MATERIAL SAFETY DATA SHEET OF

BIFENTHRIN 10% EC

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
FAX: +86 21 52912097, 61638378
TEL: +86 21 52912919, 52045380, 52045370
Product name: Bifenthrin 10% EC
Product use: An emulsifiable concentrate Termiticide & Insecticide for dilution with water before use.

2. COMPOSITION/INFORMATION ON INGREDIENTS
Formulation Type: Emulsifiable concentrate
Active Ingredients: Bifenthrin
Chemical Abstracts name:
(2-methyl[1,1′-biphenyl]-3-yl)methyl
3-(2-chloro-3,3,3-trifluoro-1-propenyl)-2,2-dimethylcyclopropanecarboxylate
Chemical Family: pyrethroid
CAS NO. 82657-04-3
Molecular Formula: C_{23}H_{22}ClF_{3}O_{2}
Molecular Weight: 422.9
Structural Formula:

\[
\begin{align*}
(Z)-(1R)-\text{cis-} & \\
(Z)-(1S)-\text{cis-} & 
\end{align*}
\]
Composition:

<table>
<thead>
<tr>
<th>INGREDIENT</th>
<th>CAS NO</th>
<th>PROPORTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bifenthrin</td>
<td>82657-04-3</td>
<td>10% Min</td>
</tr>
<tr>
<td>Inert ingredients</td>
<td>Not available</td>
<td>90% Max</td>
</tr>
</tbody>
</table>

Other ingredients determined not to be hazardous

3. HAZARDS IDENTIFICATION

Emergency overview: Harmful! Harmful if swallowed. Irritating to eyes. Avoid contact with skin and eyes. Keep locked up and out of the reach of children.

Routes of entry: Ingestion, inhalation, contact with skin and eyes.

Health hazards:

Inhalation: This product may be harmful if inhaled. Product is unlikely to cause any discomfort or irritation unless inhaled in large quantities.

Skin Contact: This product causes skin numbness but further symptoms are not available. In addition product is a skin irritant. Symptoms may include itchiness and reddening of contacted skin. Other symptoms may also become evident, but all should disappear once exposure has ceased.

Eye Contact: This product is an eye irritant. Symptoms may include stinging and reddening of eyes and watering which may become copious. Other symptoms may also become evident. If exposure is brief, symptoms should disappear once exposure has ceased. However, lengthy exposure or delayed treatment may cause permanent damage.

Ingestion: Harmful if ingested.

Environmental hazards: Toxic to fish and aquatic arthropods. Toxic to bees.

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: If in eyes, hold eyes open, flood with water for at least 15 minutes and see a doctor.

Eye contact: If skin contact occurs, remove contaminated clothing and wash skin thoroughly. If irritation occurs seek medical advice.

Ingestion: Rinse mouth with water. If swallowed, DO NOT induce vomiting. Give a glass of water. Seek medical advice.

Inhalation: Remove victim from area of exposure - avoid becoming a casualty. Remove contaminated clothing and loosen remaining clothing. Allow patient to assume most comfortable position and keep
warm. Keep at rest until fully recovered. Seek medical advice if effects persist.

Note to physician: No specific antidote. Treat symptomatically.

5. FIRE FIGHTING MEASURES

Flash point: Not highly flammable.

Flammable limits: Not determined.

Autoignition temperature: Not determined.

Hazardous combustion products: Carbon monoxide, carbon dioxide, chlorine, fluorine, hydrogen chloride and hydrogen fluoride.

Extinguishing media: Water fog (or if unavailable fine water spray), foam, dry agent (carbon dioxide, dry chemical powder).

Media to be avoided: None known.

Fire-fighting instructions: If a significant quantity of this product is involved in a fire, call the fire brigade. There is little danger of a violent reaction or explosion if significant quantities of this product are involved in a fire.

Protective equipment for firefighters: On burning will emit toxic fumes. Fire fighters to wear self-contained breathing apparatus and suitable protective clothing if risk of exposure to vapor or products of combustion.

6. ACCIDENT RELEASE MEASURES

Personal precautions: Isolate and post spill area. Keep out unprotected persons and animals. Wear prescribed protective clothing and equipment. Avoid breathing vapors. Work up wind or increase ventilation.

