

TITAN LAMBDA-CYHALOTHRIN 250 CS INSECTICIDE

Titan Ag

Chemwatch: 9642-91

Version No: 2.1

Safety Data Sheet according to Work Health and Safety Regulations (Hazardous Chemicals) 2023 and ADG requirements

Chemwatch Hazard Alert Code: 4

Initial Date: 12/08/2026

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L.GHS.AUS.EN.E

SECTION 1 Identification of the substance / mixture and of the company / undertaking

Product Identifier

Product name	TITAN LAMBDA-CYHALOTHRIN 250 CS INSECTICIDE
Chemical Name	Not Applicable
Synonyms	Not Available
Proper shipping name	PYRETHROID PESTICIDE, LIQUID, TOXIC (contains cyhalothrin)
Chemical formula	Not Applicable
Other means of identification	Not Available

Relevant identified uses of the substance or mixture and uses advised against

Relevant identified uses	Agricultural insecticide. Use according to manufacturer's directions.
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Details of the manufacturer or importer of the safety data sheet

Registered company name	Titan Ag
Address	Princes Street Marina, Suite 15/16 Princes Street Newport NSW 2106 Australia
Telephone	+61 2 9999 6655
Fax	+61 2 9999 0483
Website	https://www.titanag.com.au/
Email	titanorders@titanag.com.au

Emergency telephone number

Association / Organisation	Titan Ag
Emergency telephone number(s)	1800 033 111 (24 hours)
Other emergency telephone number(s)	Not Available

SECTION 2 Hazards identification

Classification of the substance or mixture

Poisons Schedule	S7
Classification ^[1]	Acute Toxicity (Oral) Category 3, Acute Toxicity (Dermal) Category 4, Sensitisation (Skin) Category 1, Serious Eye Damage/Eye Irritation Category 2A, Acute Toxicity (Inhalation) Category 1, Specific Target Organ Toxicity - Repeated Exposure Category 2, Hazardous to the Aquatic Environment Long-Term Hazard Category 1
Legend:	1. Classified by Chemwatch; 2. Classification drawn from HCIS; 3. Classification drawn from Regulation (EU) No 1272/2008 - Annex VI

Label elements

Hazard pictogram(s)	  
Signal word	Danger

Hazard statement(s)

H301	Toxic if swallowed.
H312	Harmful in contact with skin.
H317	May cause an allergic skin reaction.
H319	Causes serious eye irritation.
H330	Fatal if inhaled.
H373	May cause damage to organs through prolonged or repeated exposure.
H410	Very toxic to aquatic life with long lasting effects.

Precautionary statement(s) Prevention

P260	Do not breathe mist/vapours/spray.
P264	Wash all exposed external body areas thoroughly after handling.
P270	Do not eat, drink or smoke when using this product.
P271	Use only a well-ventilated area.
P280	Wear protective gloves, protective clothing, eye protection and face protection.
P273	Avoid release to the environment.
P284	[In case of inadequate ventilation] wear respiratory protection.
P272	Contaminated work clothing should not be allowed out of the workplace.

Precautionary statement(s) Response

P301+P310	IF SWALLOWED: Immediately call a POISON CENTER/doctor/physician/first aider.
P304+P340	IF INHALED: Remove person to fresh air and keep comfortable for breathing.
P330	Rinse mouth.
P302+P352	IF ON SKIN: Wash with plenty of water and soap.
P305+P351+P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P333+P313	If skin irritation or rash occurs: Get medical advice/attention.
P337+P313	If eye irritation persists: Get medical advice/attention.
P362+P364	Take off contaminated clothing and wash it before reuse.
P391	Collect spillage.

Precautionary statement(s) Storage

P403+P233	Store in a well-ventilated place. Keep container tightly closed.
P405	Store locked up.

Precautionary statement(s) Disposal

P501	Dispose of contents/container to authorised hazardous or special waste collection point in accordance with any local regulation.
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No further product hazard information.

SECTION 3 Composition / information on ingredients

Substances

See section below for composition of Mixtures

Mixtures

CAS No	%[weight]	Name
91465-08-6	20-25	cyhalothrin
Legend:	1. Classified by Chemwatch; 2. Classification drawn from HCIS; 3. Classification drawn from Regulation (EU) No 1272/2008 - Annex VI; 4. Classification drawn from C&L; * EU IOELVs available	

SECTION 4 First aid measures

Description of first aid measures

Eye Contact	If this product comes in contact with the eyes: ▶ Immediately hold eyelids apart and flush the eye continuously with running water. ▶ Ensure complete irrigation of the eye by keeping eyelids apart and away from eye and moving the eyelids by occasionally lifting the upper and lower lids. ▶ Continue flushing until advised to stop by the Poisons Information Centre or a doctor, or for at least 15 minutes. ▶ Transport to hospital or doctor without delay. ▶ Removal of contact lenses after an eye injury should only be undertaken by skilled personnel.
Skin Contact	If skin or hair contact occurs: ▶ Immediately flush body and clothes with large amounts of water, using safety shower if available. ▶ Quickly remove all contaminated clothing, including footwear. ▶ Wash skin and hair with running water. Continue flushing with water until advised to stop by the Poisons Information Centre. ▶ Transport to hospital, or doctor.
Inhalation	▶ If fumes or combustion products are inhaled remove from contaminated area. ▶ Lay patient down. Keep warm and rested. ▶ Prostheses such as false teeth, which may block airway, should be removed, where possible, prior to initiating first aid procedures. ▶ Apply artificial respiration if not breathing, preferably with a demand valve resuscitator, bag-valve mask device, or pocket mask as trained. Perform CPR if necessary.

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Ingestion	Transport to hospital, or doctor, without delay.
	IF SWALLOWED, REFER FOR MEDICAL ATTENTION, WHERE POSSIBLE, WITHOUT DELAY. - For advice, contact a Poisons Information Centre or a doctor. - Urgent hospital treatment is likely to be needed. - In the mean time, qualified first-aid personnel should treat the patient following observation and employing supportive measures as indicated by the patient's condition. - If the services of a medical officer or medical doctor are readily available, the patient should be placed in his/her care and a copy of the SDS should be provided. Further action will be the responsibility of the medical specialist. - If medical attention is not available on the worksite or surroundings send the patient to a hospital together with a copy of the SDS.
	Where medical attention is not immediately available or where the patient is more than 15 minutes from a hospital or unless instructed otherwise: INDUCE vomiting with fingers down the back of the throat, ONLY IF CONSCIOUS. Lean patient forward or place on left side (head-down position, if possible) to maintain open airway and prevent aspiration. NOTE: Wear a protective glove when inducing vomiting by mechanical means.

Indication of any immediate medical attention and special treatment needed

For chronic or short term repeated exposures to pyrethrum and synthetic pyrethroids:

- Mammalian toxicity of pyrethrum and synthetic pyrethroids is low, in part because of poor bioavailability and a large first pass extraction by the liver.
- The most common adverse reaction results from the potent sensitising effects of pyrethrins.
- Clinical manifestations of exposure include contact dermatitis (erythema, vesiculation, bullae); anaphylactoid reactions (pallor, tachycardia, diaphoresis) and asthma. *[Ellenhorn Barceloux]*
- In cases of skin contact, it has been reported that topical application of Vitamin E Acetate (alpha-tocopherol acetate) has been found to have high therapeutic value, eliminating almost all skin pain associated with exposure to synthetic pyrethroids. *[Incitec]*

For sodium channel blockers:

