ISO 9001: 2008

Technical Data Sheet

of

KARATRIX 5CS

(Lambda-cyhalothrin 5% CS)

201921-09-14

NANJING ESSENCE FINE-CHEMICAL CO., LTD.

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I. INTRODUCTION

Common Name:	KARATRIX 5CS
Use:	Insecticide

Company Name: Nanjing Essence Fine-Chemical Co., Ltd.

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II. CHEMISTRY OF THE PRODUCT

1. Product Name: Lambda-cyhalothrin 5% CS

2. Common Name: Lambda-cyhalothrin

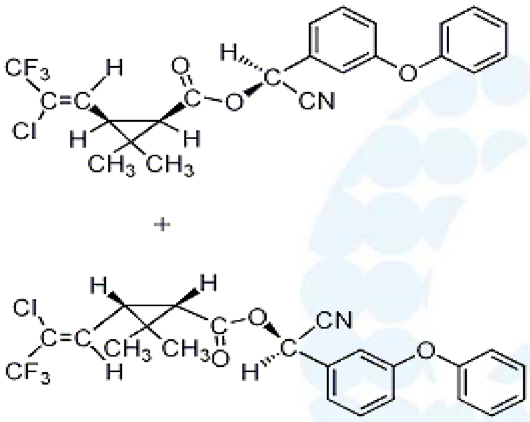
3. Commercial Name: KARATRIX 5CS

4. Chemical Class: Insecticide

5. Chemical Abstracts Name: [1α(*S**),3α(*Z*)]-(±)-cyano(3-phenoxyphenyl)methyl 3-(2-chloro-3,3,3-trifluoro-1-propenyl)-2,2-dimethylcyclopropanecarboxylate

6. Structural Formula:

(*S*) (*Z*)-(1*R*)-*cis*-



(*R*) (*Z*)-(1*S*)-*cis*-

III. TYPE OF FORMULATIONS AND SPECIFICATIONS

TYPE OF FORMULATIONS

Aqueous capsule suspensions (CS)

COMPOSITION AND INGREDIENT INFORMATION

Lambda-cyhalothrin	5.0%

SPECIFICATIONS OF FORMULATIONS

1. Appearance: Off white liquid

2. Alkalinity or Acidity: pH value 4.0-87.0

3. Suspensibility: 90.0% min

4. Emulsification Properties: Not applicable

5. Density: 1.05±0.05

6. Viscosity: Not available.

7. Flash Point: Not available.

8. Freeze Point: Not available.

9. Wettability: Not applicable.

10. Particle Size: 98.0% min pass through 75μm test sieve.

11. Heat Stability: Up to grade.

12. Storage Stability: Up to grade.

13. Water content: Not applicable.

14. Methods of Analysis

Analytical Method of Lambda-Cyhalothrin 5% CS

1. Method abstract

Dissolve the sample with methanol, acetonitrile + water as flow phase, use the stainless steel column filled with ODS C_{18} and variable wave length ultra violet detector, separate and determinate the sample with HPLC.

2. Reagents and solutions

Lambda-cyhalothrin standard sample: Known content ≥96.0%;
Methanol: Chromatographic pure;
Acetonitrile: Chromatographic pure;
Water: Re-distilled.

3. Apparatus

HPLC, with variable wavelength ultraviolet detector;
Chromatographic column: 250 mm × 4.6 mm (id) stainless steel columns packaged with ODS C_{18}, 5 μm;
Micro injector: 50 μl;

Filter: pore size of filter is about 0.5 µm.

4. Operating conditions

Flowing phase: acetonitrile + water = 85 + 15 (v/v)

Flow rate: 0.8 ml/min;

Column temperature: Room temperature (Temperature variations should not exceed 2 °C);

Detector wavelength: 230 nm;

Injection volume: 5 µl.

The above mentioned HPLC condition is the normal experimental condition; you may change it according to the different machine to achieve the best result.

5. Procedures

5.1 Preparation of standard solution

Weigh Lambda-cyhalothrin standard sample 0.05 g (accuracy to 0.0001 g) into 50 ml volumetric vessel, dissolve and dilute to mark with flowing phase. Dissolve fully by ultrasonic vibration.

5.2 Preparation of sample solution

Weigh the testing sample containing Lambda-cyhalothrin 0.05 g (accuracy to 0.0001 g) into 50 ml volumetric vessel, dissolve and dilute to mark with flowing phase. Dissolve fully by ultrasonic vibration.

5.3 Determination

Under the operation conditions, after the baseline is stable, inject the standard solution continuously with microliter syringe, calculate repetition value of relative response value; When the relative response value between two needles is less than 1.0%, test as the below sequence. a. Standard solution; b. Sample solution; c. Sample solution; d. Standard solution.