Environmental precautions: DO NOT allow spilled product or wash solution to enter sewers, drains, dams, creeks or any other waterways.

Method for cleaning up: Stop leak if safe to do so, and contain spill. Absorb onto sand, vermiculite or other suitable absorbent material. If spill is too large or if absorbent material is not available, try to create a dike to stop material spreading or going into drains or waterways. Sweep up and shovel or collect recoverable product into labelled containers for recycling or salvage, and dispose of promptly. After spills, wash area preventing runoff from entering drains. If a significant quantity of material enters drains, advise emergency services.

7. HANDLING AND STORAGE

Handling: Read the label before use. Avoid skin and eye contact and breathing in vapour. Keep out of reach of children.
Storage: Store in the closed, original container in a dry, cool, well-ventilated area out of direct sunlight. Store in a locked room or place away from children, animals, food, feedstuffs, seed and fertilizers.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Exposure limits: No exposure limits have been established for this material.

Engineering controls: Use in a well ventilated areas. Use with local exhaust ventilation or while wearing organic vapor / particulate respirator. Keep containers closed when not in use.

Personal protective equipment (PPE):
Ventilation: No special ventilation requirements are normally necessary for this product. However make sure that the work environment remains clean and that vapours and mists are minimised.
Eye Protection: Protective glasses or goggles should be worn when this product is being used. Failure to protect your eyes may cause them harm. Emergency eye wash facilities are also recommended in an area close to where this product is being used.
Skin Protection: Prevent skin contact by wearing impervious gloves, clothes and, preferably, apron. Make sure that all skin areas are covered. See below for suitable material types. Protective Material Types: We suggest that protective clothing be made from the following materials: PVC, nitrile, neoprene.
Respirator: If inhalation risk exists, wear a properly fitted half-face or full-face air purifying respirator which is approved for pesticides.
Eyebaths or eyewash stations and safety deluge showers should be provided near to where this product is being used.

User safety recommendations: Avoid contact with eyes and skin. Avoid inhaling spray mist. When preparing spray, wear cotton overalls buttoned to the neck and wrist and washable hat, elbow-length PVC gloves and goggles. When using the prepared spray with hand held application equipment in bananas and grapes, wear cotton overalls buttoned to the neck and wrist and elbow length PVC gloves. Wash hands after use. After each day’s use, wash gloves, goggles and contaminated clothing.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance: Light brown liquid.
Odor: Solvent.
Solubility in water: Emulsifies.
Freezing/Melting point: No specific data. Liquid at normal temperatures.
Boiling point: Not available.
Specific gravity: Approx 0.93 g/ml.
Corrosive hazard: Non corrosive.
10. STABILITY AND REACTIVITY

Chemical stability: Stable under normal conditions.

Conditions to avoid: Avoid direct sunlight. Avoid heat and fire.

Hazardous decomposition products: Carbon dioxide, and if combustion is incomplete, carbon monoxide and smoke. Nitrogen and its compounds, and under some circumstances, oxides of nitrogen.

Incompatible materials: Avoid oxidizing agents.

Hazardous reactions: Hazardous polymerization will not occur.

11. TOXICOLOGICAL INFORMATION

Acute toxicity:
Oral: \(LD_{50}\) for rats 531 mg/kg.
Dermal: \(LD_{50}\) for rabbits >2000 mg/kg.
Inhalation: \(LC_{50}\) for rats >5.0 mg/l.

Irritant properties:
Skin: Irritating to skin (rabbits).
Eye: Irritating to eyes (rabbits).

Allergic and sensitizing effects: Not considered to be a skin sensitizer (Guinea pig).

Chronic toxicity/ Carcinogenicity: There was no evidence of cancer in a 2-year study of rats who ate as much as 10 mg/kg/day of Bifenthrin. However, an 87 week feeding study of mice with doses of 7, 29, 71, and 86 mg/kg showed a significantly higher, dose related trend of increased tumor incidence in the male urinary bladder. The incidence was significantly increased at 86 mg/kg/day. Also, females had higher incidences of lung cancer than the controls at doses of 7 mg/kg and higher. The EPA has classified Bifenthrin as a class C carcinogen, a possible human carcinogen.