- Immediate initial management must begin with an assessment of airway, breathing, and circulation. Many patients present with hypotension, bradycardia or tachycardia and altered mental status. An endotracheal tube or other advanced airways should be placed in patients who are unable to protect their airway.
 - The cornerstone of treatment is the administration of sodium bicarbonate. It is indicated for patients with an ECG demonstrating a QRS duration >100 ms or any suspicious QT prolongation or dysrhythmia. Sodium bicarbonate is beneficial in raising the serum pH and increasing the extracellular sodium. Alkalinization leads to an increase of the electrochemical gradient across cell membranes which helps to offload sodium channels. It might also increase the protein binding of the offending agent. Patients should be given 1-2 mEq/kg as a bolus dose. Bolus doses can be administered until the QRS duration is less than 100 ms. This can be followed with a continuous infusion of sodium bicarbonate of 2-3 50 mEq ampules in one litre of dextrose 5% in water (D5W). Hypertonic saline has been used but is not routinely recommended; it remains an option in dire circumstances as reported in a case of flecainide overdose.
 - Management of hypotension requires a combination of volume resuscitation and vasopressor and inotropic support. Use of inotropic agents such as dobutamine helps increase cardiac output while the effects of the toxicity dissipate. Addition of vasopressors such as norepinephrine, vasopressin, or epinephrine might be considered for haemodynamic support. These agents lead to vasoconstriction and an increase in the systemic vascular resistance, resulting in increased systemic blood pressure.
 - Patients with sodium channel blocker toxicity from lidocaine have benefited from the administration of 20% lipid emulsion if they are hemodynamically unstable. The mechanism of action of lipid emulsion is unclear; however, it is hypothesized that it acts as a lipid sink, with an electrochemical gradient drawing the lidocaine into the lipid. Patients should be given a 1.5 mL/kg bolus followed by a 0.25 mL/kg infusion. Few studies exist on lipid emulsion for other sodium channel toxicities. There is controversy over its utility in TCA overdose.
 - Extracorporeal membrane oxygenation (ECMO) has been used in a refractory case with reported survival. In general, the drugs which cause sodium channel blockade toxicity are highly lipophilic, have a wide volume of distribution, and are not dialyzable.
 - Seizure management is accomplished with benzodiazepine medications, such as lorazepam and midazolam. For refractory seizures, loading of antiepileptic medications such as levetiracetam is recommended. Phenytoin and its derivatives should be avoided in this situation as phenytoin is itself a sodium channel blocker and will likely lead to clinical deterioration. Intubation and sedation with propofol should be considered for seizures refractory to other management.
 - Complications of sodium channel blocker toxicity include cardiogenic shock, hypotension, bradycardia or tachycardia, cardiovascular collapse, respiratory depression, encephalopathy, status epilepticus, and death.
 - The high mortality rate of tricyclic antidepressant (TCA) overdose is well known.
 - Class I antiarrhythmic toxicity is associated with a significantly higher mortality rate (22.5%) compared with other drugs (1%). Prompt recognition and treatment are vital to minimize morbidity and mortality. Diarrhea, nausea, headache and dizziness are also common side effects of many Class I drugs. Quinidine enhances digitalis toxicity, especially if hypokalemia is present. Quinidine, by delaying repolarization, can precipitate torsades de pointes (especially in patients with long-QT syndrome), a ventricular tachyarrhythmia caused by afterdepolarizations. Disopyramide is contraindicated for patients with uncompensated heart failure because of its negative inotropic actions; propafenone can also depress inotropy. IC compounds can cause increased risk of sudden death in patients with a prior history of myocardial infarction or sustained ventricular arrhythmias.
 - There tends to be no significant effect on the atrioventricular (AV) node as it does not depend on fast sodium channels. Instead, sodium channel blockade produces a variety of cardiac effects as demonstrated by their impact on the myocyte action potential. With varying degrees of potency, class I agents decrease the slope and amplitude of phase 0, and thereby reduce the rate of depolarization and the conduction velocity through the myocyte. This leads to a slower depolarization of the cell and is important for the desired therapeutic suppression of tachydyssrhythmias through reentrant mechanisms. Concomitant anticholinergic effects of many of these drugs can complicate their sodium channel effects.
- Sodium Channel Blocker Toxicity: Kaylinn Dokken; Patrick Fairley. Treasure Island (FL): StatPearls Publishing; 2020 Jan-
<https://www.ncbi.nlm.nih.gov/books/NBK430685/>

SECTION 5 Firefighting measures

Extinguishing media

- Foam.
- Dry chemical powder.
- BCF (where regulations permit).
- Carbon dioxide.
- Water spray or fog - Large fires only.

Special hazards arising from the substrate or mixture

Fire Incompatibility	Avoid contamination with oxidising agents i.e. nitrates, oxidising acids, chlorine bleaches, pool chlorine etc. as ignition may result
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Advice for firefighters

Fire Fighting	- Alert Fire Brigade and tell them location and nature of hazard. - Wear full body protective clothing with breathing apparatus. - Prevent, by any means available, spillage from entering drains or water course. - Use fire fighting procedures suitable for surrounding area. Do not approach containers suspected to be hot. - Cool fire exposed containers with water spray from a protected location. - If safe to do so, remove containers from path of fire. - Equipment should be thoroughly decontaminated after use.
Fire/Explosion Hazard	- Combustible. - Slight fire hazard when exposed to heat or flame. - Heating may cause expansion or decomposition leading to violent rupture of containers.

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	- On combustion, may emit toxic fumes of carbon monoxide (CO). - May emit acrid smoke. - Mists containing combustible materials may be explosive. Combustion products include: - carbon dioxide (CO₂) - hydrogen fluoride - nitrogen oxides (NO_x) - other pyrolysis products typical of burning organic material. May emit poisonous fumes.
HAZCHEM	2X

SECTION 6 Accidental release measures

Personal precautions, protective equipment and emergency procedures

See section 8

Environmental precautions

See section 12

Methods and material for containment and cleaning up

Minor Spills	Environmental hazard - contain spillage. - Remove all ignition sources. - Clean up all spills immediately. - Avoid breathing vapours and contact with skin and eyes. - Control personal contact with the substance, by using protective equipment. - Contain and absorb spill with sand, earth, inert material or vermiculite. - Wipe up. - Place in a suitable, labelled container for waste disposal.
Major Spills	Environmental hazard - contain spillage. - Clear area of personnel and move upwind. - Alert Fire Brigade and tell them location and nature of hazard. - Wear full body protective clothing with breathing apparatus. - Prevent, by any means available, spillage from entering drains or water course. - Stop leak if safe to do so. - Contain spill with sand, earth or vermiculite. - Collect recoverable product into labelled containers for recycling. - Neutralise/decontaminate residue (see Section 13 for specific agent). - Collect solid residues and seal in labelled drums for disposal. - Wash area and prevent runoff into drains. - After clean up operations, decontaminate and launder all protective clothing and equipment before storing and re-using. - If contamination of drains or waterways occurs, advise emergency services.

Personal Protective Equipment advice is contained in Section 8 of the SDS.

SECTION 7 Handling and storage

Precautions for safe handling

Safe handling	- Avoid skin contact, including inhalation. - Wear protective clothing when risk of exposure occurs. - Use in a well-ventilated area. - Prevent concentration in hollows and sumps. DO NOT enter confined spaces until atmosphere has been checked. DO NOT allow material to come in direct contact with human skin or eyes. DO NOT allow material to come in contact with exposed food or food contact surfaces. - Suitable PPE must be worn at all times. - Avoid contact with incompatible materials. When handling, DO NOT eat, drink or smoke. - Keep containers securely sealed when not in use. - Avoid physical damage to containers. - Always wash hands with soap and water after handling. - Work clothes should be laundered separately. Launder contaminated clothing before re-use. - Use good occupational work practice. - Observe manufacturer's storage and handling recommendations contained within this SDS. - Atmosphere should be regularly checked against established exposure standards to ensure safe working conditions are maintained. DO NOT allow clothing wet with material to stay in contact with skin
Other information	- Store in original containers. - Keep containers securely sealed. - Store in a cool, dry, well-ventilated area. - Store away from incompatible materials and foodstuff containers. - Protect containers against physical damage and check regularly for leaks. - Observe manufacturer's storage and handling recommendations contained within this SDS.

Conditions for safe storage, including any incompatibilities

Suitable container	- Glass container is suitable for laboratory quantities - Lined metal can, lined metal pail/ can. - Plastic pail. - Polyliner drum. - Packing as recommended by manufacturer. - Check all containers are clearly labelled and free from leaks. For low viscosity materials - Drums and jerricans must be of the non-removable head type. - Where a can is to be used as an inner package, the can must have a screwed enclosure. For materials with a viscosity of at least 2680 cSt. (23 deg. C) and solids (between 15 C deg. and 40 deg C.): - Removable head packaging; - Cans with friction closures and
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	▶ low pressure tubes and cartridges may be used. - Where combination packages are used, and the inner packages are of glass, there must be sufficient inert cushioning material in contact with inner and outer packages *. - In addition, where inner packagings are glass and contain liquids of packing group I and II there must be sufficient inert absorbent to absorb any spillage *. - * unless the outer packaging is a close fitting moulded plastic box and the substances are not incompatible with the plastic. All inner and sole packagings for substances that have been assigned to Packaging Groups I or II on the basis of inhalation toxicity criteria, must be hermetically sealed.
Storage incompatibility	Pyrethrins and permethrins: ▶ are unstable in the presence of light, heat, moisture and air ▶ are hydrolysed by oxygen and/ or sunlight ▶ may react with strong oxidisers to produce fire and explosions ▶ are incompatible with alkalis ▶ Avoid reaction with oxidising agents

SECTION 8 Exposure controls / personal protection

Control parameters

Occupational Exposure Limits (OEL)

INGREDIENT DATA

Not Available

MATERIAL DATA

Airborne particulate or vapour must be kept to levels as low as is practicably achievable given access to modern engineering controls and monitoring hardware. Biologically active compounds may produce idiosyncratic effects which are entirely unpredictable on the basis of literature searches and prior clinical experience (both recent and past). For pyrethrum and its active components:

IDLH Level: 5000 mg/m³

Pyrethrum and/or its active components, the pyrethrins, cause dermatitis and sensitisation. Ingestion of massive doses can induce convulsions, vomiting and bradycardia. Animals exhibit liver damage and death through respiratory failure. The recommended TLV-TWA is equivalent to an occupational dose of 0.7 mg/kg/day and is thought to minimise the potential for systemic effects. The TLV may NOT prevent the development of hypersensitisation, particularly among those with pre-existing allergies to pollen and related agents.

