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ISO 9001: 2015

MATERIAL SAFETY DATA SHEET

1. Identification

1.1 GHS Product identifier

4,4'-Diaminodiphenylmethane, 99%

Code: D 1377

2. Hazard identification

2.1 Classification of the substance or mixture

Skin sensitization, Category 1

Germ cell mutagenicity, Category 2

Carcinogenicity, Category 1B

Specific target organ toxicity \u2013 single exposure, Category 1

Specific target organ toxicity \u2013 repeated exposure, Category 2

Hazardous to the aquatic environment, long-term (Chronic) - Category Chronic 2

2.2 GHS label elements, including precautionary statements

Pictogram(s)



Signal word

Hazard statement(s)

Danger

H317 May cause an allergic skin reaction

H341 Suspected of causing genetic defects

H350 May cause cancer

H370 Causes damage to organs

H373 May cause damage to organs through prolonged or repeated exposure

H411 Toxic to aquatic life with long lasting effects

Precautionary statement(s)

Prevention

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

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

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

P201 Obtain special instructions before use.

P202 Do not handle until all safety precautions have been read and understood.

P260 Do not breathe dust/fume/gas/mist/vapours/spray.

P264 Wash ... thoroughly after handling.

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

P273 Avoid release to the environment.

Response

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

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

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

P362+P364 Take off contaminated clothing and wash it before reuse.

P308+P313 IF exposed or concerned: Get medical advice/ attention.

P308+P311 IF exposed or concerned: Call a POISON CENTER/doctor/...

P314 Get medical advice/attention if you feel unwell.

P391 Collect spillage.

Storage

P405 Store locked up.

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
4,4'-diaminodiphenylmethane	4,4'-diaminodiphenylmethane	101-77-9	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. Refer for medical attention.

In case of skin contact

Remove contaminated clothes. Rinse and then wash skin with water and soap. 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. Refer for medical attention.

4.2 Most important symptoms/effects, acute and delayed

Excerpt from ERG Guide 153 [Substances - Toxic and/or Corrosive (Combustible)]: TOXIC; inhalation, ingestion or skin contact with material may cause severe injury or death. Contact with molten substance may cause severe burns to skin and eyes. Avoid any skin contact. Effects of contact or inhalation may be delayed. Fire may produce irritating, corrosive and/or toxic gases. Runoff from fire control or dilution water may be corrosive and/or toxic and cause pollution. (ERG, 2016)

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

Immediate first aid: Ensure that adequate decontamination has been carried out. If patient is not breathing, start artificial respiration, preferably with a demand-valve resuscitator, bag-valve-mask device, or pocket mask, as trained. Perform CPR as necessary. Immediately flush contaminated eyes with gently flowing water. Do not induce vomiting. If vomiting occurs, lean patient forward or place on left side (head-down position, if possible) to maintain an open airway and prevent aspiration. Keep patient quiet and maintain normal body temperature. Obtain medical attention. /Nitrates, nitrites, and related compounds/

5. Fire-fighting measures

5.1 Extinguishing media

Suitable extinguishing media

Excerpt from ERG Guide 153 [Substances - Toxic and/or Corrosive (Combustible)]: SMALL FIRE: Dry chemical, CO₂ or water spray. LARGE FIRE: Dry chemical, CO₂, alcohol-resistant foam or water spray. Move containers from fire area if you can do it without risk. Dike fire-control water for later disposal; do not scatter the material. FIRE INVOLVING TANKS OR CAR/TRAILER LOADS: Fight fire from maximum distance or use unmanned hose holders or monitor nozzles. Do not get water inside containers. Cool containers with flooding quantities of water until well after fire is out. Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank. ALWAYS stay away from tanks engulfed in fire. (ERG, 2016)

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

Personal protection: complete protective clothing including self-contained breathing apparatus. Do NOT let this chemical enter the environment. Sweep spilled substance into sealable containers. If appropriate, moisten first to prevent dusting. Carefully collect remainder. Then store and dispose of according to local regulations.

6.3 Methods and materials for containment and cleaning up

FACILITY AND PROCESS ARE DISCUSSED FOR REMOVAL OF METHYLENEDIANILINE.

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 and food and feedstuffs. Well closed. Store in an area without drain or sewer access. Provision to contain effluent from fire extinguishing. MATERIALS WHICH ARE TOXIC AS STORED OR WHICH CAN DECOMPOSE INTO TOXIC COMPONENTS... SHOULD BE STORED IN A COOL WELL VENTILATED PLACE, OUT OF THE DIRECT RAYS OF THE SUN, AWAY FROM AREAS OF HIGH FIRE HAZARD, & SHOULD BE PERIODICALLY INSPECTED. INCOMPATIBLE MATERIALS SHOULD BE ISOLATED...

8. Exposure controls/personal protection

8.1 Control parameters

Occupational Exposure limit values

NIOSH considers 4,4'-methylenedianiline to be a potential occupational carcinogen.

NIOSH usually recommends that occupational exposures to carcinogens be limited to the lowest feasible concn.

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 yellow or beige flakes or crystals

Colour

Crystals from water or benzene

Odour

Faint, amine-like odor

Melting point/ freezing point

88-92 °C

Boiling point or initial boiling point and boiling range

398-399 °C (768 torr)

Flammability

Combustible Solid Combustible.

Lower and upper explosion limit / flammability limit

no data available

Flash point

221 °C

Auto-ignition temperature

no data available

Decomposition temperature

no data available

pH

Weak base

Kinematic viscosity

8.3 cP at 100 °C

Solubility

In water: Slightly soluble.

