Material Safety Data Sheet

Clethodim TC

1. Chemical Product and Company Identification

MSDS Name:

Clethodim Technical

Company Identification: SHANGHAI TENGLONG AGROCHEM CO., LTD.

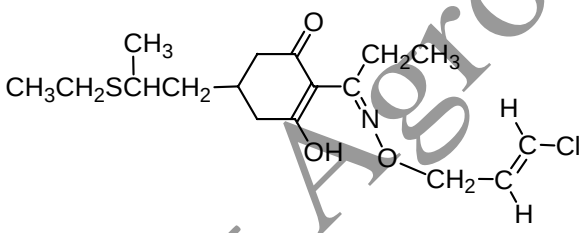
For information, call: +86-21-5506 3225

Emergency Number: +86-21-63375612

2. Composition, Information on Ingredients

COMPONENT	CAS NO.	%W/V
Clethodim	99129-21-2	94%min
Other ingredients		6%max

Structural formula:



Molecular formula: $C_{17}H_{26}ClNO_3S$

Molecular Weight: 359.9

Chemical Abstracts name:

(*E*,*E*)-(±)-2-[1-[[(3-chloro-2-propenyl)oxy]imino]propyl]-5-[2-(ethylthio)propyl]-3-hydroxy-2-cyclohexen-1-one

IUPAC name

(±)-2-[(*E*)-1-[(*E*)-3-chloroallyloxyimino]propyl]-5-[2-(ethylthio)propyl]-3-hydroxycyclohex-2-enone

3. Hazards Identification

Warning: Causes eye irritation. Harmfull if swallowed or inhaled. Avoid breathing vapors or spray mist. Aspiration hazard, do not induce vomiting. Do not get in eyes, on skin or on clothing. Keep out of reach of children.

4. First Aid Measures

Eyes: Hold eye open and rinse slowly and gently with water for 15-20 minutes. Remove contact lenses, if present, after the first 5 minutes, then continue rinsing eye. Call a poison control center or doctor for treatment advice.

Skin: Take off contaminated clothing. Rinse skin immediately with plenty of water for 15-20 minutes. Call a poison control center or doctor for treatment advice.

Ingestion: Call a poison control center or doctor immediately for treatment advice. Have a person

sip a glass of water if able to swallow. Do not induce vomiting unless told to do so by the poison control center or doctor. Do not give anything by mouth to an unconscious person.

Inhalation: Move person to fresh air. If person is not breathing, call 911 or an ambulance, then give artificial respiration, preferably by mouth-to-mouth, if possible. Call a poison control center or doctor for further treatment advice.

5. Fire Fighting Measures

Liquid evaporates and forms vapor (fumes) which can catch fire and burn with explosive violence. Invisible vapor spreads easily and can be set on fire by many sources such as pilot lights, welding equipment, and electrical motors and switches. Fire hazard is greater as liquid temperature rises above 85℉.

6. Accidental Release Measures

For spills on land

Containment: Avoid runoff into storm sewers and ditches which lead to waterways. Contain spilled liquids with dry sorbents.

Cleanup: Clean up spill immediately. Absorb spill with inert material (such as dry sand or earth), then place in a chemical waste container. Wash area with soap and water. Pick up wash liquid with additional absorbent and place in a chemical waste container.

For spills in water

Containment: This material forms an emulsion in water. Stop or reduce contamination of any water. Isolate contaminated water.

Cleanup: Remove contaminated water for treatment or disposal.

7. Handling and Storage

Do use or store near flame, sparks or hot surfaces. Use only in well ventilated area. Keep container closed. Do not weld, heat or drill container. Replace cap or bung. Emptied container still contains hazardous or explosive vapor or liquid. Keep pesticide in original container. Do not store or transport near food or feed. Do not contaminate food or feed. Do not put concentrate into food or drink containers. Do not dilute concentrate in food
or drink containers. Store in a cool, dry place, out of direct sunlight.

8. Exposure Controls, Personal Protection

Eye protection: Appropriate eye protection must be worn when working with this material or serious harm can result. Wear protective eyewear. respiration/ventilation: This material may be a respiratory irritant and, unless ventilation is adequate, the use of approved respiratory protection is recommended. Use this material only in well ventilated areas.

Skin protection: Do not get on skin or clothing. Skin contact should be avoided by wearing protective clothing including chemical resistant gloves, long sleeved shirt, long pants, shoes and socks. Discard clothing and other absorbent materials that may have been drenched or heavily contaminated with this product's concentrate. Do not reuse them.

9. Physical and Chemical Properties

Water solubility: Highly dependent on pH

Solubility in Other Solvents: Soluble in most organic solvents
Melting Point: Not Available
Vapor Pressure: <1 x 10-2 mPa (20℃)
Relative density : 1.14 at 20℃
Partition Coefficient: Not Available
Adsorption Coefficient: 0.49 at pH=9; 40 at pH=7; >3,000 at pH=5

10. Stability and Reactivity

Chemical Stability: Unstable at extreme pH's, temperature and upon exposure to UV light. Incompatibility: May react with strong oxidizing agents, such as chlorates, nitrates, peroxides, etc.