Synthetic pyrethrins (pyrethroids) often produce a range of toxic effects resembling pyrethrum; in the absence of a regulated exposure limit prudence dictates that the value for pyrethrum serves as a reference.

Exposure controls

Appropriate engineering controls	For potent pharmacological agents: Solutions Handling: ▶ Solutions can be handled outside a containment system or without local exhaust ventilation during procedures with no potential for aerosolisation. If the procedures have a potential for aerosolisation, an air-purifying respirator is to be worn by all personnel in the immediate area. ▶ Solutions used for procedures where aerosolisation may occur (e.g., vortexing, pumping) are to be handled within a containment system or with local exhaust ventilation. ▶ In situations where this is not feasible (may include animal dosing), an air-purifying respirator is to be worn by all personnel in the immediate area. If using a ventilated enclosure that has not been validated, wear a half-mask respirator equipped with HEPA cartridges until the enclosure is validated for use. ▶ Ensure gloves are protective against solvents in use. Unless written procedures, specific to the workplace are available, the following is intended as a guide: ▶ For Laboratory-scale handling of Substances assessed to be toxic by inhalation. Quantities of up to 25 grams may be handled in Class II biological safety cabinets *; Quantities of 25 grams to 1 kilogram may be handled in Class II biological safety cabinets* or equivalent containment systems; Quantities exceeding 1 kg may be handled either using specific containment, a hood or Class II biological safety cabinet*. ▶ HEPA terminated local exhaust ventilation should be considered at point of generation of dust, fumes or vapours. ▶ The need for respiratory protection should also be assessed where incidental or accidental exposure is anticipated. Dependent on levels of contamination, PAPR, full face air purifying devices with P2 or P3 filters or air supplied respirators should be evaluated. When handling: Quantities of up to 25 grams, an approved respirator with HEPA filters or cartridges should be considered; Quantities of 25 grams to 1 kilogram, a half-face negative pressure, full negative pressure, or powered helmet-type air purifying respirator should be considered. Quantities in excess of 1 kilogram, a full face negative pressure, helmet-type air purifying, or supplied air respirator should be considered. Written procedures, specific to a particular work-place, may replace these recommendations * For Class II Biological Safety Cabinets, Types B2 or B3 should be considered. Where only Class I, open fronted Cabinets are available, glove panels may be added, Laminar flow cabinets do not provide sufficient protection when handling these materials unless especially designed to do so. Pilot Plant and Production ▶ Wear appropriate gloves; lab coat, nylon coveralls or disposable Tyvek suit; safety glasses, safety shoes, and disposable booties. Use good manufacturing practices (i.e., cGMPs). ▶ Protective garment (coveralls, Tyvek, lab coat) is not to be worn outside the work area. ▶ Clean/dirty/decontamination areas are to be established. ▶ Negative/positive air pressure relationships and buffer zones required (i.e., ante-room/degowning room/airlock). ▶ Area access is to be restricted. ▶ High-energy operations such as milling, particle sizing, spraying or fluidising should be done within an approved emission control or containment system. ▶ Develop cleaning procedures and techniques that limit potential exposure
Individual protection measures, such as personal protective equipment	
Eye and face protection	▶ Chemical protective goggles with full seal.[AS/NZS 1337.1, EN166 or national equivalent] ▶ Shielded mask (gas-type). ▶ Contact lenses may pose a special hazard; soft contact lenses may absorb and concentrate irritants. A written policy document, describing the wearing of lenses or restrictions on use, should be created for each workplace or task. This should include a review of

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	lens absorption and adsorption for the class of chemicals in use and an account of injury experience. Medical and first-aid personnel should be trained in their removal and suitable equipment should be readily available. In the event of chemical exposure, begin eye irrigation immediately and remove contact lens as soon as practicable. Lens should be removed at the first signs of eye redness or irritation - lens should be removed in a clean environment only after workers have washed hands thoroughly. [CDC NIOSH Current Intelligence Bulletin 59].
Skin protection	See Hand protection below
Hands/feet protection	▶ Elbow length PVC gloves NOTE: ▶ The material may produce skin sensitisation in predisposed individuals. Care must be taken, when removing gloves and other protective equipment, to avoid all possible skin contact. ▶ Contaminated leather items, such as shoes, belts and watch-bands should be removed and destroyed. The selection of suitable gloves does not only depend on the material, but also on further marks of quality which vary from manufacturer to manufacturer. Where the chemical is a preparation of several substances, the resistance of the glove material can not be calculated in advance and has therefore to be checked prior to the application. The exact break through time for substances has to be obtained from the manufacturer of the protective gloves and has to be observed when making a final choice. Personal hygiene is a key element of effective hand care. Gloves must only be worn on clean hands. After using gloves, hands should be washed and dried thoroughly. Application of a non-perfumed moisturiser is recommended. Suitability and durability of glove type is dependent on usage. Important factors in the selection of gloves include: · frequency and duration of contact, · chemical resistance of glove material, · glove thickness and · dexterity Select gloves tested to a relevant standard (e.g. Europe EN 374, US F739, AS/NZS 2161.1 or national equivalent). · When prolonged or frequently repeated contact may occur, a glove with a protection class of 5 or higher (breakthrough time greater than 240 minutes according to EN 374, AS/NZS 2161.10.1 or national equivalent) is recommended. · When only brief contact is expected, a glove with a protection class of 3 or higher (breakthrough time greater than 60 minutes according to EN 374, AS/NZS 2161.10.1 or national equivalent) is recommended. · Some glove polymer types are less affected by movement and this should be taken into account when considering gloves for long-term use. · Contaminated gloves should be replaced. As defined in ASTM F-739-96 in any application, gloves are rated as: · Excellent when breakthrough time > 480 min · Good when breakthrough time > 20 min · Fair when breakthrough time < 20 min · Poor when glove material degrades For general applications, gloves with a thickness typically greater than 0.35 mm, are recommended. It should be emphasised that glove thickness is not necessarily a good predictor of glove resistance to a specific chemical, as the permeation efficiency of the glove will be dependent on the exact composition of the glove material. Therefore, glove selection should also be based on consideration of the task requirements and knowledge of breakthrough times. Glove thickness may also vary depending on the glove manufacturer, the glove type and the glove model. Therefore, the manufacturers technical data should always be taken into account to ensure selection of the most appropriate glove for the task. Note: Depending on the activity being conducted, gloves of varying thickness may be required for specific tasks. For example: · Thinner gloves (down to 0.1 mm or less) may be required where a high degree of manual dexterity is needed. However, these gloves are only likely to give short duration protection and would normally be just for single use applications, then disposed of. · Thicker gloves (up to 3 mm or more) may be required where there is a mechanical (as well as a chemical) risk i.e. where there is abrasion or puncture potential Gloves must only be worn on clean hands. After using gloves, hands should be washed and dried thoroughly. Application of a non-perfumed moisturiser is recommended. ▶ Rubber gloves (nitrile or low-protein, powder-free latex, latex/ nitrile). Employees allergic to latex gloves should use nitrile gloves in preference. ▶ Double gloving should be considered. ▶ PVC gloves. ▶ Change gloves frequently and when contaminated, punctured or torn. ▶ Wash hands immediately after removing gloves. ▶ Protective shoe covers. [AS/NZS 2210] ▶ Head covering.
Body protection	See Other protection below
Other protection	▶ For quantities up to 500 grams a laboratory coat may be suitable. ▶ For quantities up to 1 kilogram a disposable laboratory coat or coverall of low permeability is recommended. Coveralls should be buttoned at collar and cuffs. ▶ For quantities over 1 kilogram and manufacturing operations, wear disposable coverall of low permeability and disposable shoe covers. ▶ For manufacturing operations, air-supplied full body suits may be required for the provision of advanced respiratory protection. ▶ Eye wash unit. ▶ Ensure there is ready access to an emergency shower. ▶ For Emergencies: Vinyl suit

Respiratory protection

Full face respirator with supplied air.

