

Material Safety Data Sheet

1 CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Chemical/Product Name	4,4'-Diaminodiphenyl ether (ODA)
Company Name	Shanghai Liluo Industrial Co.,Ltd.
Department	Chemicals Dept.
Address	Rm.5110,Bldg 5,No.735,Liyang Rd.,Shanghai 200080,China
Telephone number	+86-21-5697-3112
Fax number	+86-21-5672-1121
Emergency phone number	+86-21-6333-5570
General Use	Starting material for functional polymer.

2 HAZARDS IDENTIFICATION

GHS Classification (According to JIS 7252:2009 Draft)

Physical Hazards Not classified


Health Hazards

Acute toxicity (oral)	Category 4
Skin sensitization	Category 1
Carcinogenicity	Category 2
Specific target organ toxicity – repeated exposure	Category 2 (blood, central nervous system)

Environmental Hazards

Hazardous to the aquatic environment -Acute hazard	Category 1
Hazardous to the aquatic environment -Chronic hazard	Category 1

GHS Label Elements

Pictogram	
Signal word	Danger
Hazard statements	<ul style="list-style-type: none"> • Harmful if swallowed. • May cause an allergic skin reaction. • Suspected of causing cancer. • May cause damage to organs (blood and central nervous system) through prolonged or repeated exposure. • Very toxic to aquatic life. • Very toxic to aquatic life with long lasting effects.
Precautionary statement [Prevention]	<ul style="list-style-type: none"> • Obtain special instructions before use. • Do not handle until all safety precautions have been read and understood.

- Do not eat, drink or smoke when using this product.
 - Wear protective gloves.
 - Avoid breathing dust/fume/vapours.
 - Contaminated work clothing should not be allowed out of the workplace.
 - Use personal protective equipment as required.
 - Wash hands thoroughly after handling.
 - Avoid release to the environment.
 - If swallowed: Call a poison center or doctor/physician if you feel unwell.
 - Rinse mouth.
 - If on skin: wash with plenty of soap and water.
 - If skin irritation or rash occurs: get medical advice/attention.
 - Wash contaminated clothing before reuse.
 - If exposed or concerned: get medical advice/attention.
 - Get medical advice/attention if you feel unwell.
 - Collect spillage.
 - Store locked up.
 - Dispose of contents/container in accordance with local/regional regulations.
- [Response]
- [Storage]
- [Disposal]

3 COMPOSITION/INFORMATION ON INGREDIENTS

Discrimination of single substance or mixture

	Single substance
Common chemical name	4,4'-Diaminodiphenyl ether
Synonym	ODA
Concentration/ concentration range	≥ 99%
Chemical formula	(H ₂ NC ₆ H ₄) ₂ O
Molecular weight	200.24
CAS Number	101-80-4
Class Reference number in the Gazetted List	(3)-854
EINECS Number	202-977-0
TSCA Inventory	Listed
Impurities and ingredients contributing to classification	No information

4 FIRST-AID MEASURES

- If inhaled**
- Remove victim to fresh air and keep at rest in a position comfortable for breathing.
 - Keep warm covering victim with a blanket.
 - If effects on breathing occur, call a doctor.
- If on skin**
- Rinse immediately contacted area with plenty of soap and water.
 - If effects occur call a doctor.
 - Wash contaminated clothing before reuse.
- If in eye**
- Immediately rinse eyes with clean water for at least 15 minutes, and get medical advice/attention.
- If swallowed**
- If the victim is conscious, rinse mouth with plenty of water and give something to drink.
 - If the victim loses consciousness, do not give anything from mouth.
 - Get medical treatment immediately.

Expected acute and delayed effects

- Headache, mental modulation, confusion, fit, faint, hypoxia.
- If swallowed, nausea and vomiting.

Most serious symptoms and effects

- If on skin: May cause an allergic skin reaction.
- Suspected of causing cancer.
- May cause damage to organs (blood and central nervous system) through prolonged or repeated exposure.

Protection of first-aiders

- Wear protective equipments which designated by the manufacturer.
- When take first-aid measures, attention not to contact on skin or in eyes.

5 FIRE-FIGHTING MEASURES

Extinguish agents

- Water, powder, carbon dioxide, fire foam, dry sand.

Prohibited agents

- Direct pouring of cylinder shape water.

Special hazardous information

- Irritating or toxic fume or gases may produce.
- When fire-fighting, wear an appropriate protective equipment so as to prevent breathing smoke.

Special fire-fighting procedures

- Cut off fire source and extinguish with an appropriate agent.
- Take action from the windward as can as possible.
- Take precautionary measures so that contaminants will not enter the environment due to the fire-fighting.
- Move container and place it in a safe area if it is not dangerous. If it is not possible, keep cool by spraying water against the container.

Protection of fire-fighters

- Take action from the windward and avoid breathing toxic gases.
- Use protective respiratory equipment as appropriate.

