MATERIAL SAFETY DATA SHEET OF
MALATHION 95% TC

1. IDENTIFICATION OF THE CHEMICAL PRODUCT AND COMPANY
Supplier: SHANGHAI MINGDOU AGROCHEMICAL CO., LTD
Address: Rm. 1210, Zhenyuan Building, No. 2052 North Zhongshan Rd, Shanghai, China
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Product name: Malathion 95% TC

2. COMPOSITION/INFORMATION ON INGREDIENTS
Formulation Type: Technical material
Active Ingredients: Malathion
Chemical Abstracts name: diethyl [(dimethoxyphosphinothioyl)thio]butanedioate
IUPAC name: diethyl (dimethoxythiophosphorylthio)succinate; S-1,2-bis(ethoxycarbonyl)ethyl O,O-dimethyl phosphorodithioate
Chemical Family: organophosphate
CAS NO.: 121-75-5
Molecular Formula: C_{10}H_{19}O_{6}PS_{2}
Molecular Weight: 330.4
Structural Formula:

Other ingredients determined not to be hazardous

<table>
<thead>
<tr>
<th>INGREDIENT</th>
<th>CAS NO.</th>
<th>PURITY</th>
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<tbody>
<tr>
<td>malathion</td>
<td>121-75-5</td>
<td>≥95%</td>
</tr>
<tr>
<td>others</td>
<td>Not available</td>
<td>≤5%</td>
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</table>

3. HAZARDS IDENTIFICATION
Emergency overview: Cholinesterase inhibitor. Harmful if swallowed. Harmful if absorbed through skin or inhaled. Causes slight eye irritation. Avoid breathing product vapors or spray mist. Avoid contact with eyes, skin or clothing. Keep out of reach of children.
Routes of entry: Ingestion, inhalation, contact with skin and eyes.

Health hazards:
Symptoms of over exposure are headaches, nausea, vomiting, cramps, weakness, blurred vision, pin point pupils, tightness in chest, labored breathing, nervousness, sweating, watering of eyes, drooling, muscle spasms and coma.
Eye contact: May cause eye injury.
Skin contact: Irritation may occur. The most likely rout of entry.
Ingestion: Contact a physician if material is ingested.
Inhalation: Contact a physician if material is inhaled and breathing is difficult.
Environmental hazards: The substance is very toxic to aquatic organisms. This substance may be hazardous to the environment; special attention should be given to honey bees. Avoid release to the environment in circumstances different to normal use.

4. FIRST AID MEASURES

General: Have the product container, label or Material Safety Data Sheet with you when going for treatment. Tell the person contacted the complete product name, and the type and amount of exposure. Describe any symptoms and follow the advice given.
Skin contact: Remove contaminated clothes. Rinse and then wash skin with water and soap. Refer for medical attention.
Eye contact: First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
Ingestion: Do not induce vomiting if the person is conscious. Give glass of water. Get to a doctor.
Inhalation: Move affect person to fresh air and keep at rest until recovered. If not breathing, give artificial respiration and get to a doctor.
Note to physician: Treat symptomatically. Antidote: Atropine, PAM, 2-PAMCI, 2-PAMM.

5. FIRE FIGHTING MEASURES

Flash point: Not highly flammable.
Flammable limits:
LFL: Not determined.
UFL: Not determined.
Autoignition temperature: Not determined.
Hazardous combustion products: Alert medical personnel to be ready to treat for pesticide poisoning, should treatment be necessary.
Extinguishing media: Dry chemical or carbon dioxide for small fires. Water spray or foam for large fires.

Media to be avoided: None known.

Fire-fighting instructions: Use as little water as possible. Dike area to prevent pesticide runoff. Use spray or fog. Conduct fire fighting upwind.

Protective equipment for firefighters: Wear self-contained breathing apparatus and full fire fighting clothing.

6. ACCIDENT RELEASE MEASURES

Personal precautions: Restrict access to area until completion of clean up. Ensure clean-trained personnel conduct up only. All persons dealing with clean up should wear the appropriate chemically protective equipment. Refer to Section 8, for additional information on acceptable personal protective equipment.

Environmental precautions: Ensure spilled product does not enter drains, sewers, waterways, or confined spaces. Dike far ahead of the spill for later recovery or disposal. Washings must be prevented from entering surface water drains. Uncontrolled discharge into watercourses must be alerted to the appropriate regulatory body.

Method for cleaning up: Eliminate all sources of heat, sparks and flame. Ventilate area of release. Stop leak if you can do so without risk. Notify the appropriate authorities. For spills on the floor or other impervious surfaces, absorb spill with inert, non-combustible absorbent material, such as hydrated lime. Fuller’s earth or other absorbent clays. Scoop up and place contaminated absorbent material into suitable containers for later disposal. Rinse spills area with soda lye. Do not flush to sewer or allow entering confined spaces. Large spills that soak into the ground should be dug up, placed in suitable containers and disposed of appropriately. Notify the appropriate authorities.

7. HANDLING AND STORAGE

Handling: Read the label before use. Do not breathe vapors or mists. Avoid contact all contact with eyes, skin and clothing.

Storage: Store in cool, dry, well-ventilated, secure area out of reach of children and animals. Harmful if swallowed or inhaled. Avoid contact with skin. Wash thoroughly after handling. Change contaminated clothing. Do not contaminate food or feed products. Biological activity of malathion premium grade remains practically unvaried for 2 years provided stored in unopened, undamaged original containers, in cool, shaded, well ventilated places. Recommended 68-86 °F (20-25 °C) for good shelflife. Do not heat above 55 °C. Above 100 °C, decomposes rapidly and explosion may be induced.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Exposure limits: No exposure limits have been established for this material.
Engineering controls: Provide adequate ventilation.