Selection of the Class and Type of respirator will depend upon the level of breathing zone contaminant and the chemical nature of the contaminant. Protection Factors (defined as the ratio of contaminant outside and inside the mask) may also be important.

Required minimum protection factor	Maximum gas/vapour concentration present in air p.p.m. (by volume)	Half-face Respirator	Full-Face Respirator
up to 10	1000	A-AUS / Class1 P2	-
up to 50	1000	-	A-AUS / Class 1 P2
up to 50	5000	Airline *	-
up to 100	5000	-	A-2 P2
up to 100	10000	-	A-3 P2
100+			Airline**

* - Continuous Flow ** - Continuous-flow or positive pressure demand
A(All classes) = Organic vapours, B AUS or B1 = Acid gasses, B2 = Acid gas or hydrogen cyanide(HCN), B3 = Acid gas or hydrogen cyanide(HCN), E = Sulfur dioxide(SO2), G = Agricultural chemicals, K = Ammonia(NH3), Hg = Mercury, NO = Oxides of nitrogen, MB = Methyl bromide, AX = Low boiling point organic compounds(below 65 degC)

- ▶ Cartridge respirators should never be used for emergency ingress or in areas of unknown vapour concentrations or oxygen content.
- ▶ The wearer must be warned to leave the contaminated area immediately on detecting any odours through the respirator. The odour may indicate that the mask is not functioning properly, that the vapour concentration is too high, or that the mask is not properly fitted. Because of these limitations, only restricted use of cartridge respirators

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is considered appropriate.

- ▶ Cartridge performance is affected by humidity. Cartridges should be changed after 2 hr of continuous use unless it is determined that the humidity is less than 75%, in which case, cartridges can be used for 4 hr. Used cartridges should be discarded daily, regardless of the length of time used

SECTION 9 Physical and chemical properties

Information on basic physical and chemical properties

Appearance	Beige liquid.		
Physical state	Liquid	Relative density (Water = 1)	1.1
Odour	No Odour	Partition coefficient n-octanol / water	Not Available
Odour threshold	Not Available	Auto-ignition temperature (°C)	Not Available
pH (as supplied)	5.4	Decomposition temperature (°C)	Not Available
Melting point / freezing point (°C)	Not Available	Viscosity (mm2/s)	Not Available
Initial boiling point and boiling range (°C)	Not Available	Molecular weight (g/mol)	Not Applicable
Flash point (°C)	Not Available	Taste	Not Available
Evaporation rate	Not Available	Explosive properties	Not Available
Flammability	Not Applicable	Oxidising properties	Not Available
Upper Explosive Limit (%)	Not Available	Surface Tension (dyn/cm or mN/m)	Not Available
Lower Explosive Limit (%)	Not Available	Volatile Component (%vol)	Not Available
Vapour pressure (kPa)	0.0002	Gas group	Not Available
Solubility in water	Immiscible	pH as a solution (1%)	Not Available
Vapour density (Air = 1)	Not Available	VOC g/L	Not Available
Heat of Combustion (kJ/g)	Not Available	Ignition Distance (cm)	Not Available
Flame Height (cm)	Not Available	Flame Duration (s)	Not Available
Enclosed Space Ignition Time Equivalent (s/m3)	Not Available	Enclosed Space Ignition Deflagration Density (g/m3)	Not Available

SECTION 10 Stability and reactivity

Reactivity	See section 7
Chemical stability	▶ Unstable in the presence of incompatible materials. ▶ Product is considered stable. ▶ Hazardous polymerisation will not occur.
Possibility of hazardous reactions	See section 7
Conditions to avoid	See section 7
Incompatible materials	See section 7
Hazardous decomposition products	See section 5

SECTION 11 Toxicological information

Information on toxicological effects

a) Acute Toxicity	There is sufficient evidence to classify this material as acutely toxic.
b) Skin Irritation/Corrosion	Based on available data, the classification criteria are not met.
c) Serious Eye Damage/Irritation	There is sufficient evidence to classify this material as eye damaging or irritating
d) Respiratory or Skin sensitisation	There is sufficient evidence to classify this material as sensitising to skin or the respiratory system
e) Mutagenicity	Based on available data, the classification criteria are not met.
f) Carcinogenicity	Based on available data, the classification criteria are not met.
g) Reproductivity	Based on available data, the classification criteria are not met.
h) STOT - Single Exposure	Based on available data, the classification criteria are not met.
i) STOT - Repeated Exposure	There is sufficient evidence to classify this material as toxic to specific organs through repeated exposure
j) Aspiration Hazard	Based on available data, the classification criteria are not met.

Inhaled	Inhalation of vapours or aerosols (mists, fumes), generated by the material during the course of normal handling, may produce severely toxic effects; these may be fatal. Strong evidence exists that exposure to the material may produce very serious irreversible damage (other than carcinogenesis, mutagenesis and teratogenesis) following a single exposure by inhalation. Evidence shows, or practical experience predicts, that the material produces irritation of the respiratory system, in a substantial number of individuals, following inhalation. In contrast to most organs, the lung is able to respond to a chemical insult by first removing or neutralising the irritant and then repairing the damage. The repair process, which initially evolved to protect mammalian lungs from foreign matter and antigens, may however, produce further lung damage resulting in the impairment of gas exchange, the primary function of the lungs.
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TITAN LAMBDA-CYHALOTHRIN 250 CS INSECTICIDE