6 ACCIDENTAL RELEASE MEASURES

Human health precaution

- In case of indoor spillage, ventilate until after the treatment.
- Off-limits around the released area by stretching a rope.
- Wear appropriate protective equipment and avoid contacting a spray on the skin or breathing dust.
- Take action from the windward, and evacuate persons in leeward.
- Wear an appropriate protective equipment (See 8 EXPOSURE CONTROLS/PERSONAL PROTECTION) and avoid contacting on skin or eye, or inhalation.

Environmental precautions

- Attention releasing products into rivers so as to avoid any effects may occur to the environment.
- Avoid releasing contaminated waste water into the environment without appropriate treatment.

Recovery and neutralisation

- Collect dispersed products and recover in recover in an empty container which can be locked up.
- Wipe up released area with a waste or dustcloth.

Methods for cleaning up, devices

- Stop leakage if it is not dangerous.

Prevention of secondary hazards

- Cut off immediately any combustion sources (No smoking and avoid sparks or flame).
- Treat frequently because the floor may be slippery if released product remains on the floor.

7 HANDLING AND STORAGE

Handling

Technical measures

- Avoid contacting a strong oxidizing agent because it may react and cause heating.
- Take facilitation measures described in "8 EXPOSURE CONTROLS/PERSONAL PROTECTION" and wear protective equipments.

Local/general ventilation

- Take local or overall ventilation described in "8 EXPOSURE CONTROLS/PERSONAL PROTECTION".

Precautions for safe handling

- Do not handle until all safety precautions have been read and understood.
- Do not handle the container violently such as dropping or falling down, damaging or dragging.
- Locked up immediately after handling.
- Wash hands and face, and gargle after handling.
- Do not eat, drink or smoking where it is allowed to do so.
- Do not bring contaminated gloves or protective equipments into a resting place.

Contact evasion

Storage Technical measures

- Off limits around the handling area without responsible persons.
- Wear appropriate protective equipments so as to avoid breathing or contacting on the skin, clothing or eyes.
- Use local ventilation for indoor use.
- See "10 STABILITY AND REACTIVITY".
- Install light and ventilation devices in a storage place so that it is necessary to storage and handle dangerous products.

Incompatible products Storage condition

- See "10 STABILITY AND REACTIVITY".
- Store in a dark, cool and well ventilated place.
- Store apart from oxidizing agents.
- Store locked up.

Packaging materials

- Glass
- Store in a closed container.

8 EXPOSURE CONTROLS AND PERSONAL PROTECTION

Administrative control level

Not specified

Occupational exposure limit

The Society for Occupational Health (2008) ACGIH (2008)

Not specified

TLV-TWA 5 ppm

Engineering measures

- Enclose the exposure source and use a local ventilation if dust may produce.
- Install eye washer and safety shower near handling and storage area and display where are them.

Personal protective equipment

Respiratory protection

- If ventilation is insufficient, use a specified respiratory equipment (e.g. dust protective mask).

Hand protection

- Use appropriate protective gloves (e.g. impermeable protective gloves).

Eye protection

- Use eye and face protective equipments (e.g. protective glasses or goggle with side shields).

- Skin and body protection** • Wear an appropriate protective clothing (e.g. long-sleeve shirts).
- Hygiene measures** • Do not eat, drink or smoke when using this product.
- Wash hands well after handling.

9 PHYSICAL AND CHEMICAL PROPERTIES

Physical state (appearance, etc)	White to light yellow crystalline powder
Melting/freezing point	186 to 187°C (JEF Chemical Corporation, 2006) 189°C (SRC:PhysProp Database)
Boiling point	350°C (SRC:PhysProp Database)
Flash point	218°C (Lange, 2005)
Vapor pressure	0.0000409 Pa (25°C) (U.S. NLM : HSDB) 0.0000581 Pa (25°C) (SRC : PhysProp Database)
Solubility	in water: 560mg/L (SRC:PhysProp Database) others: soluble in alcohols and acetone (JEF Chemical Corporation, 2006)
Octanol/water partition coefficient	logP = 1.36 (measured) (SRC : PhysProp Database) logP = 2.06 (estimated) (U.S. NLM : HSDB)
Other information	Not available.

10 STABILITY AND REACTIVITY

Stability	• Stable under normal handling condition.
	• May ignite when heating.
Possible hazardous reactions	• React with strong oxidizing agents.
Conditions to avoid	• Heat, direct sunlight
Incompatible compounds	• Strong oxidizing agents
Hazardous decomposition products	• Carbon monoxide, carbon dioxide and nitrogen oxides may produce by fire.

