

# SAFETY DATA SHEETS

According to the UN GHS revision 9

Version: 1.0  
Creation Date: July 15, 2019  
Revision Date: July 15, 2019

## SECTION 1: Identification

### 1.1 GHS Product identifier

**Product name** 3,3'-dichlorobenzidine

### 1.2 Other means of identification

**Product number** -  
**Other names** 4-(4-amino-3-chlorophenyl)-2-chloroaniline; 1,1'-Biphenyl-4,4'-diamine, 3,3'-dichloro-

### 1.3 Recommended use of the chemical and restrictions on use

**Identified uses** Industrial and scientific research use.  
**Uses advised against** no data available

### 1.4 Supplier's details

**Company** Shanghai Baishun Biotechnology Co., Ltd  
**Address** No. 26, Lane 918, Lianye Road, Zhelin Town, Fengxian District, Shanghai, 201400, China  
**Telephone** +86-21-37581181

### 1.5 Emergency phone number

**Emergency phone number** +86-21-37581181  
**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 4, Dermal  
Skin sensitization, Category 1  
Carcinogenicity, Category 1B  
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)** H312 Harmful in contact with skin

H317 May cause an allergic skin reaction  
H350 May cause cancer  
H410 Very toxic to aquatic life with long lasting effects

**Precautionary statement(s)**

**Prevention**

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.  
P203 Obtain, read and follow all safety instructions before use.  
P273 Avoid release to the environment.

**Response**

P302+P352 IF ON SKIN: Wash with plenty of water/...  
P317 Get medical help.  
P321 Specific treatment (see ... on this label).  
P362+P364 Take off contaminated clothing and wash it before reuse.  
P333+P317 If skin irritation or rash occurs: Get medical help.  
P318 IF exposed or concerned, get medical advice.  
P391 Collect spillage.

**Storage**

P405 Store locked up.

**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

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## SECTION 3: Composition/information on ingredients

### 3.1 Substances

Chemical name	Common names and synonyms	CAS number	EC number	Concentration
3,3'-dichlorobenzidine	3,3'-dichlorobenzidine	91-94-1	202-109-0	100%

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## SECTION 4: First-aid measures

### 4.1 Description of necessary first-aid measures

**If inhaled**

Fresh air, rest. Seek medical attention if you feel unwell.

**Following skin contact**

Remove contaminated clothes. Rinse and then wash skin with water and soap. Seek medical attention if you feel unwell.

**Following eye contact**

Rinse with plenty of water (remove contact lenses if easily possible).

**Following ingestion**

Rinse mouth. 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: Skin sensitization, dermatitis; headache, dizziness; caustic burns; frequent urination, dysuria; hematuria (blood in the urine); gastrointestinal upset; upper respiratory infection; [Potential occupational carcinogen] Target Organs: Bladder, liver, lung, skin, gastrointestinal tract Cancer Site [in animals: liver & bladder cancer] (NIOSH, 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. Aniline and related compounds

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## **SECTION 5: Fire-fighting measures**

### **5.1 Suitable extinguishing media**

Wear self contained breathing apparatus for fire fighting if necessary.

### **5.2 Specific hazards arising from the chemical**

Combustible. (NTP, 1992)

### **5.3 Special protective actions for fire-fighters**

Use fine water spray, dry powder, carbon dioxide.

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## **SECTION 6: Accidental release measures**

### **6.1 Personal precautions, protective equipment and emergency procedures**

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.

### **6.2 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**

Use of sodium hypochlorite bleach solution to decontaminate 3,3'-dichlorobenzidine was partially effective. An aqueous solution of 5% tetrapotassium pyrophosphate and 10% sodium ethyl hexyl sulfate when blended in a jet sprayer effectively removed 3,3'-dichlorobenzidine from a worker area (90-99% reduction). Once removed from the work site and collected in a central location, it was then determined that the diazotization reaction (the addition of sulfate, ice and sodium nitrate occurred to eliminate any detectable dichlorobenzine from the washings.

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## **SECTION 7: Handling and storage**

### **7.1 Precautions for safe handling**

NO open flames. 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**

Provision to contain effluent from fire extinguishing. Separated from food and feedstuffs. Well closed. Store only in original container. Store in an area without drain or sewer access. Stable under recommended storage conditions.

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## **SECTION 8: Exposure controls/personal protection**

### **8.1 Control parameters**

**Occupational Exposure limit values**

TLV: (skin); A3 (confirmed animal carcinogen with unknown relevance to humans).MAK: skin absorption (H); carcinogen category: 2

#### **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 face shield or eye protection in combination with breathing protection if powder.

#### **Skin protection**

Protective gloves. Protective clothing.

#### **Respiratory protection**

Avoid inhalation of dust. Use local exhaust or breathing protection.