	Respiratory tract irritation often results in an inflammatory response involving the recruitment and activation of many cell types, mainly derived from the vascular system. Inhalation of pyrethrins may produce nausea, vomiting, sneezing, serious nasal discharge, nasal stuffiness and asthma. High concentrations may produce hyperexcitability, incoordination, tremors, muscular paralysis and death (due to respiratory failure). There have been some reports of transient facial tingling (paraesthesia) which lasts a few hours after exposure. In common with natural pyrethrins, the material may produce central nervous system stimulation with nausea, vomiting, gastroenteritis, diarrhoea, hypersensitivity, incoordination, tremors, muscle paralysis, convulsion, coma, and respiratory failure. Synthetic pyrethroids are neuropoisons acting on the axons in the peripheral and central nervous systems by interacting with sodium channels in mammals and/or insects. A single dose produces toxic signs in mammals, such as tremors, hyperexcitability, salivation, choreoathetosis (a condition characterised by aimless muscle movements and involuntary motions), and paralysis. The signs disappear fairly rapidly, and the animals recover, generally within a week. At near-lethal dose levels, synthetic pyrethroids cause transient changes in the nervous system, such as axonal swelling and/or breaks and myelin degeneration in the sciatic nerves. They are not considered to cause delayed neurotoxicity of the kind induced by some organophosphorus compounds. Pyrethroids have at least two distinct actions- a short-term pharmacological effect at near-lethal dose levels and a more long-term neurotoxic effect that results in sparse axonal nerve damage. This synthetic pyrethroid produces Type II syndrome (or CS syndrome characteristic of those ester containing the alpha-cyano substituent) and, in rats, causes coarse tremors, clonic seizures, sinus writhing (choreoathetosis) and profuse salivation without lachrymation: hence the term CS (choreoathetosis/salivation) syndrome. The bulk of evidence indicates that Type II syndrome principally involves an action in the mammalian central nervous system. In poorly ventilated spaces, exposure may result in toxic effects in humans. Ingestion (associated with sloppy handling) of deltamethrin, fenvalerate and cypermethrin (all Type II compounds), amongst Chinese cotton crop workers, produced epigastric pain, nausea and vomiting, headache, dizziness, anorexia, fatigue, tightness of the chest, blurred vision, paraesthesia, palpitations, coarse muscular fasciculations in large muscle extremities and disturbances of consciousness. Severe poisonings produced convulsive attacks (lasting 30-120 seconds) accompanied by flexion of upper limbs, extension of lower limbs and loss of consciousness. These seizures occurred between 10 and 20 times a day in the first week after exposure, gradually decreasing in frequency, with complete recovery in two to three weeks. direct neurotoxicity) there is little evidence of allergic-type responses amongst humans exposed to the synthetic pyrethroid esters.
Ingestion	Strong evidence exists that exposure to the material may produce very serious irreversible damage (other than carcinogenesis, mutagenesis and teratogenesis) following a single exposure by swallowing. Ingestion of pyrethrins may produce nausea, vomiting, headache and other central nervous system disturbances. Excitation, muscular tremors and a period of shock may be followed by death. Dogs fed 5000 ppm of pyrethrum, for 90 days, developed dyspnoea, tremors, ataxia and excessive salivation. An estimated fatal human dose is thought to be 100 gms. for a typical 70 kg man (1430 mg/kg). No cases of acute human poisoning with cyhalothrin have been reported. After oral administration cyhalothrin is well absorbed and extensively metabolised. It is eliminated as polar conjugates in urine. In a 90-day feeding study in which rats were fed cyhalothrin at dose levels up to 250 mg/kg diet, reduced body weight gains were observed in males at 250 mg/kg diet. Marginal effects on mean erythrocyte volumes were noted in some treated groups as well as some liver changes. Lambda-cyhalothrin produced similar effects. The no-observed-effect-level was 50 mg/kg diet. Dogs produced clinical signs of pyrethroid neurotoxicity at doses of 10 mg/kg body weight in a 26 week oral study. At levels of 250 mg/kg diet for 28 days rats showed signs of neurotoxicity including high-stepping gait, ataxia and hypersensitivity. Thymic atrophy, adrenal enlargement with vacuolisation and incomplete spermatogenesis occurred at 750 mg/kg diet.
Skin Contact	Strong evidence exists that exposure to the material may produce very serious irreversible damage (other than carcinogenesis, mutagenesis and teratogenesis) following a single exposure by skin contact. Limited evidence exists, or practical experience predicts, that the material either produces inflammation of the skin in a substantial number of individuals following direct contact, and/or produces significant inflammation when applied to the healthy intact skin of animals, for up to four hours, such inflammation being present twenty-four hours or more after the end of the exposure period. Skin irritation may also be present after prolonged or repeated exposure; this may result in a form of contact dermatitis (nonallergic). The dermatitis is often characterised by skin redness (erythema) and swelling (oedema) which may progress to blistering (vesiculation), scaling and thickening of the epidermis. At the microscopic level there may be intercellular oedema of the spongy layer of the skin (spongiosis) and intracellular oedema of the epidermis. Skin contact with natural pyrethrins may result in severe dermatitis and may also be associated with allergic rhinitis and asthma. Absorption through the skin may result in a toxic syndrome similar to that produced by inhalation. Systemic effects, following skin absorption, may include liver and kidney damage. Prolonged or repeated exposure may cause central nervous system effects and allergic skin reaction. One form of toxicity associated with alpha-substituted synthetic pyrethroids, is a cutaneous paraesthesia observed amongst workers involved in spraying the material. This develops several hours following exposure and produces a stinging or burning sensation on the skin progressing, in some cases, to tingling and numbness, effects lasting for 12-18 hours. Chinese cotton crop workers reported dizziness, burning, itching or tingling sensations of exposed skin which was exacerbated by sweating and washing with warm water. These symptoms disappeared by 24 hours after exposure. Spilling these agents on the head, face and eyes resulted in pain, lachrymation, photophobia, congestion and oedema of the conjunctiva and eyelids. [Cassaret & Doull's Toxicology: The Basic Science of Poisoning, 4th Ed] Symptoms of subjective facial sensation to cyhalothrin have been described in manufacturing, formulation and laboratory work. This effect generally lasts for up to 72-hours after exposure. Medical examination has not revealed any neurological abnormalities. This sensation is believed to be brought about by repetitive firing of sensory nerve terminals in skin. Facial irritation has been reported following use of cyhalothrin in sheep sprays where the concentration was very low (0.002% w/v) - the characteristics of the spray were unclear. In 21-day dermal study at dose-levels up to 1000 mg/kg per day (in a polyethylene glycol vehicle), clinical signs of toxicity were observed at the highest dose levels. Cyhalothrin (but not lambda-cyhalothrin) is a moderate skin sensitiser in guinea-pigs.
Eye	This material causes serious eye irritation.
Chronic	Long-term exposure to respiratory irritants may result in disease of the airways involving difficult breathing and related systemic problems. Practical experience shows that skin contact with the material is capable either of inducing a sensitisation reaction in a substantial number of individuals, and/or of producing a positive response in experimental animals. Substances that can cause occupational asthma (also known as asthmagens and respiratory sensitisers) can induce a state of specific airway hyper-responsiveness via an immunological, irritant or other mechanism. Once the airways have become hyper-responsive, further exposure to the substance, sometimes even to tiny quantities, may cause respiratory symptoms. These symptoms can range in severity from a runny nose to asthma. Not all workers who are exposed to a sensitiser will become hyper-responsive and it is impossible to identify in advance who are likely to become hyper-responsive. Substances that can cause occupational asthma should be distinguished from substances which may trigger the symptoms of asthma in people with pre-existing air-way hyper-responsiveness. The latter substances are not classified as asthmagens or respiratory sensitisers. Wherever it is reasonably practicable, exposure to substances that can cause occupational asthma should be prevented. Where this is not possible the primary aim is to apply adequate standards of control to prevent workers from becoming hyper-responsive. Activities giving rise to short-term peak concentrations should receive particular attention when risk management is being considered. Health surveillance is appropriate for all employees exposed or liable to be exposed to a substance which may cause occupational asthma and there should be appropriate consultation with an occupational health professional over the degree of risk and level of surveillance. Toxic: danger of serious damage to health by prolonged exposure through inhalation, in contact with skin and if swallowed. Serious damage (clear functional disturbance or morphological change which may have toxicological significance) is likely to be caused by repeated or prolonged exposure. As a rule the material produces, or contains a substance which produces severe lesions. Such damage may become apparent following direct application in subchronic (90 day) toxicity studies or following sub-acute (28 day) or chronic (two-year) toxicity tests.

Limited evidence suggests that repeated or long-term occupational exposure may produce cumulative health effects involving organs or biochemical systems.

Chronic poisoning by natural pyrethrins may result in convulsion, tetanic paralysis, rapid and uneven heart beat, liver and kidney damage, or death.

The natural pyrethrins may produce hypersensitivity, especially following previous sensitising exposure. In general, repeated exposures over 2 or 3 years are required to elicit a response and involve exposure to pyrethrum rather than its individual components (including pyrethrins). The sesquiterpene lactone (pyrethrosin) and the pyrethrum glycoproteins account for the immediate and delayed hypersensitivity seen in guinea pigs following a single injection of ground chrysanthemum in Freud's adjuvant. Mild erythematic vesicular dermatitis (with papules), pruritus, localized oedema (particularly of the face, lips and eyelids), rhinitis, tachycardia, pallor and sweating are the most common syndromes. An initial skin sensitisation can progress to marked dermal oedema and skin cracking. Pyrethrum dermatitis appears to increase in hot weather or under conditions where heavy perspiration is produced. The active ingredients of pyrethrum (except pyrethrin II) are inactive in patch tests. Those patients allergic to ragweed pollen are particularly sensitive to pyrethrin.

Rats fed on a diet of pyrethrins for 5000 ppm for 2 years showed some signs of tissue damage including liver lesions, bile duct proliferation and focal necrosis of the liver cells. A no-effect level of 1000 ppm found in animal experiments correspond to a daily dose of 3600 mg/man. In two 104-week feeding studies with cyhalothrin no oncogenic effects were seen at dose levels up to 250 mg/kg diet and 500 mg/kg diet for rats and mice respectively. The no-observed-effect level for systemic toxicity was 50 mg/kg diet (1.8 mg/kg rat body weight per day) and 20 mg/kg diet (1.9 mg/kg mouse body weight).

TITAN LAMBDA-CYHALOTHRIN 250 CS INSECTICIDE	TOXICITY	IRRITATION
	Not Available	Not Available
cyhalothrin	TOXICITY	IRRITATION
	dermal (rat) LD50: 632 mg/kg ^[2]	Skin: adverse effect observed (irritating) ^[1]
	Inhalation (Rat) LC50: 0.083 mg/L4h ^[2]	Skin: no adverse effect observed (not irritating) ^[1]
	Oral (Rat) LD50: 144 mg/kg ^[2]	

Legend: 1. Value obtained from Europe ECHA Registered Substances - Acute toxicity 2. Value obtained from manufacturer's SDS. Unless otherwise specified data extracted from RTECS - Register of Toxic Effect of chemical Substances