Personal protective equipment (PPE):
Respiratory protection: Approved respirator
Protective gloves: Rubber gloves
Eye protection: Safety goggles or face shield.

User safety recommendations: Do not breathe vapors or mists. Avoid contact all contact with eyes, skin and clothing. Before removing gloves, wash them with soap and water. Always wash hands, face and arms with soap and water before smoking, eating or drinking. After work, take off all protective equipment, work clothes and shoes, and wash with soap and water. Respirator should be cleaned and filter replaced according to manufacturer's instructions. Wear only clean, uncontaminated clothes when leaving place of work. Persons working with this product for a longer period should have frequent blood tests for cholinesterase levels. If the cholinesterase levels fall below a critical point, no further exposure should be allowed until it has been determined, by means of blood tests that cholinesterase levels have returned to normal.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance: Clear, amber oily liquid with a weak ester dour.

Vapour pressure and reference temperature: 5.3 mPa (30 °C)
Boiling point: 156-157 °C/0.7 mmHg.
Melting point: 2.85 °C.
S.g./density: 1.23 (25 °C)
Solubility: In water 145 mg/l (25 °C). Miscible with most organic solvents, e.g. alcohols, esters, ketones, ethers, aromatic hydrocarbons. Slightly soluble in petroleum ether and some types of mineral oil.

10. STABILITY AND REACTIVITY

Chemical stability: Stable under normal conditions.

Conditions to avoid: high temperature, flame, fire, and moist condition.

Hazardous decomposition: Thermal decomposition (e.g. fire) may produce dimethyl sulfide, sulfur dioxide, carbon monoxide, carbon dioxide, phosphorus pentoxide, nitrogen oxides.

Incompatible materials: Acidic and alkaline media.

Hazardous reactions: Hazardous polymerization will not occur.

11. TOXICOLOGICAL INFORMATION

The following information is for the active ingredient, Malathion.

Acute toxicity:
Oral: LD$_{50}$ rat 1375-2800mg/kg
Dermal: LD$_{50}$ rabbit 4100mg/kg
Inhalation: LC$_{50}$ for rats >5.0 mg/l.

**Irritant properties:**

Skin: Mild irritant to skin (rabbits)
Eye: Slight eye irritant (rabbits)

**Reproductive effects:** Rats fed high doses of 240 mg/kg/day during pregnancy showed an increased rate of newborn mortality. However, malathion fed to rats at low dosages caused no reproductive effects. It is not likely that malathion will cause reproductive effects in humans under normal circumstances.

**Teratogenic effects:** Rats fed high doses (240 mg/kg/day) showed no teratogenic effects. Malathion and its metabolites can cross the placenta of the goat and depress cholinesterase activity of the fetus. Chickens fed diets at low doses for 2 years showed no adverse effects on egg hatching. Current evidence indicates that malathion is not teratogenic.

**Mutagenic effects:** Malathion produced detectable mutations in three different types of cultured human cells, including white blood cells and lymph cells.

**Carcinogenic effects:** Female rats on dietary doses of approximately 500 mg/kg/day of malathion for 2 years did not develop tumors. Adrenal tumors developed in the males at low doses, but not at the high doses, suggesting that malathion was not the cause. Three of five studies that have investigated the carcinogenicity of malathion have found that the compound does not produce tumors in the test animals.

### 12. ECOLOGICAL INFORMATION

The following information is for the active ingredient, Malathion.

**Ecotoxicity:**

Birds Dietary LC$_{50}$ (5 days): for bobwhite quail 3500, ring-necked pheasants 4320 mg/kg diet.
Fish LC$_{50}$ (96 h): for bluegill sunfish 0.1, largemouth bass 0.28 mg/l.
Daphnia EC$_{50}$ (48 h): 1.0 μg/l.
Algae EC$_{50}$: 13 mg/l.
Bees Toxic to bees.
Earthworm: LC$_{50}$ (14 days): 613 mg/kg soil.

**Persistence and degradability:** Malathion is of low persistence in soil with reported field half-lives of 1 to 25 days. Degradation in soil is rapid and related to the degree of soil binding. Breakdown occurs by a combination of biological degradation and nonbiological reaction with water. **Bioaccumulative potential:**

BCF (Bio-concentration factor): 103
Mobility in soil: Malathion is moderately bound to soils, and is soluble in water, so it may pose a risk of groundwater or surface water contamination in situations which may be less conducive to breakdown.

13. DISPOSAL CONSIDERATION
Waste disposal: Pesticide wastes are toxic and hazardous. Dispose of in accordance with applicable and local laws and regulations. Do not discharge or pour into soil, drainage system or bodies of water.
Container disposal: Triple rinse (or equivalent). Then offer for recycling or reconditioning, or puncture and dispose of in a sanitary landfill, or incineration, or if allowed by state and local authorities, by burning (plastic containers). If burned, stay out of smoke.

14. TRANSPORT INFORMATION
UN Number: 3077
UN Proper shipping name: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S.
Transport hazard class: 9
Packing group: III
Marine pollutant: Yes

15. REGULATORY INFORMATION
Hazard symbols:
   Xn Harmful
Risk phrases:
   R22 Harmful if swallowed,
   R36 Irritating to eyes.
Safety phrases:
   S60 This material and/or it's container must be disposed of as hazardous waste.
   S61 Avoid release to the environment. Refer to special instructions/Safety data sheet.

16. OTHER INFORMATION
This MSDS summarizes our best knowledge of the health and safety hazard information of the product and how to safely handle and use the product in the workplace. Each user should read this MSDS and consider the information in the context of the how the product will be handled and used in the workplace including in conjunction with other products.
If clarification or further information is needed to ensure that an appropriate risk assessment can be made the user should contact the company.
END OF MSDS