#### **Thermal hazards**

no data available

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## **SECTION 9: Physical and chemical properties and safety characteristics**

<b>Physical state</b>	3,3'-dichlorobenzidine is a gray to purple crystalline powder. Insoluble in water. Very toxic. Used in the dye industry, curing agent for isocyanate terminated resins.
<b>Colour</b>	Needles from alcohol or benzene
<b>Odour</b>	no data available
<b>Melting point/freezing point</b>	133°C
<b>Boiling point or initial boiling point and boiling range</b>	368°C
<b>Flammability</b>	Combustible. Gives off irritating or toxic fumes (or gases) in a fire.
<b>Lower and upper explosion limit/flammability limit</b>	no data available
<b>Flash point</b>	10°C
<b>Auto-ignition temperature</b>	350°C
<b>Decomposition temperature</b>	no data available
<b>pH</b>	Weak base
<b>Kinematic viscosity</b>	no data available
<b>Solubility</b>	0.07 % at 59° F (NIOSH, 2016)
<b>Partition coefficient n-octanol/water</b>	log Kow = 3.51
<b>Vapour pressure</b>	4.1X10-6 mm Hg at 25 deg C (est)
<b>Density and/or relative density</b>	1.381g/cm <sup>3</sup>
<b>Relative vapour density</b>	no data available
<b>Particle characteristics</b>	no data available

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## **SECTION 10: Stability and reactivity**

### **10.1 Reactivity**

NIOSH considers 3,3'-dichlorobenzidine (and its salts) to be a potential occupational carcinogens.

Decomposes on burning. This produces toxic and corrosive fumes including nitrogen oxides and hydrogen chloride.

## 10.2 Chemical stability

no data available

## 10.3 Possibility of hazardous reactions

A halide- and amine-substituted aromatic compound. Amines are chemical bases. They neutralize acids to form salts plus water. These acid-base reactions are exothermic. The amount of heat that is evolved per mole of amine in a neutralization is largely independent of the strength of the amine as a base. Amines may be incompatible with isocyanates, halogenated organics, peroxides, phenols (acidic), epoxides, anhydrides, and acid halides. Flammable gaseous hydrogen is generated by amines in combination with strong reducing agents, such as hydrides.

## 10.4 Conditions to avoid

no data available

## 10.5 Incompatible materials

Strong oxidizing agents

## 10.6 Hazardous decomposition products

When heated to decomposition it emits very high toxic fumes of hydrogen chloride and nitrogen oxides.

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# SECTION 11: Toxicological information

### Acute toxicity

- Oral: LD50 Mouse (female) oral 352 mg/kg/day (7 consecutive days)
- 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

NTP: Reasonably anticipated to be a human carcinogen

### Reproductive toxicity

No information is available on the reproductive or developmental effects of 3,3'-dichlorobenzidine in humans. Animal studies have reported abnormal growth in the kidneys of the fetuses of pregnant mice treated subcutaneously with 3,3'-dichlorobenzidine. No data were reported on maternal effects.

### STOT-single exposure

The substance is irritating to the respiratory tract.

### STOT-repeated exposure

Repeated or prolonged contact with skin may cause dermatitis. The substance may have effects on the liver. This substance is probably carcinogenic to humans.

#### Aspiration hazard

Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly when dispersed, especially if powdered.

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## SECTION 12: Ecological information

### 12.1 Toxicity

- Toxicity to fish: LC50; Species: Pimephales promelas (Fathead Minnow) age 30 days, length 20 mm, weight 0.103 g; Conditions: freshwater, flow through, 22 (21.7-22.5) deg C, pH 7.24 (6.76-7.54), hardness 51.6 (50.9-51.9) mg/L CaCO<sub>3</sub>, alkalinity 43 (36-46) mg/L CaCO<sub>3</sub>, dissolved oxygen 83.1% (73.7-88.5%); Concentration: 2080 ug/L for 96 hr /98% purity
- Toxicity to daphnia and other aquatic invertebrates: LC50; Species: Daphnia magna (Water Flea) age <24 hr neonate; Conditions: freshwater, renewal, 22.3. (22-22.6 deg C), pH 8.43 (8.33-8.61), hardness 170 (163-183) mg/L CaCO<sub>3</sub>, alkalinity 108 (88-131) mg/L CaCO<sub>3</sub>, dissolved oxygen 98.4% (94.8-100.8%); Concentration: 1050 ug/L for 48 hr (95% confidence interval: 810-1360 ug/L) /98% purity
- Toxicity to algae: no data available
- Toxicity to microorganisms: no data available