TITAN LAMBDA-CYHALOTHRIN 250 CS INSECTICIDE	Asthma-like symptoms may continue for months or even years after exposure to the material ends. This may be due to a non-allergic condition known as reactive airways dysfunction syndrome (RADS) which can occur after exposure to high levels of highly irritating compound. Main criteria for diagnosing RADS include the absence of previous airways disease in a non-atopic individual, with sudden onset of persistent asthma-like symptoms within minutes to hours of a documented exposure to the irritant. Other criteria for diagnosis of RADS include a reversible airflow pattern on lung function tests, moderate to severe bronchial hyperreactivity on methacholine challenge testing, and the lack of minimal lymphocytic inflammation, without eosinophilia. RADS (or asthma) following an irritating inhalation is an infrequent disorder with rates related to the concentration of and duration of exposure to the irritating substance. On the other hand, industrial bronchitis is a disorder that occurs as a result of exposure due to high concentrations of irritating substance (often particles) and is completely reversible after exposure ceases. The disorder is characterized by difficulty breathing, cough and mucus production.
CYHALOTHRIN	Oral (rat) LD50: 56-79 mg/kg* Dermal (rat) LD50: 1293-1507 mg/kg* for lambda-cyhalothrin: CAS RN: 91465-08-6 RTECS No.: GZ 1227780 Convulsions, ataxia and changes in salivary glands recorded. lambda-cyhalothrin: ADI: 0.001 mg/kg/day NOEL: 0.1 mg/kg/day
TITAN LAMBDA-CYHALOTHRIN 250 CS INSECTICIDE & CYHALOTHRIN	The following information refers to contact allergens as a group and may not be specific to this product. Contact allergies quickly manifest themselves as contact eczema, more rarely as urticaria or Quincke's oedema. The pathogenesis of contact eczema involves a cell-mediated (T lymphocytes) immune reaction of the delayed type. Other allergic skin reactions, e.g. contact urticaria, involve antibody-mediated immune reactions. The significance of the contact allergen is not simply determined by its sensitisation potential: the distribution of the substance and the opportunities for contact with it are equally important. A weakly sensitising substance which is widely distributed can be a more important allergen than one with stronger sensitising potential with which few individuals come into contact. From a clinical point of view, substances are noteworthy if they produce an allergic test reaction in more than 1% of the persons tested. Medications that act by sodium channel blockade have a wide variety of clinical applications. Broadly they include Vaughn Williams Class 1 antiarrhythmics, local anesthetics, many medications used to treat neuropathic pain (including tricyclic antidepressants (TCA)), anticonvulsants, and cocaine. Insecticides also cause sodium channel blockade. Toxicity of all these substances, whether intentional or accidental, can lead to catastrophic effects including death. It is essential to understand how these medications work, in order to effectively treat their toxicity and side effects. Sodium channel blocker toxicity results primarily from intentional overdose. Broadly speaking, sodium channel blockers cause metabolic, cardiac, and neurologic symptoms. This leads to haemodynamic compromise and metabolic acidosis, potentiating the effects of the medications and causing further sodium blockade. Sodium channel blockers cross the blood-brain barrier and act through multiple mechanisms. They inhibit the gamma-aminobutyric acid (GABA) system (primarily lidocaine), activate the sodium ouabain-sensitive current, stimulate 5-HT_{2C} receptors, antagonize H₁ receptors and block all noradrenaline activating effect. It is through these actions that adrenergic stimulation occurs. These medications in large doses are also pro-convulsant through the above mechanisms. TCAs are well known for their concomitant anticholinergic effects but they also produce potassium channel blockade, peripheral alpha blockade, and norepinephrine reuptake blockade, all of which will potentially cloud the clinical presentation. The anticholinergic effects of IA drugs can produce tachycardia, dry mouth, urinary retention, blurred vision and constipation. For cyhalothrin: Lambda cyhalothrin is moderately toxic in the technical form, but may be highly toxic via some routes in formulation (e.g., as Karate). Available data indicate that lambda cyhalothrin is moderately toxic via the oral route in test animals. Reported oral LD50 values are 79 mg/kg and 56 mg/kg for male and female rats, respectively. The vehicle used was corn oil. The rat oral LD50 has also been reported as 144 mg/kg . The reported rat LD50 for the technical product is similar, 64 mg/kg . These indicate moderate acute toxicity via the oral route of exposure. No data were available regarding the acute toxicity of the technical compound via the inhalation route, but for Karate the reported 4-hour inhalation LC50s were 0.175 mg/L and 0.315 mg/L for female and male rats, respectively . These data indicate a moderate to high toxicity via the inhalation route for the formulated product Karate. The technical product has reported dermal LD50s of 632 mg/kg and 696 mg/kg for male and female rats (vehicle used was propane-1,2-diol) . It has also been found to be non-irritating to the skin of rabbits. and non-sensitising to the skin of guinea pigs but may cause mild eye irritation in rabbits. The formulated product, Karate, however, causes severe primary skin irritation in rabbits and mild skin sensitisation in guinea pigs . Primary eye irritation also was observed with the technical product . In addition to the corrosive effects to skin and eyes, other acute effects due to exposure to lambda cyhalothrin, like those of other pyrethroids, will be mainly neuropathy (effects on the nervous system) . Cyhalothrin may act on ion channels within the nerve cells (neurons) to disrupt proper function of the cells of both the peripheral and central nervous systems . At lower doses, this may take the form of stable, repetitive firing of the neuron, but high doses may result in depolarisation of the nerve cell and blockage of conduction . These effects may result in observable effects such as: tingling, burning or numbness sensations (particularly at the point of skin contact); tremors, incoordination of movement , paralysis or other disrupted motor function; and confusion or loss of consciousness . Since most pyrethroids are generally absorbed only poorly through the skin , the latter two systemic effects are unlikely unless the compound has been ingested. Effects are generally reversible due to rapid breakdown of the compound in the body. Like many compounds of the pyrethroid family, the observed toxicity of lambda cyhalothrin may vary according to not only the concentration of the active ingredient, but also according to the solvent vehicle .

Chronic toxicity: The principal toxic effects noted in chronic studies were decreased body weight gain and decreased food consumption. These effects occurred in rats at oral doses of 1.5 mg/kg/day (the highest dose tested) in a three-generational study . In a two-year study in rats, no effects were observed at oral doses of 2.5 mg/kg/day and doses of up to 8.5 mg/kg/day produced no observable changes in the function or structure of the liver or nervous system. In this study, decreased body weight gain and decreased food consumption occurred at doses of 12.5 mg/kg/day as did elevation of plasma triglycerides.

In a 26 week feeding study on dogs, doses of 2.5 mg/kg/day disrupted water absorption from the small intestine resulting in liquid faeces , and at doses of 3.5 mg/kg/day and higher, neurological effects were noted . In two teratology studies, no maternal toxicity was observed at doses of 10 mg/kg/day in both rats and rabbits . It is unlikely that lambda cyhalothrin would cause chronic effects in humans under normal conditions.

Reproductive Effects: 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.

Teratogenic Effects: No teratogenic or foetotoxic 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.

Mutagenic Effects: 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.

Carcinogenic Effects: No carcinogenic effects have been noted in studies of lambda cyhalothrin on various test animals (rats, rabbits, dogs) . The evidence regarding the carcinogenicity of lambda cyhalothrin is inconclusive, but suggests that it is probably not carcinogenic.

Organ Toxicity: No specific target organs or organ systems have been identified in the available studies of chronic toxicity. The nervous system may be affected after acute exposure.

Fate in Humans and Animals: In rat studies, lambda cyhalothrin is rapidly metabolised and excreted via the urine and faeces . Hydrolytic cleavage of the ester bond occurs, forming more polar, water-soluble compounds which are less toxic and more easily eliminated

Acute Toxicity	✓	Carcinogenicity	✗
Skin Irritation/Corrosion	✗	Reproductivity	✗
Serious Eye Damage/Irritation	✓	STOT - Single Exposure	✗
Respiratory or Skin sensitisation	✓	STOT - Repeated Exposure	✓
Mutagenicity	✗	Aspiration Hazard	✗

Legend: ✗ – Data either not available or does not fill the criteria for classification
✓ – Data available to make classification

SECTION 12 Ecological information

Toxicity

TITAN LAMBDA-CYHALOTHRIN 250 CS INSECTICIDE	Endpoint	Test Duration (hr)	Species	Value	Source
	Not Available	Not Available	Not Available	Not Available	Not Available
cyhalothrin	Endpoint	Test Duration (hr)	Species	Value	Source
	EC50	48h	Crustacea	<0.001mg/L	4
	EC50(ECx)	48h	Crustacea	<0.001mg/L	4
	LC50	96h	Fish	<0.001mg/L	4
Legend:	Extracted from 1. IUCLID Toxicity Data 2. Europe ECHA Registered Substances - Ecotoxicological Information - Aquatic Toxicity 3. US EPA, Ecotox database - Aquatic Toxicity Data 4. ECETOC Aquatic Hazard Assessment Data 5. NITE (Japan) - Bioconcentration Data 6. METI (Japan) - Bioconcentration Data 7. Vendor Data				

Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

Do NOT allow product to come in contact with surface waters or to intertidal areas below the mean high water mark. Do not contaminate water when cleaning equipment or disposing of equipment wash-waters.

Wastes resulting from use of the product must be disposed of on site or at approved waste sites.

Toxic to bees.