11 TOXICOLOGICAL INFORMATION

Acute toxicity	
Oral	LD ₅₀ = 725 mg/kg (rat) (U.S. NLM : HSDB) LD ₅₀ = 685 mg/kg (mouse) (U.S. NLM : HSDB)
Intraperitoneal	LD ₅₀ = 365 mg/kg (rat) (JEF Chemical Corporation, 2006) LD ₅₀ = 300 mg/kg (mouse) (JEF Chemical Corporation, 2006)
Skin corrosion/irritation	Not irritating (rabbit) (DFGOT, 1994)
Serious eye damage/eye irritation	Not irritating (rabbit) (DFGOT, 1994)
Skin sensitization	Positive (Guinea pig skin sensitization study) (DFGOT, 1994)
Germ cell mutagenicity	<i>in vitro</i> reverse mutation assay and mammalian cell chromosome abbreviation assay: Positive (U.S. NLM: HSDB) <i>in vitro</i> reverse mutation assay: Positive (MHLW 1996) <i>in vivo</i> UDS assay (rat and mouse): Negative (U.S. NLM: HSDB)
Carcinogenicity	IARC: Group 2B (Possibly carcinogenic to humans) (IARC, 1987) U.S. NTP: R (Reasonably anticipated to be human carcinogen) (U.S. NTP, 2001) The Society for Occupational Health: 2B (Possibly carcinogenic to humans) (The Japan Society for occupational health, 2008)
Specific target organ toxicity – repeated exposure	

Cyanosis, breathing difficulty and lethargy were observed by a rat repeated exposure study (dietary exposure). (DFGOT, 1994)

Other toxicological information

No information

12 ECOLOGICAL INFORMATION

Aquatic toxicity - acute

Fish (medaka): 96h-LC₅₀ > 52mg/L (MOE, 2006)
Crustacean (daphnia magna): 48h-EC₅₀ = 0.99 mg/L (MOE, 2006)

Aquatic toxicity - long term

Algae: 72h-ErC₅₀ = 28mg/L (MOE, 2006)

Persistence/degradability

Algae: 72h-NOEC = 3.9mg/L (MOE, 2006)

Half-life in the air: reaction with OH radical = 1.8h (U.S. NLM: HSDB)

Mobility in soil

Soil adsorption coefficient (Koc) (estimated) = 315 (U.S. NLM: HSDB)

13 DISPOSAL CONSIDERATIONS

Waste from residues

- When incinerated: dissolve in a flammable solvent and spray into an incinerator equipped with a scrubber.
- Follow related regulations and standards of local authorities when disposing.
- Ask industrial waste disposal traders who are certificated by the local authorities, or consult to local government.
- When asking to a waste trader, inform them dangerous and hazard information.

Contaminated packaging

- Recycle containers after cleaning or dispose appropriately in accordance with laws and local regulations.
- Remove completely remaining products from a container before disposal.

14 TRANSPORT INFORMATION

International regulations

UN number

Not applicable

Name and description

Not applicable

Class or division

Not applicable

UN packing group

Not applicable

National regulations in Japan

Ground transport

Not applicable

Marine transport

Not applicable

Air transport

Not applicable

Precautionary transport measures and conditions

- When transporting, loading containers so as to avoid direct sunlight, damaging, corrosion or leakage. Make sure not falling off the containers.
- Avoid putting heavy product on the upper side.

15 REGULATORY INFORMATION (Japan)

(Other than below, refer to national regulations in your country/region)

The PRTR Law

Specified Class 1 (cabinet order number: 143, 4,4'-Diaminodiphenyl ether, as from October1, 2009)

The Industrial Safety and Health Law

Shall be indicated the name of the substance (Cabinet order number: 208, 4,4'-Diaminodiphenyl ether)

US Regulations

TSCA CHIPs, SARA III/313 Tox. Chem., Cal. Prop. 65 Carci., Cal. No Sig. Risk Lev., NTP Test Prog., Penn. Haz. Subst. List, New Jers. RTK Haz. Subst. List, Mass. Subst. List

EPA

EPCRA SECTION 313, minimum concentration is 0.1%
EPCRA TPQ: Not listed
CER CLA RQ: Not listed.

OSHA

TQ, Not listed

California

No-significant-risk level = 5 micro-g/day

EU Regulation**Symbol**

T: Toxic, N: Dangerous for the environment

R-phrases

R45: May cause cancer.

R46: May cause heritable genetic damage.

R23/24/25: Toxic by inhalation, in contact with skin and if swallowed.

R62: Possible risk of impaired fertility.

R51/53: Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

S-phrases

S53: Avoid exposure - obtain special instructions before use.

S45: In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).

S61: Avoid release to the environment. Refer to special instructions/ Safety data sheets.

Annex 1 index No.

612-199-00-7

16 OTHER INFORMATION**References**

DFGOT (1994) DFG Occupational Toxicants Vol. 6

IARC (1987) Overall Evaluations of Carcinogenicity, Supplement 7

JFE Chemical Corporation, (2006) MSDS

Lange (2005) Lange's Handbook of Chemistry, 16th ed.

SRC (Syracuse Research Corporation): PhysProp Database.

U.S. EPA : ECOTOX Database

U.S. NLM : HSDB (Hazardous Substance Data Bank).

U.S. NTP (2001) Report on Carcinogens, 11th Edition.

The Japan Society for occupational Exposure Limits (2008) Recommendation of Occupational Exposure Limits

The Ministry of Health, Labour and Welfare (1996) Data on mutagenicity based on the The Industrial Safety and Health Law.

[Note] This MSDS has been prepared based on the available product and hazard information. Please note that the contents may not cover all the possible situations/conditions. Description in this MSDS are subject to be updated when new information becomes available. Precautions only cover normal handling conditions and need to modify/adapt safety measures to meet the special use or handling conditions.