### 12.2 Persistence and degradability

3,3-Dichlorobenzidine, present at 3 mg/L dissolved organic carbon, was 9-43% 0-91%, 34-93% and 18-99% biodegraded in 4 weeks using an activated sludge inoculum, amended with a yeast extract nutrient broth of 50, 100, 200 and 400 mg/L, respectively, in the Modified AFNOR test. No biodegradation was observed in tests not amended with the yeast extract(1). When incubated with natural aquatic communities from eutrophic and mesotrophic lakes, 25% of the 3,3'-dichlorobenzidine degraded in a month(2). When incubated in soil under aerobic conditions, only 2% mineralization occurred in 32 weeks and no degradation intermediates were detected(3). Under anaerobic conditions no mineralization occurred in a year(3). 3,3'-Dichlorobenzidine, present at 100 mg/L, achieved 1% of its theoretical BOD in 4 weeks using an activated sludge inoculum at 30 mg/L and the Japanese MITI test which classified the compound as not readily biodegradable(4). The half-life of 3,3'-dichlorobenzidine in a lake water and sediment slurry obtained from Lake Macatawa, MI was approximately 150 days(5). 3,3'-Dichlorobenzidine dihydrochloride was not readily biodegradable by microorganisms obtained from freshwater lakes and incubated for 28 and 30 days or in an activated sludge study(6,7). These data suggest that biodegradation of 3,3'-dichlorobenzidine will occur slowly in the environment(SRC). Half-lives of 4-26 weeks and 16-101 weeks have been estimated for the biodegradation of 3,3'-dichlorobenzidine in surface water and anaerobic groundwater, respectively(8).

### 12.3 Bioaccumulative potential

The equilibrium bioconcentration factors using (14)-C-3,3'-dichlorobenzidine in whole bluegill sunfish (*Lepomis macrochirus*) was reported as 495-507, the BCF was 114-175 in the edible portion and 814-856 in non-edible parts(1). The BCF values measured in Golden ide fish (*Leuciscus idus*) and in algae were 610 and 940, respectively(2). A BCF range of 43-213 was measured in fish for 3,3'-dichlorobenzidine(SRC), using carp (*Cyprinus carpio*) which were exposed over an 8-week period(3). According to a classification scheme(4), these BCF data suggest the potential for bioconcentration in aquatic organisms is moderate to high(SRC).

### 12.4 Mobility in soil

Based upon measured Freundlich adsorption coefficients in a Brookston clay loam soil and a Rubicon sandy soil(1), the Koc of 3,3'-dichlorobenzidine can be determined to be 33,720 and 15,885 in the respective soils(SRC). Batch isotherm studies using five sandy to silty-clay sediment samples collected from Lake Macatawa (Holland, MI), measured Koc values ranging from 721 to 3,965(2); the majority of adsorption was determined to occur through covalent bonding(2). According to a classification scheme(3), these Koc values suggest that 3,3'-dichlorobenzidine is expected to have low to no mobility in soil. 3,3'-Dichlorobenzidine is a weak base with pKa values of 3.2 and 1.6(4), indicating that this compound will exist primarily in the neutral form. Aromatic amines like benzidine, 3,3'-

dichlorobenzidine and substituted anilines are known to bind to soils containing a large organic carbon content due to the ability of the aromatic amino group to form covalent bonds with humic and fulvic material in soils(5). These complexes are often irreversibly bound and immobile(5).

## 12.5 Other adverse effects

no data available

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## 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.

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## SECTION 14: Transport information

### 14.1 UN Number

ADR/RID: UN3077 (For reference only, please check.)

IMDG: UN3077 (For reference only, please check.)

IATA: UN3077 (For reference only, please check.)

### 14.2 UN Proper Shipping Name

ADR/RID:  
ENVIRONMENTALLY  
HAZARDOUS SUBSTANCE,  
SOLID, N.O.S. (For  
reference only, please check.)

IMDG:  
ENVIRONMENTALLY  
HAZARDOUS  
SUBSTANCE, SOLID,  
N.O.S. (For reference only,  
please check.)

IATA:  
ENVIRONMENTALLY  
HAZARDOUS  
SUBSTANCE, SOLID,  
N.O.S. (For reference only,  
please check.)

### 14.3 Transport hazard class(es)

ADR/RID: 9 (For reference only, please check.)

IMDG: 9 (For reference only, please check.)

IATA: 9 (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

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## SECTION 15: Regulatory information

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

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Chemical name	Common names and synonyms	CAS number	EC number
3,3'-dichlorobenzidine	3,3'-dichlorobenzidine	91-94-1	202-109-0
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** July 15, 2019

### 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](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

The substance is combustible but no flash point is available in literature. TLV Note: Exposure by all routes should be carefully controlled to levels as low as possible.

**Any questions regarding this SDS, Please send your inquiry to [sds@xixisys.com](mailto:sds@xixisys.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.*