For synthetic pyrethroids:

Environmental fate:

Synthetic pyrethroids are examples of optimised insecticidal activity, selectivity and tailored environmental persistence. Through modifications of both acid and alcohol portions of the ester, compounds of desired residual activity have been synthesised whilst maintaining a biodegradable ester linkage. These compounds are generally very toxic to crustaceans and fish in laboratory bio assays. Under field conditions, however, the residues are tightly bound in sediment, and ingested residues are readily metabolised. Their toxicity in natural systems are generally less than laboratory test data might indicate. They are generally non-persistent in the environment.

In pond waters and in laboratory degradation studies, pyrethroid concentrations decrease rapidly due to sorption to sediment, suspended particles and plants. Microbial and photodegradation also occur

Pyrethrins are generally unstable in the presence of light, are hydrolysed rapidly under alkaline conditions and oxidise rapidly in air. Vapour phase pyrethrins may combine chemically with ozone to produce hydroxy radicals. Pyrethroids where the isobutenyl group attached to the cyclopropane moiety has been altered are more stable to sunlight than the early pyrethroids like allethrin or resmethrin. For this reason, pyrethroids such as permethrin, deltamethrin, cyhalothrin, cyfluthrin, and cypermethrin are more frequently applied outdoors to crops in comparison to the rapidly degraded pyrethroids like resmethrin and allethrin.

Because agricultural dose rates are low and biological degradation is generally rapid, residues are unlikely to attain significant levels. Permethrin disappears from ponds and streams within 6-24 hours, pond sediments within 7 days and foliage and forest soil within 58 days. Since pyrethrins and pyrethroids undergo photolysis in the atmosphere, they are also degraded by this mechanism in sunlit surface waters. Photosensitising agents found in natural waters such as fulvic and humic acids increase the rate of photolysis.

Pyrethroids and pyrethrins also undergo hydrolysis in the environment at varying rates depending upon pH and temperature. Generally, hydrolysis is only an important environmental fate process under alkaline conditions and at temperatures of 20 deg. C or greater.

Based on the vapor pressure of the pyrethrins and pyrethroids, these compounds are expected to exist in both vapor and particulate phases in the ambient atmosphere. Vapor phase pyrethrins and pyrethroids are rapidly degraded in the atmosphere by direct photolysis and reaction with oxidants found in air such as photochemically-produced hydroxyl radicals, ozone, and nitrate radicals. Particulate phase compounds are slower to degrade, however, and can travel long distances before being removed from the air by wet and dry deposition.

Pyrethrins and pyrethroids are strongly adsorbed to soil surfaces and are not considered very mobile. A wide range of Koc values has been reported by different authors, but most of these values indicate a high degree of adsorption and little leaching potential. Since light is attenuated as a function of depth from the soil surface, photolysis of pyrethrins and pyrethroids is only an important environmental fate process at the surface of the soil. The potential for significant toxicity is not reached in fields. Under aerobic conditions in soil, permethrin degrades in a relatively short time (half-life 28 days).

Volatilisation from water and soil is expected to occur slowly for many of the pyrethroids since these compounds generally have low vapor pressures and Henry's law constants. When released to water, partitioning to suspended solids and sediment occurs rapidly. These compounds adsorb strongly to suspended solids and sediment in the water column, and this process significantly attenuates volatilisation. Volatilisation losses from foliage may be considerably greater than volatilisation from soils because pyrethrins and pyrethroids do not adsorb as strongly to the leafy component of vegetation as to soils. Pyrethrins and pyrethroids are often used indoors in sprays or aerosol bombs, and the volatilisation rates from glass or floor surfaces may be significantly faster than from soils since these compounds are not likely to adsorb as strongly to these surfaces. Little data exist regarding the uptake and transport of pyrethrins and pyrethroids by plant material. Since many of these compounds are rapidly degraded in the environment, this transport mechanism may not be an important environmental fate process other than the initial settling of these compounds on the canopy following deposition. The aerial surface of a plant, including foliage, is covered by a cuticle, which serves as a barrier to water loss and to prevent penetration of applied chemicals or environmental pollutants. Once deposited on the surface, a chemical may be degraded, bind to the cuticle, or diffuse into the plant through the stomata. Since pyrethrins and pyrethroids adsorb strongly to soils, their uptake from roots and transport within plants is expected to be limited.

The general population is exposed to pyrethrins and pyrethroids primarily from food sources, especially fruits and vegetables. The tendency of young children to ingest soil, either intentionally through pica or unintentionally through hand-to-mouth activity, is well documented. These behavioral traits can result in ingestion of pyrethrins and pyrethroids present in soil and dust. Since these compounds are adsorbed strongly to soils, they may not be in a highly bioavailable form. Young children often play on the ground or on carpets and this will increase the likelihood of dermal exposure and inhalation of contaminated particles from soil, household dust and treated surfaces.

Drinking Water Standards:
pesticide 0.1 ug/l (UK max.)

Ecotoxicity:
Synthetic pyrethroids are extremely effective against insects, but are relatively safe to mammals and birds. One potential problem of pyrethroids is their extreme toxicity to aquatic organisms, where often <1 ug/L will produce toxic effects.

The half-lives for elimination of several pyrethroids by trout are all greater than 48 hours, while elimination half-lives in birds and mammals range from 6 to 12 hours

Pyrethroids are highly toxic to fish; with 96-hour LC50 values generally below 10 ug/l. Corresponding LD50 values in mammals and birds are in the range of several hundred to several thousand mg/kg. Fish sensitivity to the pyrethroids may be explained by their relatively slow metabolism and elimination of these compounds. The half-lives for elimination of several pyrethroids by trout are all greater than 48 hours, while elimination half-lives for birds and mammals range from 6 to 12 hours

Generally, the lethality of pyrethroids to fish increases with increasing octanol/water partition coefficients

The bioaccumulation factor of cypermethrin in fish is approximately 1000 when measured experimentally

For cyhalothrin:
Log Pow: 7

Environmental fate:
Lambda cyhalothrin is moderately persistent in the soil environment. Reported field half-lives range from four to 12 weeks. Its field half-life is probably close to 30 days in most soils. It shows a high affinity for soil; the reported Koc is 180,000 . Lambda cyhalothrin is not expected to be appreciably mobile in most soils. There is little potential for groundwater contamination. Soils with high sand content or with very low organic matter content may tend to retain the compound to a lesser degree. In field studies of Karate, leaching of lambda cyhalothrin and its degradates from the soil were minimal.

Breakdown products formed in the soil environment are similar to those formed in mammalian systems, via the hydrolysis of the central ester bond and oxidation. Breakdown rates of both the technical product and Karate were similar under aerobic and anaerobic conditions.

Breakdown of Chemical in Surface Water: Lambda cyhalothrin has extremely low water solubility and is tightly bound to soil, it is therefore not expected to be prevalent in surface waters. One possible source of infiltration into surface waters would be surface runoff. In this event, the compound would most probably remain bound to the solid particle and settle to the bottom.

Bioconcentration is possible in aquatic species, but bioaccumulation is not likely. Bioconcentration in channel catfish has been reported as minimal, with rapid depuration (elimination) . A bioconcentration factor of 858 has been reported in fish (species unspecified), but concentration was confined to non-edible tissues and rapid depuration was observed .

Ecotoxicity:
Highly toxic to fish and aquatic invertebrate species.
Slightly to practically non-toxic to birds.

For gamma-cyhalothrin - data ex Dow AgroSciences
Fish LC50 (96): rainbow trout 0.00011 mg/l, bluegill sunfish 0.00047 mg/l
Daphnia magna EC50 (48 h): 0.000067 mg/l
Green algae EC50: 2.85 mg/l
Oral (bee) LD50 (48 h): 0.0013 mg/bee
Bird LC50 dietary: bobwhite quail =2644 mg/kg, mallard duck= 4430 mg/kg
Bird LD50 dietary: bobwhite quail = 2000 mg/kg

For lambda-cyhalothrin - data ex Orica:
Fish LC50 (96 h): rainbow trout: 0.00044 mg/l, bluegill sunfish 0.00021 mg/l, sheephead minnow 00081 mg/l
Daphnia magna EC50 (48 h): 0.00036 ug/l
Bird Oral LD50: mallard duck 3950 mg/kg
Bird Oral LC50 (3 d) dietary: bobwhite quail 7530 mg/kg
Oral (bee) LC50: 38 ng/bee
Dermal (bee) LD50: 909 ng/bee

DO NOT discharge into sewer or waterways.