11. Toxicological Information

Acute oral LD_{50} (rat):1630mg/kg
Acute dermal LD_{50} (rabbit) :> 5000mg/kg
Reproductive Effects: No effects on fertility, length of gestation or growth and development of offspring were observed at doses up to and including the highest dose tested, 263 mg/kg/day. No other data were available regarding reproductive effects; while these data are insufficient, it appears unlikely that reproductive effects would occur in humans under normal circumstances.
Teratogenic Effects: Reductions in fetal body weights and increases in skeletal abnormalities were observed in rats at doses of 350 mg/kg/day and higher. In another study of rats, there were significant reductions in fetal body weight, litter size and significant increases in cervical rib deformation at doses of 700 mg/kg/day, but not at lower doses. In rabbits, no teratogenic or developmental effects were seen in offspring at doses up to and including the highest dose tested, 300 mg/kg/day.The evidence suggests that while there have been documented teratological effects in animal studies, such effects are unlikely in humans under normal conditions of exposure.
Mutagenic Effects: Results of the Ames mutagenicity assay indicated that clethodim did not show mutagenic potential. Testing for unscheduled DNA synthesis in mouse liver cells following oral administration of 5,000 mg/kg were negative. Tests for structural chromosomal damage in rat bone marrow cells after oral administration of 1,500 mg/kg were also negative. The available data for mutagenicity and genotoxicity yield no evidence for mutagenic or genotoxic activity.
Carcinogenic Effects: No carcinogenic effects were observed in mice administered clethodim at doses of 24 mg/kg/day over an 18 month period. No carcinogenic effects were observed in rats fed up to the highest dose tested, approximately 100 mg/kg/day, in a two-year carcinogenicity study. Based on the available data, it appears that clethodim is not carcinogenic.
Organ Toxicity: The liver was the primary organ affected in chronic animal studies. Although potential effects associated with acute exposure are reported to include central nervous system effects, no available chronic data pointed to such effects.
Fate in Humans & Animals: Clethodim is readily absorbed in the gastrointestinal tract, with approximately 90% absorption of oral doses. It is rapidly metabolized and eliminated (primarily sulfoxide metabolites, ca 63%) with less than 1% recoverable unchanged.

12. Ecological Information

Effects on Birds: Clethodim is practically non-toxic to birds. Reported 8-day dietary LC_{50}s are greater than 6,000 ppm in the mallard duck and bobwhite quail and greater than 5,000 ppm for the

Japanese quail. Under likely conditions of use, it is unlikely to pose a hazard to avian species.

Effects on Aquatic Organisms: Clethodim is slightly toxic to fish and aquatic invertebrate species. Reported 96-hour LC_{50}s ranged from 18 mg/L to 56mg/L in rainbow trout, and 33 mg/L in bluegill sunfish . A 48-hour LC_{50} of 20.2 mg/Lhas been reported for Daphnia species for the formulation. No effects were seen at concentrations of 5.5 mg/L in Daphnia. No significant bioaccumulation has been observed in fish. Under likely conditions of use, it is unlikely to pose a hazard to aquatic species.

Effects on Other Animals (Nontarget species): Clethodim is practically non-toxic to honeybees with reported LD_{50}s of greater than 100 ug/bee for both the technical product. EPA has stated that "available...wildlife data indicate that the proposed uses on cotton and soybeans will result in minimal hazard to nontarget and endangered beneficial insect, avian and freshwater fish and mammalian species". Clethodim is selectively toxic to plants, affecting only grass species.

13. Disposal Considerations

End users must dispose of any unused product as per the label recommendations.

Disposal methods: Check governmental regulations and local authorities for approved disposal of this material. Dispose in accordance with applicable laws and regulations.

14. Transport Information

Transport Information： It is good practice to separate this product from food, food related materials, animal feedstuffs, seed or fertilisers during transport.

U.N. Number： 3082

Proper Shipping Name： ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S. - (Clethodim, 94%TC)

IMDG Class： 9

Packing Group： Ⅱ

15. Regulatory Information

Risk phrases: R20 Harmful by inhalation.
R22 Harmful if swallowed.
R65 Harmful-may cause lung damage if swallowed.

Safety phrases: S20/21 When using do not eat or drink/smoke.
S24/25 Avoid contact with skin/eyes.
S29/35 Do not empty into drains/Dispose of material and container in a safe way.

SUSDP Classification: S5

UN Number: 3082

16. Additional 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 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 this

company. Our responsibility for products sold is subject to our standard terms and conditions, a copy of which is sent to our customers and is also available on request.