6. Calculation

The content of Lambda-cyhalothrin sample may be calculated by the following equation:

$$X_2 = \frac{A_2 \times m_1 \times p}{A_1 \times m_2}$$

A_1: Peak area of Lambda-cyhalothrin in standard sample solution;

A_2: Peak area of Lambda-cyhalothrin in sample solution;

m_1: Mass of the standard sample, g;

m_2: Mass of the testing sample, g;

IV. BIOLOGICAL SPECTRUM

1. Pesticide efficacy (list of pests)

Control of a wide spectrum of insect pests, e.g. aphids, Colorado beetles, thrips, lepidopteran larvae, coleopteran larvae and adults, etc., in cereals, hops, ornamentals, potatoes, vegetables, cotton, and other crops. Provides good control of insect-borne plant viruses. Also used for control of insect pests in public health.

2. Mode of Action:

Non-systemic insecticide with contact and stomach action, and repellent properties. Gives rapid knockdown and long residual activity.

3. Uses and Recommendations

Crop	Typical pests	Dosage of formulation	Methods
Outdoor	Mosquitoes, flies, cockroaches	Mosquitoes, flies: 0.5 g/lt Cockroaches: 1ml/lt	Spraying

4. Phytotoxicity

Not phytotoxic to the crops, if use according to recommendations.

V. TOXICOLOGICAL STUDIES

1. Acute Mammalian Toxicity

For Lambda-Cyhalothrin tech:

Acute toxicity:

Oral: Acute oral LD_{50} for male rats 79, female rats 56 mg/kg.

Skin and eye: Acute percutaneous LD_{50} for rats 632–696 mg/kg. Mild eye irritant; non-irritant to skin (rabbits). Not a skin sensitiser (guinea pigs).

Inhalation: LC_{50} (4 h) for rats 0.06 mg/l air (total particulate).

2. Chronic toxicity

For Lambda-Cyhalothrin tech:

In a study that complied with GLP, groups of 72 male and 72 female Alpk/AP SPF rats were fed diets containing technical-grade lambda-cyhalothrin (purity, 89.25%; containing 92.2% pyrethroids of which 96.8% was lambda-cyhalothrin) at a concentration of 0, 10, 50, or 250 mg/kg for 104 weeks, providing mean doses of 0, 0.47, 2.3, and 12 mg/kg bw per day for males and 0, 0.55, 2.7, and 14 mg/kg bw per day for females. Satellite groups of 10 rats of each sex were given the same diets but were killed after only 52 weeks. Blood was taken for haematological measurements from 10 rats of each sex in each group at 4 and 13 weeks and thereafter at 13-week intervals. Blood was taken for biochemical analyses and urine for urinary analyses from 12 rats of each sex in each group at the same intervals. In weeks 52 and 103, ophthalmoscopy was performed on 20 males and 20 females from each group.

No clinical signs were seen that could be attributed to treatment. The mortality rate was unaffected. Body-weight gain was suppressed in both males and females given 250 mg/kg of diet (two-sided Student t test: $p < 0.05$), and the males in this group had increased food use efficiency. No consistent, dose-related haematological effects were seen, although changes in various parameters occasionally achieved statistical significance (two-sided

Student *t* test: $p < 0.05$). The volume of urine produced by rats fed 250 mg/kg of diet tended to be decreased, but otherwise there was no effect on urinary parameters. Ophthalmoscopy revealed no treatment-related effects. Blood biochemistry showed intermittent effects in rats at 250 mg/kg of diet, consisting of reduced plasma concentrations of glucose and triglycerides, reduced plasma alkaline phosphatase activity, and increased plasma urea concentration (two-sided Student *t* test: $p < 0.05$). The reduction in plasma triglycerides was the most marked finding, especially in females.

Long, pointed fibres, thought to originate from the diet, were found embedded in the tissues of the palate, nasal turbinates, roof of the nasal cavity, and peridontal space. The presence of the fibers suggested that the lesions were caused by penetration of the tissue by these fibers rather than by lambda-cyhalothrin. No treatment-related gross lesions were detected *post mortem*, but several rats in all groups, including controls, had rhinitis and oral lesions (oral granuloma formation and erosion of the palate) in response to the presence of the fibers in the diet. At the interim kill, the weight of the liver (relative to body weight) was increased in rats of each sex given 250mg/kg of diet, but this effect was not seen in rats killed at 104 weeks. The weight of the adrenals (relative to body weight) was increased in females at 50 and 250 mg/kg of diet killed at 104 weeks. Histopathological examination revealed no treatment-related effect on the incidence or severity of any neoplastic or non-neoplastic lesions. The NOEL was 50 mg/kg of diet, equal to 2.3 mg/kg bw per day.