Persistence and degradability

Ingredient	Persistence: Water/Soil	Persistence: Air
cyhalothrin	HIGH	HIGH

Bioaccumulative potential

Ingredient	Bioaccumulation
cyhalothrin	HIGH (LogKOW = 7)

Mobility in soil

Ingredient	Mobility
cyhalothrin	LOW (Log KOC = 476000)

SECTION 13 Disposal considerations

Waste treatment methods

Product / Packaging disposal	► Containers may still present a chemical hazard/ danger when empty. ► Return to supplier for reuse/ recycling if possible. Otherwise: ► If container can not be cleaned sufficiently well to ensure that residuals do not remain or if the container cannot be used to store the same product, then puncture containers, to prevent re-use, and bury at an authorised landfill. ► Where possible retain label warnings and SDS and observe all notices pertaining to the product. Legislation addressing waste disposal requirements may differ by country, state and/ or territory. Each user must refer to laws operating in their area. In some areas, certain wastes must be tracked. A Hierarchy of Controls seems to be common - the user should investigate: ► Reduction ► Reuse
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- ▶ Recycling

▶ Disposal (if all else fails)
- This material may be recycled if unused, or if it has not been contaminated so as to make it unsuitable for its intended use. If it has been contaminated, it may be possible to reclaim the product by filtration, distillation or some other means. Shelf life considerations should also be applied in making decisions of this type. Note that properties of a material may change in use, and recycling or reuse may not always be appropriate.
- ▶ DO NOT allow wash water from cleaning or process equipment to enter drains.

▶ It may be necessary to collect all wash water for treatment before disposal.

▶ In all cases disposal to sewer may be subject to local laws and regulations and these should be considered first.

▶ Where in doubt contact the responsible authority.

▶ Recycle wherever possible or consult manufacturer for recycling options.

▶ Consult State Land Waste Authority for disposal.

▶ Bury or incinerate residue at an approved site.

▶ Recycle containers if possible, or dispose of in an authorised landfill.

SECTION 14 Transport information

Labels Required

	
Marine Pollutant	
HAZCHEM	2X

Land transport (ADG)

14.1 UN number or ID number	3352	
14.2 UN proper shipping name	PYRETHROID PESTICIDE, LIQUID, TOXIC (contains cyhalothrin)	
14.3 Transport hazard class(es)	Class	6.1
	Subsidiary Hazard	Not Applicable
14.4. Packing group	II	
14.5. Environmental hazard	Environmentally hazardous	
14.6 Special precautions for user	Special provisions	61 274
	Limited quantity	100 ml

Air transport (ICAO-IATA / DGR)

14.1. UN number	3352	
14.2 UN proper shipping name	Pyrethroid pesticide, liquid, toxic * (contains cyhalothrin)	
14.3 Transport hazard class(es)	ICAO/IATA Class	6.1
	ICAO / IATA Subsidiary Hazard	Not Applicable
	ERG Code	6L
14.4. Packing group	II	
14.5. Environmental hazard	Environmentally hazardous	
14.6 Special precautions for user	Special provisions	A3 A4
	Cargo Only Packing Instructions	662
	Cargo Only Maximum Qty / Pack	60 L
	Passenger and Cargo Packing Instructions	654
	Passenger and Cargo Maximum Qty / Pack	5 L
	Passenger and Cargo Limited Quantity Packing Instructions	Y641
	Passenger and Cargo Limited Maximum Qty / Pack	1 L

Sea transport (IMDG-Code / GGVSee)

14.1. UN number	3352	
14.2 UN proper shipping name	PYRETHROID PESTICIDE, LIQUID, TOXIC (contains cyhalothrin)	
14.3 Transport hazard class(es)	IMDG Class	6.1
	IMDG Subsidiary Hazard	Not Applicable
14.4. Packing group	II	

14.5 Environmental hazard	Marine Pollutant	
14.6 Special precautions for user	EMS Number	F-A, S-A
	Special provisions	61 274
	Limited Quantities	100 mL

14.7. Maritime transport in bulk according to IMO instruments

14.7.1. Transport in bulk according to Annex II of MARPOL and the IBC code

Not Applicable

14.7.2. Transport in bulk in accordance with MARPOL Annex V and the IMSBC Code

Product name	Group
cyhalothrin	Not Applicable

14.7.3. Transport in bulk in accordance with the IGC Code

Product name	Ship Type
cyhalothrin	Not Applicable

SECTION 15 Regulatory information

Safety, health and environmental regulations / legislation specific for the substance or mixture

cyhalothrin is found on the following regulatory lists

- Australia Chemicals with non-industrial uses removed from the Australian Inventory of Chemical Substances (old Inventory)
- Australia Hazardous Chemical Information System (HCIS) - Hazardous Chemicals
- Australia Standard for the Uniform Scheduling of Medicines and Poisons (SUSMP) - Schedule 2
- Australia Standard for the Uniform Scheduling of Medicines and Poisons (SUSMP) - Schedule 5
- Australia Standard for the Uniform Scheduling of Medicines and Poisons (SUSMP) - Schedule 6
- Australia Standard for the Uniform Scheduling of Medicines and Poisons (SUSMP) - Schedule 7

Additional Regulatory Information

Not Applicable

National Inventory Status

National Inventory	Status
Australia - AIIC / Australia Non-Industrial Use	Yes
Canada - DSL	No (cyhalothrin)
Canada - NDSL	No (cyhalothrin)
China - IECSC	Yes
Europe - EINEC / ELINCS / NLP	Yes
Japan - ENCS	No (cyhalothrin)
Korea - KECI	Yes
New Zealand - NZIoC	Yes
Philippines - PICCS	Yes
USA - TSCA	No (cyhalothrin)
Taiwan - TCSI	Yes
Mexico - INSQ	Yes
Vietnam - NCI	Yes
Russia - FBEPH	Yes
UAE - Control List (Banned/Restricted Substances)	Yes
Legend:	Yes = All CAS declared ingredients are on the inventory No = One or more of the CAS listed ingredients are not on the inventory. These ingredients may be exempt or will require registration.

SECTION 16 Other information

Revision Date	12/08/2026
Initial Date	12/08/2026

SDS Version Summary

Version	Date of Update	Sections Updated
2.1	12/08/2026	Physical and chemical properties - Appearance, Name

Other information

Classification of the preparation and its individual components has drawn on official and authoritative sources as well as independent review by the Chemwatch Classification committee using available literature references.

TITAN LAMBDA-CYHALOTHRIN 250 CS INSECTICIDE

The SDS is a Hazard Communication tool and should be used to assist in the Risk Assessment. Many factors determine whether the reported Hazards are Risks in the workplace or other settings. Risks may be determined by reference to Exposures Scenarios. Scale of use, frequency of use and current or available engineering controls must be considered.

Definitions and abbreviations

- ▶ PC—TWA: Permissible Concentration-Time Weighted Average
- ▶ PC—STEL: Permissible Concentration-Short Term Exposure Limit
- ▶ IARC: International Agency for Research on Cancer
- ▶ ACGIH: American Conference of Governmental Industrial Hygienists
- ▶ STEL: Short Term Exposure Limit
- ▶ TEEL: Temporary Emergency Exposure Limit
- ▶ IDLH: Immediately Dangerous to Life or Health Concentrations
- ▶ ES: Exposure Standard
- ▶ OSF: Odour Safety Factor
- ▶ NOAEL: No Observed Adverse Effect Level
- ▶ LOAEL: Lowest Observed Adverse Effect Level
- ▶ TLV: Threshold Limit Value
- ▶ LOD: Limit Of Detection
- ▶ OTV: Odour Threshold Value
- ▶ BCF: BioConcentration Factors
- ▶ BEI: Biological Exposure Index
- ▶ DNEL: Derived No-Effect Level
- ▶ PNEC: Predicted no-effect concentration
- ▶ MARPOL: International Convention for the Prevention of Pollution from Ships
- ▶ IMSBC: International Maritime Solid Bulk Cargoes Code
- ▶ IGC: International Gas Carrier Code
- ▶ IBC: International Bulk Chemical Code

- ▶ AIIC: Australian Inventory of Industrial Chemicals
- ▶ DSL: Domestic Substances List
- ▶ NDSDL: Non-Domestic Substances List
- ▶ IECSC: Inventory of Existing Chemical Substance in China
- ▶ EINECS: European INventory of Existing Commercial chemical Substances
- ▶ ELINCS: European List of Notified Chemical Substances
- ▶ NLP: No-Longer Polymers
- ▶ ENCS: Existing and New Chemical Substances Inventory
- ▶ KECI: Korea Existing Chemicals Inventory
- ▶ NZIoC: New Zealand Inventory of Chemicals
- ▶ PICCS: Philippine Inventory of Chemicals and Chemical Substances
- ▶ TSCA: Toxic Substances Control Act
- ▶ TCSI: Taiwan Chemical Substance Inventory
- ▶ INSQ: Inventario Nacional de Sustancias Químicas
- ▶ NCI: National Chemical Inventory
- ▶ FBEPH: Russian Register of Potentially Hazardous Chemical and Biological Substances

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