SAFETY DATA SHEETS

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

Version: 1.0

Creation Date: Aug 17, 2017

Revision Date: Aug 17, 2017

1.Identification

1.1GHS Product identifier

Product name	biphenyl-4-amine

1.2Other means of identification

Product number	-
Other names	[1,1 '-Biphenyl]-4-amine

1.3Recommended use of the chemical and restrictions on use

Identified uses	For industry use only. 4-Aminobiphenyl is no longer manufactured commercially; it was used as a rubber antioxidant and a dye intermediate in the past.
Uses advised against	no data available
Service hours	Monday to Friday, 9am-5pm (Standard time zone: UTC/GMT +8 hours).

2.Hazard identification

2.1Classification of the substance or mixture

Acute toxicity - Oral, Category 4

Carcinogenicity, Category 1A

2.2GHS label elements, including precautionary statements

Pictogram(s)	

Signal word	Danger
Hazard statement(s)	H302 Harmful if swallowed H350 May cause cancer
Precautionary statement(s)	
Prevention	P264 Wash ... thoroughly after handling. P270 Do not eat, drink or smoke when using this product. P201 Obtain special instructions before use. P202 Do not handle until all safety precautions have been read and understood. P280 Wear protective gloves/protective clothing/eye protection/face protection.
Response	P301+P312 IF SWALLOWED: Call a POISON CENTER/doctor/…if you feel unwell. P330 Rinse mouth. P308+P313 IF exposed or concerned: Get medical advice/ attention.
Storage	P405 Store locked up.
Disposal	P501 Dispose of contents/container to ...

2.3Other hazards which do not result in classification

none

3.Composition/information on ingredients

3.1Substances

Chemical name	Common names and synonyms	CAS number	EC number	Concentration
biphenyl-4-amine	biphenyl-4-amine	92-67-1	none	100%

4.First-aid measures

4.1Description 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.

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 .

4.2Most important symptoms/effects, acute and delayed

Exposure Routes: inhalation, skin absorption, ingestion, skin and/or eye contact Symptoms: Headache, dizziness; drowsiness, dyspnea (breathing difficulty); ataxia, lassitude (weakness, exhaustion); methemoglobinemia; urinary burning; acute hemorrhagic cystitis; [potential occupational carcinogen] Target Organs: Bladder, skin (NIOSH, 2016)

4.3Indication 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

5.1Extinguishing media

Suitable extinguishing media

Suitable extinguishing media: Use water spray, alcohol-resistant foam, dry chemical, or carbon dioxide.

5.2Specific hazards arising from the chemical

This chemical is probably combustible.

5.3Special protective actions for fire-fighters

Wear self-contained breathing apparatus for firefighting if necessary.

6.Accidental release measures

6.1Personal 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.

6.2Environmental precautions

Personal protection: complete protective clothing including self-contained breathing apparatus. 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.

6.3Methods and materials for containment and cleaning up

ACCIDENTAL RELEASE MEASURES: Personal precautions, protective equipment and emergency procedures: Use personal protective equipment. Avoid dust formation. Avoid breathing vapors, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust. Environmental precautions: Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Methods and materials for containment and cleaning up: Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

7.Handling and storage

7.1Precautions 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.

7.2Conditions for safe storage, including any incompatibilities

Separated from strong oxidants and acids. Well closed.Keep container tightly closed in a dry and well-ventilated place.

8.Exposure controls/personal protection

8.1Control parameters

Occupational Exposure limit values

NIOSH considers 4-aminodiphenyl to be a potential occupational carcinogen.

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

Biological limit values

no data available

8.2Appropriate engineering controls

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

8.3Individual 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	brownish yellow solid
Colour	Colorless crystals
Odour	Floral odor
Melting point/ freezing point	52-54°C
Boiling point or initial boiling point and boiling range	191°C (15 mmHg)
Flammability	Combustible Solid, but must be preheated before ignition possible.Combustible. Gives off irritating or toxic fumes (or gases) in a fire.
Lower and upper explosion limit / flammability limit	no data available
Flash point	113°C
Auto-ignition temperature	450° C
Decomposition temperature	no data available
pH	no data available
Kinematic viscosity	no data available
Solubility	less than 0.1 mg/mL at 18.89° C
Partition coefficient n-octanol/water	log Kow = 2.86 at pH 7.5

(log value)	
Vapour pressure	1 mm Hg at 108.33° C (NIOSH, 2016)
Density and/or relative density	1.077g/cm3
Relative vapour density	5.8 (Air = 1) at boiling point of 4-aminodiphenyl
Particle characteristics	no data available

10.Stability and reactivity

10.1Reactivity

no data available

10.2Chemical stability

Stable under recommended storage conditions.