Partition coefficient n-octanol/water (log value)

log Kow = 1.59

Vapour pressure

1.52E-06 mmHg at 25 °C

Density and/or relative density

1.15

Relative vapour density

6.8 (Relative to Air)

Particle characteristics

no data available

10. Stability and reactivity

10.1 Reactivity

no data available

10.2 Chemical stability

OXIDIZES IN AIR; PALE YELLOW CRYSTALS TURN DARK COLOR WHEN EXPOSED TO AIR.

10.3 Possibility of hazardous reactions

Combustible when exposed to heat or flame. 4,4'-DIAMINODIPHENYLMETHANE polymerizes if heated above 125 °C.

Incompatible with strong oxidizing agents. It is also incompatible with acids. Catalyzes isocyanate-alcohol and epoxide reactions.

Flammable gaseous hydrogen may be generated in combination with strong reducing agents, such as hydrides.

10.4 Conditions to avoid

no data available

10.5 Incompatible materials

Strong oxidizers.

10.6 Hazardous decomposition products

When heated to decomposition it emits highly toxic fumes of aniline and NOx.

11. Toxicological information

Acute toxicity

Oral: LD50 Dog oral 300 ppm

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. Sufficient evidence of carcinogenicity in animals. OVERALL EVALUATION: Group 2B: The agent is possibly carcinogenic to humans.

Reproductive toxicity

No adequate information is available on the reproductive or developmental effects of MDA in humans or animals.

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: LC50; Species: Brachydanio rerio (Zebra danio); Conditions: static, nominal concentrations); Concentration: 42.0 mg/L for 96 hr /95.5-98% purity

Toxicity to daphnia and other aquatic invertebrates: no data available

Toxicity to algae: EC50; Species: Scenedesmus subspicatus (Green algae); Concentration: 21 mg/L for 72 hr; Effect: growth inhibition /95.5-98% purity/ /Conditions of bioassay not specified in source examined

Toxicity to microorganisms: no data available

12.2 Persistence and degradability

AEROBIC: 4,4'-Diaminodiphenylmethane, present at 100 mg/L, reached 0% of its theoretical BOD in 4 weeks using an activated sludge inoculum at 30 mg/L in the Japanese MITI test(1). Aerobic biodegradation of 4,4'-diaminodiphenylmethane in a silt loam soil (measured as the fraction of CO₂ recovered) was 2, 10, 11.2, and 11.6% after 3, 14, 28, and 56 days, respectively(2). Apparent biodegradation after 365 days in the silt loam soil was reported as 40.1%(2).

12.3 Bioaccumulative potential

BCF values ranging from 3.0 to 14 were measured for 4,4'-diaminodiphenylmethane (200 ug/L) in carp (4.5% lipid content) after a 6 week period(1). According to a classification scheme(2), these BCF values suggest the bioconcentration in aquatic organisms is low(SRC).

12.4 Mobility in soil

After an 8 hour sorption period, Koc values of 5681 and 3825 were measured for 4,4'-diaminodiphenylmethane in sandy loam under aerobic and anaerobic conditions, respectively(1). Koc values of 4015 and 3831 were measured in silt loam under aerobic and anaerobic conditions, respectively(1). According to a classification scheme(2), these measured Koc values suggest that 4,4'-diaminodiphenylmethane is expected to have slight to no mobility in soil. The reaction of 4,4'-diaminodiphenylmethane with soil humics was studied by allowing the substance to remain in contact with soil for 7 days and then measuring desorption in 1 day. The results suggested that 4,4'-diaminodiphenylmethane sorbed onto soil may be in a relatively facile equilibrium with the surrounding solution as shown by the similarity of distribution ratios (sorbed compound (in ug/g of soil)/concentrated in solution (in ug/mL)) for both sorption and desorption with Rdesorb/Rsorb ranging from 1.1 to 1.4(1). In this study the average ratio of aerobic/anaerobic soil sorption coefficients for 4,4'-diaminodiphenylmethane was 1.27, suggesting little difference between the behavior of 4,4'-diaminodiphenylmethane with soil under oxidizing and reducing conditions(1). Aromatic amines have been observed to undergo rapid and reversible covalent bonding with humic materials in aqueous solution; the initial bonding reaction is followed by a slower and much less reversible reaction believed to represent the addition of the amine to quinoidal structures followed by oxidation of the product to give an amino-substituted quinone; these processes represent pathways by which aromatic amines may be converted to latent forms in the biosphere(3).

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: UN2651

IMDG: UN2651

IATA: UN2651

14.2 UN Proper Shipping Name

ADR/RID: 4,4'-DIAMINODIPHENYL- METHANE

IMDG: 4,4'-DIAMINODIPHENYL- METHANE

IATA: 4,4'-DIAMINODIPHENYL- METHANE

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
4,4'-diaminodiphenylmethane	4,4'-diaminodiphenylmethane	101-77-9	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			Not Listed.
Chinese Chemical Inventory of Existing Chemical Substances (China IECSC)			Listed.

SECTION 16: OTHER INFORMATION

This safety data sheet should be used in conjunction with technical sheets. It does not replace them. The information given is based on our knowledge of this product, at the time of publication. It is given in good faith. The attention of the user is drawn to the possible risks incurred by using the product for any other purpose other than that for which it was intended. This does not in any way excuse the user from knowing and applying all the regulations governing his activity. It is the sole responsibility of the user to take all precautions required in handling the product. The aim of the mandatory regulations mentioned is to help the user to fulfill his obligations regarding the use of hazardous products.