3. Reproductive effects

For Lambda-Cyhalothrin tech:

In two studies, lambda cyhalothrin caused reduced body weight gain at doses of 15 mg/kg/day in pregnant rats (highest dose tested) and at doses of 30 mg/kg/day in pregnant rabbits (also the highest dose tested), but these doses produced no observable reproductive effects. There were reduced numbers of viable offspring at doses of 50 mg/kg/day in the second and third generations in the three-generational rat study noted above. It is unlikely that lambda cyhalothrin would cause reproductive effects in humans under normal conditions.

4. Teratogenic effects:

For Lambda-Cyhalothrin tech:

No teratogenic or fetotoxic effects were observed in teratology studies of lambda cyhalothrin in rats and rabbits at the highest doses tested in both species (15 mg/kg/day and 30 mg/kg/day, respectively. Based on these data, it is unlikely that lambda cyhalothrin causes teratogenic effects.

5. Mutagenic effects

For Lambda-Cyhalothrin tech:

Lambda cyhalothrin produced negative results in all Ames mutagenicity assays using five different test strains, both with and without metabolic activation. Results of other in-vitro cytogenetic assays and chromosomal structural aberration tests indicated no mutagenic or genotoxic effects were caused by lambda cyhalothrin. The available evidence suggests that lambda cyhalothrin is non-mutagenic and non-genotoxic.

6. Carcinogenic effects:

For Lambda-Cyhalothrin tech:

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7. Acceptable Daily Intake (ADI)

For Lambda-Cyhalothrin: (EC) 0.005 mg/kg b.w. [2000]; (EPA) cRfD 0.001 mg/kg b.w. [1997].

VI. ECOTOXICOLOGY

1. Birds

For Lambda-Cyhalothrin tech: Acute oral LD_{50} for mallard ducks >3950 mg/kg. Dietary LC_{50} for quail >5300 mg/kg. No accumulation of residues in eggs or tissues.

2. Aquatic organism

For Lambda-Cyhalothrin tech:
Fish: LC_{50} (96 h) for bluegill sunfish 0.21, rainbow trout 0.36 μg/l.
Daphnia: Intrinsic toxicity to aquatic organisms is greatly reduced by rapid loss from the water by adsorption and degradation: EC_{50} (72 h) in water 0.26 μg/l, in water/sediment 31 μg/l.
Algae: E_rC_{50} (96 h) for Selenastrum capricornutum >1000 μg/l.

3. Earthworm:

For Lambda-Cyhalothrin tech: LC_{50} for Eisenia foetida >1000 mg/kg soil.

4. Bees:

For Lambda-Cyhalothrin tech: LD_{50} (oral) 909 ng/bee; (contact) 38 ng/bee.

VII. SAFETY HANDLING STORAGE AND DISPOSAL

1. Storage

Store it in its original container in dry, cool, well-ventilated area. Avoid excess heat. Not to be stored next to foodstuffs and water supplies. Keep out of reach of children, uninformed persons and animals. Do not contaminate other pesticides and fertilizers.

2. Shelf Life

It is stable within two years under room condition.

3. Handling Precautions

Avoid contact with skin and eyes. Do not handle broken packages without protective equipment. Wash hands before eating, drinking, chewing gum, smoking, or using the toilet. Remove clothing immediately if the product gets inside. Then wash skin thoroughly using a non-abrasive soap and put on clean clothing. Seek medical advice. Water used to clean equipment must be disposed of correctly to avoid contamination.

4. Packaging

Plastic drums: 200 L;
HDPE bottle: 1 L, 500 ml, 250 ml, 100 ml, etc; all according to client's requirements.

5. Signs and Symptoms of over Exposure:

Emergency overview: Harmful if swallowed. This material causes irritation following skin contact and can cause serious damage to the eyes. May cause tingling/numbness in exposed areas (paraesthesia).

Routes of exposure: Inhalation, skin contact and inhalation.

6. Note to Physician:

Treatment: Gastric lavage may be effective when performed within 4 hours of ingestion. Aspiration of this material into the lungs should be avoided. Symptomatic treatment and supportive therapy as indicated.

7. First Aid

General: When possible, have the product container or label with you when calling a poison control center or doctor or going for treatment.

Eye: 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 physician or poison control center immediately.

Skin: Take off contaminated clothing and shoes immediately. Wash off immediately with plenty of water for at least 15 minutes. Call a physician or poison control center immediately.

Ingestion: Call a physician or poison control center immediately. Rinse out mouth and give water in small sips to drink. DO NOT induce vomiting unless directed to do so by a physician or poison control center. Never give anything by mouth to an unconscious person. Do not leave victim unattended.

Inhalation: Move to fresh air. If person is not breathing, call an ambulance, then give artificial respiration, preferably mouth-to-mouth if possible. Call a physician or poison control center immediately.

8. Antidote

No specific antidote.