10.3Possibility of hazardous reactions

Slight to moderate when exposed to heat, flames, (sparks) or powerful oxidizers.4-AMINOBIPHENYL is a weak base. Incompatible with acids and acid anhydrides. Forms salts with hydrochloric acid and sulfuric acid. Can be diazotized, acetylated and alkylated. . May react with strong oxidizing agents.

10.4Conditions to avoid

no data available

10.5Incompatible materials

Incompatible materials: Strong oxidizing agents.

10.6Hazardous decomposition products

Hazardous decomposition products formed under fire conditions - Carbon oxides, nitrogen oxides (NOx).

11.Toxicological information

Acute toxicity

- Oral: LD50 Rat oral 500 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

Sufficient evidence of carcinogenicity in humans. Sufficient evidence of carcinogenicity in animals. OVERALL EVALUATION: Group 1: The agent is carcinogenic to humans.

Reproductive toxicity

4-Aminobiphenyl has been shown to cross the placenta in humans and has been detected in fetal blood. No other information is available on the reproductive or developmental effects of 4-aminobiphenyl in humans or animals.

STOT-single exposure

no data available

STOT-repeated exposure

no data available

Aspiration hazard

no data available

12.Ecological information

12.1Toxicity

- 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

12.2Persistence and degradability

AEROBIC: 4-Biphenylamine was 0-50% degraded at the end of a 28 day test period in a static biodegradability test in which 2 mg/L of the compound was seeded with sludge, mineral salts, 5 mg/l yeast, with 7-day static incubation followed by 3 weekly subcultures(1); this was considered as slowly degraded with acclimation under the conditions of this test system(1). In another static system procedure where a 1% solution of the chemical in an emulsifier was added to a bacterial suspension at a concentrations of 1 to 2 ppm, 4-biphenylamine was 50% degraded at the end an initial 7-day incubation period(2). Two analogous compounds, aniline (phenylamine) and biphenyl, were classified as readily biodegradable by the Japanese MITI test (OECD Guideline 301C)(3). Aniline and biphenyl, present at 100 mg/L, reached 85 and 66% of their respective theoretical BOD in 2 weeks using an activated sludge inoculum at 30 mg/L in the Japanese MITI test(3).

12.3Bioaccumulative potential

An estimated BCF of 36 was calculated in fish for 4-biphenylamine(SRC), using a log Kow of 2.86(1) and a regression-derived equation(2). According to a classification scheme(3), this BCF suggests the potential for bioconcentration in aquatic organisms is moderate(SRC).

12.4Mobility in soil

Using a structure estimation method based on molecular connectivity indices(1), the Koc of 4-biphenylamine can be estimated to be 2470(SRC). According to a classification scheme(2), this estimated Koc value suggests that

4-biphenylamine is expected to have slight mobility in soil. Aromatic amines are expected to bind strongly to humus or organic matter in soils due to the high reactivity of the aromatic amino group(3,4), suggesting that mobility may be lower in some soils(SRC).

12.5Other adverse effects

no data available

13.Disposal considerations

13.1Disposal 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

14.1UN Number

ADR/RID: UN3077	IMDG: UN3077	IATA: UN3077

14.2UN Proper Shipping Name

ADR/RID: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S.
IMDG: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S.
IATA: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S.

14.3Transport hazard class(es)

ADR/RID: 9	IMDG: 9	IATA: 9

14.4Packing group, if applicable

ADR/RID: III	IMDG: III	IATA: III

14.5Environmental hazards

ADR/RID: no	IMDG: no	IATA: no

14.6Special precautions for user

no data available

14.7Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code

no data available

15.Regulatory information

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

Chemical name	Common names and synonyms	CAS number	EC number
biphenyl-4-amine	biphenyl-4-amine	92-67-1	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.

16.Other information

Information on revision

Creation Date	Aug 17, 2017
Revision Date	Aug 17, 2017

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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