiration hazard

A harmful contamination of the air will not or will only very slowly be reached on evaporation of this substance at 20°C; on spraying or dispersing, however, much faster.

SECTION 12: Ecological information

12.1 Toxicity

- Toxicity to fish: LC50 - *Oncorhynchus mykiss* (previous name: *Salmo gairdneri*) - 3.9 mg/L - 96 h.
- Toxicity to daphnia and other aquatic invertebrates: LC50 - *Gammarus fasciatus* - 8.1 mg/L - 96 h.
- Toxicity to algae: EC50 - *Chlorella pyrenoidosa* - 0.53 mg/L - 90 h.
- Toxicity to microorganisms: EC50 - activated sludge of a predominantly domestic sewage - 13.4 mg/L - 3 h. Remarks: Respiration rate.

12.2 Persistence and degradability

Biodegradation of 1,4-benzenediamine (60 ng/l) with an adapted mixed culture from soil, compost or mud from a waste lagoon capable of rapid degradation of phenol led to a 9% theoretical BOD in 3 hr at 30 deg C (phenol reference - 70% theoretical BOD)(1). An 80% degradation of 1,4-benzenediamine (25-30 mg/l) with acclimated activated sludge in 120 hr at 20 deg C has been reported(2). Aniline-acclimated activated sludge led to 8% theoretical BOD in 190 hr at 20 deg C(3). No degradation of 500 mg/l 1,4-benzenediamine was observed with 3 activated sludges in 24 hr at 20 deg C, the test compound was toxic to the 3 sludges(4). A 0% theoretical BOD was observed for 1,4-benzenediamine in a Warburg apparatus during a 5 day incubation period(5). 3.8% Biodegradation was observed when 1,4-diaminobenzene dihydrochloride (initial concentration unspecified) was incubated with an activated sludge inoculum obtained from a municipal sewage treatment facility over a 5 day incubation period(6).

12.3 Bioaccumulative potential

An estimated BCF value of 0.3 was calculated for 1,4-benzenediamine(SRC), using a measured log Kow of -0.3(1, SRC) and a recommended regression-derived equation(2). According to a classification scheme(3), this BCF value suggests that bioconcentration in aquatic organisms is low(SRC). An experimental BCF value of 450 was measured for algae exposed to 1,4-diaminobenzene dihydrochloride for 24 hours(4). An experimental BCF value of 6 was measured for fish (golden ide) exposed to 1,4-diaminobenzene dihydrochloride for 3 days(4).

12.4 Mobility in soil

Based on a recommended classification scheme(1), an estimated Koc value of 16(SRC), determined from a measured log Kow of -0.3(2) and a recommended regression-derived equation(3), indicates that 1,4-benzenediamine is expected to have high mobility in soil(SRC); however it may form covalent bonds to humic material which would limit movement through soil(4).

12.5 Other adverse effects

no data available

SECTION 13: Disposal considerations

13.1 Disposal methods

Product

The material can be disposed of by removal to a licensed chemical destruction plant or by controlled incineration with flue gas scrubbing. Do not contaminate water, foodstuffs, feed or seed by storage or disposal. Do not discharge to sewer systems.

Contaminated packaging

Containers can be triply rinsed (or equivalent) and offered for recycling or reconditioning. Alternatively, the packaging can be punctured to make it unusable for other purposes and then be disposed of in a sanitary landfill. Controlled incineration with flue gas scrubbing is possible for combustible packaging materials.

SECTION 14: Transport information

14.1 UN Number

ADR/RID: UN1673 (For reference only, please check.) IMDG: UN1673 (For reference only, please check.) IATA: UN1673 (For reference only, please check.)

14.2 UN Proper Shipping Name

ADR/RID: PHENYLENEDIAMINES (o-, m-, p-) (For reference only, please check.) IMDG: PHENYLENEDIAMINES (o-, m-, p-) (For reference only, please check.) IATA: PHENYLENEDIAMINES (o-, m-, p-) (For reference only, please check.)