Genetic effects/Mutagenicity: Evidence of mutagenic effects from exposure to Bifenthrin are inconclusive. Studies of mouse white blood cells were positive for gene mutation. However, other tests of bifenthrin's mutagenic effects, including the Ames test and studies in live rat bone marrow cells, were negative.

Reproductive effects: The dose at which no toxic effect of Bifenthrin is observed on the mother (maternal toxicity NOEL) is 1 mg/kg/day for rats and 2.67 mg/kg/day for rabbits. At higher doses, test animals had tremors. The dose at which no toxic effect is observed on development (developmental toxicity NOEL) is 1 mg/kg/day for rats and is greater than 8 mg/kg/day for rabbits.

Teratogenic effects: Bifenthrin does not demonstrate any teratogenic effects at the highest levels tested (100 ppm, approximately 5.5 mg/kg/day) in a two-generational study in rats.
12. ECOLOGICAL INFORMATION

The following information is for the active ingredient, Bifenthrin.

Ecotoxicity:

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<thead>
<tr>
<th>Species</th>
<th>Route</th>
<th>Concentration</th>
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<tbody>
<tr>
<td>Birds</td>
<td>Acute oral</td>
<td>LD&lt;sub&gt;50&lt;/sub&gt;: for bobwhite quail 1800, mallard ducks 2150 mg/kg.</td>
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<tr>
<td></td>
<td>Dietary</td>
<td>LC&lt;sub&gt;50&lt;/sub&gt; (5 days): for bobwhite quail 4450, mallard ducks 1280 mg/kg diet.</td>
</tr>
<tr>
<td>Fish</td>
<td>LC&lt;sub&gt;50&lt;/sub&gt; (96 h): for bluegill sunfish 0.00035, rainbow trout 0.00015 mg/l.</td>
<td></td>
</tr>
<tr>
<td>Daphnia</td>
<td>EC&lt;sub&gt;50&lt;/sub&gt; (48 h): 0.00016 mg/l.</td>
<td></td>
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<tr>
<td>Bees</td>
<td>LD&lt;sub&gt;50&lt;/sub&gt; (oral): 0.1 μg/bee</td>
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<tr>
<td></td>
<td>LD&lt;sub&gt;50&lt;/sub&gt; (contact): 0.01462 μg/bee.</td>
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**Persistence and degradability:** In soil, bifenthrin is stable over a wide pH range and degrades at a slow rate which is governed by soil characteristics. Bifenthrin will also persist in aquatic sediments.

**Bioaccumulative potential:** There is the potential for bifenthrin to bioconcentrate (BCF = 11750).

**Mobility in soil:** Bifenthrin has a high Log P<sub>ow</sub> (>6.0), a high affinity for organic matter, and is not mobile in soil. Therefore, there is little potential for movement into groundwater.

13. DISPOSAL CONSIDERATION

Triple or preferably pressure rinse containers before disposal. Add rinsings to spray tank. Do not dispose of undiluted chemicals on-site. If recycling, replace cap and return clean containers to recycler or designated collection point. If not recycling, break, crush or puncture and bury empty containers in a local authority landfill. If no landfill is available, bury the containers below 500 mm in a disposal pit specifically marked and set up for this purpose clear of waterways, desirable vegetation and tree roots. Empty containers and product should not be burnt.

14. TRANSPORT INFORMATION

**Road and Rail Transport**

Not classified as Dangerous Goods for transport by Road and Rail.

**Marine Transport**

UN Number: 3082
UN Proper shipping name: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S. (CONTAINS BIFENTHRIN)
Transport hazard class: 9 Miscellaneous Dangerous Goods
Packing group: III

**Air Transport**

Classified as Dangerous Goods for transport by air.
UN Number: 3082
UN Proper shipping name: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S. (CONTAINS BIFENTHRIN)
Transport hazard class: 9 Miscellaneous Dangerous Goods
Packing group: III

15. REGULATORY INFORMATION

Hazard symbols:
   Xn Harmful
   Xi Irritant

Risk phrases:
   R22 Harmful if swallowed.
   R36 Irritating to eyes.
   R65 Harmful: May cause lung damage if swallowed.

Safety phrases:
   S1/2 Keep locked up and out of the reach of children.
   S13 Keep away from food, drink and animal foodstuffs.
   S24/25 Avoid contact with skin and eyes.
   S36/37 Wear suitable protective clothing and gloves.

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