

SAFETY DATA SHEETS

According to Globally Harmonized System of Classification and Labelling of Chemicals (GHS) - Sixth revised edition

Version: 1.0

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1. Identification

1.1 GHS Product identifier

Product name 1,4-phenylenediamine

1.2 Other means of identification

Product number -

Other names p-Phenylenediamine

1.3 Recommended use of the chemical and restrictions on use

Identified uses For industry use only. p-Phenylenediamine is primarily used as a dye intermediate and as a dye (e.g., hair dyes and dyes used for dyeing furs), as well as a photographic developing agent and a chemical intermediate. p-Phenylenediamine is also used as a vulcanization accelerator and as an antioxidant in rubber compounds.

Uses advised against no data available

2. Hazard identification

2.1 Classification of the substance or mixture

Acute toxicity - Oral, Category 3

Acute toxicity - Dermal, Category 3

Eye irritation, Category 2

Skin sensitization, Category 1

Acute toxicity - Inhalation, Category 3

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.

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+P310 IF SWALLOWED: Immediately call a POISON CENTER/doctor/...

P321 Specific treatment (see ... on this label).

P330 Rinse mouth.

P302+P352 IF ON SKIN: Wash with plenty of water/...

P312 Call a POISON CENTER/doctor/...if you feel unwell.

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.

P337+P313 If eye irritation persists: Get medical advice/attention.

P333+P313 If skin irritation or rash occurs: Get medical advice/attention.

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.

P311 Call a POISON CENTER/doctor/...

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 ...

2.3 Other hazards which do not result in classification

none

3. Composition/information on ingredients

3.1 Substances

Chemical name	Common names and synonyms	CAS number	EC number	Concentration
1,4-phenylenediamine	1,4-phenylenediamine	106-50-3	none	100%

4. First-aid measures

4.1 Description of necessary first-aid measures

General advice

Consult a physician. Show this safety data sheet to the doctor in attendance.

If inhaled

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

In case of skin contact

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

In case of eye contact

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

If swallowed

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.

5. Fire-fighting measures

5.1 Extinguishing media

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

Wear self-contained breathing apparatus for firefighting if necessary.

6. Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

Use personal protective equipment. Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust. For personal protection see section 8.

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

Pick up and arrange disposal. Sweep up and shovel. Keep in suitable, closed containers for disposal.

7. Handling and storage

7.1 Precautions for safe handling

Avoid contact with skin and eyes. Avoid formation of dust and aerosols. Avoid exposure - obtain special instructions before use. Provide appropriate exhaust ventilation at places where dust is formed. For precautions see section 2.2.

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.

8. Exposure controls/personal protection

8.1 Control parameters

Occupational Exposure limit values

Recommended Exposure Limit: 10 Hr Time-Weighted Avg: 0.1 mg/cu m, skin.

Biological limit values

no data available

8.2 Appropriate engineering controls

Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

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

Eye/face protection

Safety glasses with side-shields conforming to EN166. Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection

Wear impervious clothing. The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace. Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to

avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands. The selected protective gloves have to satisfy the specifications of EU Directive 89/686/EEC and the standard EN 374 derived from it.

Respiratory protection

Wear dust mask when handling large quantities.

Thermal hazards

no data available

9. Physical and chemical properties

Physical state	white to light purple solid
Colour	WHITE TO SLIGHTLY RED CRYSTALS
Odour	no data available
Melting point/ freezing point	265°C(lit.)
Boiling point or initial boiling point and boiling range	267°C(lit.)
Flammability	Combustible SolidCombustible. Gives off irritating or toxic fumes (or gases) in a fire.
Lower and upper explosion limit / flammability limit	no data available
Flash point	110°C
Auto-ignition temperature	400°C
Decomposition temperature	no data available
pH	no data available
Kinematic viscosity	no data available
Solubility	In water:47 g/L (25 °C)
Partition coefficient n-octanol/water (log value)	log Kow= -0.25
Vapour pressure	1.08 mm Hg (100 °C)
Density and/or relative density	1.15 g/cm3
Relative vapour density	3.7 (vs air)

10. Stability and reactivity

10.1 Reactivity

no data available

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.

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.

11. Toxicological information

Acute toxicity

- Oral: LDLo Rat oral 100 mg/kg
- Inhalation: no data available
- Dermal: no data available

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

no data available

STOT-repeated exposure

no data available

Aspiration hazard

no data available

12. Ecological information

12.1 Toxicity

- Toxicity to fish: no data available
- Toxicity to daphnia and other aquatic invertebrates: no data available
- Toxicity to algae: no data available
- Toxicity to microorganisms: no data available

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 3hr at 30°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°C has been reported(2). Aniline-acclimated activated sludge led to 8% theoretical BOD in 190 hr at 20°C(3). No degradation of 500 mg/l 1,4-benzenediamine was observed with 3 activated sludges in 24 hr at 20°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

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.

14. Transport information

14.1 UN Number

ADR/RID: UN1673

IMDG: UN1673

IATA: UN1673

14.2 UN Proper Shipping Name

ADR/RID: PHENYLENEDIAMINES (o-, m-, p-)

IMDG: PHENYLENEDIAMINES (o-, m-, p-)

IATA: PHENYLENEDIAMINES (o-, m-, p-)

14.3 Transport hazard class(es)

ADR/RID: 6.1

IMDG: 6.1

IATA: 6.1

14.4 Packing group, if applicable

ADR/RID: III

IMDG: III

IATA: III

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 Annex II of MARPOL 73/78 and the IBC Code

no data available

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
1,4-phenylenediamine	1,4-phenylenediamine	106-50-3	none
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.

16. Other information

Information on revision

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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/>

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