14.3 Transport hazard class(es)

ADR/RID: 6.1 (For reference only, please check.) IMDG: 6.1 (For reference only, please check.) IATA: 6.1 (For reference only, please check.)

14.4 Packing group, if applicable

ADR/RID: III (For reference only, please check.) IMDG: III (For reference only, please check.) IATA: III (For reference only, please check.)

14.5 Environmental hazards

ADR/RID: Yes IMDG: Yes IATA: Yes

14.6 Special precautions for user

no data available

14.7 Transport in bulk according to IMO instruments

no data available

SECTION 15: Regulatory information

15.1 Safety, health and environmental regulations specific for the product in question

Chemical name	Common names and synonyms	CAS number	EC number
p-phenylenediamine	p-phenylenediamine	106-50-3	203-404-7
European Inventory of Existing Commercial Chemical Substances (EINECS)			Listed.
EC Inventory			Listed.
United States Toxic Substances Control Act (TSCA) Inventory			Listed.
China Catalog of Hazardous chemicals 2015			Listed.
New Zealand Inventory of Chemicals (NZIoC)			Listed.
Philippines Inventory of Chemicals and Chemical Substances (PICCS)			Listed.
Vietnam National Chemical Inventory			Listed.
Chinese Chemical Inventory of Existing Chemical Substances (China IECSC)			Listed.
Korea Existing Chemicals List (KECL)			Listed.

SECTION 16: Other information

Information on revision

Creation Date July 15, 2019
Revision Date August 08, 2025

Abbreviations and acronyms

- CAS: Chemical Abstracts Service
- ADR: European Agreement concerning the International Carriage of Dangerous Goods by Road
- RID: Regulation concerning the International Carriage of Dangerous Goods by Rail
- IMDG: International Maritime Dangerous Goods
- IATA: International Air Transportation Association
- TWA: Time Weighted Average
- STEL: Short term exposure limit
- LC50: Lethal Concentration 50%
- LD50: Lethal Dose 50%
- EC50: Effective Concentration 50%

References

- IPCS - The International Chemical Safety Cards (ICSC), website: <http://www.ilo.org/dyn/icsc/showcard.home>
- HSDB - Hazardous Substances Data Bank, website: <https://toxnet.nlm.nih.gov/newtoxnet/hsdb.htm>
- IARC - International Agency for Research on Cancer, website: <http://www.iarc.fr/>
- eChemPortal - The Global Portal to Information on Chemical Substances by OECD, website: http://www.echemportal.org/echemportal/index?pageID=0&request_locale=en
- CAMEO Chemicals, website: <http://cameochemicals.noaa.gov/search/simple>
- ChemIDplus, website: <http://chem.sis.nlm.nih.gov/chemidplus/chemidlite.jsp>
- ERG - Emergency Response Guidebook by U.S. Department of Transportation, website: <http://www.phmsa.dot.gov/hazmat/library/erg>
- Germany GESTIS-database on hazard substance, website: <http://www.dguv.de/ifa/gestis/gestis-stoffdatenbank/index-2.jsp>
- ECHA - European Chemicals Agency, website: <https://echa.europa.eu/>

Other Information

Depending on the degree of exposure, periodic medical examination is suggested. The symptoms of asthma often do not become manifest until a few hours have passed and they are aggravated by physical effort. Rest and medical observation are therefore essential. Anyone who has shown symptoms of asthma due to this substance should avoid all further contact with this substance. Specific treatment is necessary in case of poisoning with this substance; the appropriate means with instructions must be available. The relation between odour and the occupational exposure limit cannot be indicated. Rinse contaminated clothing with plenty of water because of fire hazard.

Any questions regarding this SDS, Please send your inquiry to info@cato-chem.com

Disclaimer: The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. We as supplier shall not be held liable for any damage resulting from handling or from contact with the above product.