Emamectin B1 Benzoate

sc-204737

Material Safety Data Sheet

Long term exposure to high dust concentrations may cause changes in lung function i.e. pneumoconiosis; caused by chronic health effects. Inhalation of dusts, generated by the material during the course of normal handling, may produce serious damage to the health of the individual. Relatively small amounts absorbed from the lungs may prove fatal.

Persons with impaired respiratory function, airway diseases and conditions such as emphysema or chronic bronchitis, may incur further disability if excessive concentrations of particulate are inhaled.

Skin contact with the material may produce toxic effects; systemic effects may result following absorption. Open cuts, abraded or irritated skin should not be exposed to this material.

In monkeys, emesis occurred following a single oral dosage of 2 mg/kg; mydriasis was seen at 24 mg/kg indicating a dose-response curve is flatter in monkeys than in rodents.

Macrolides comprise a large group of antibiotics derived from Streptomyces spp. having in common a macrocyclic lactone ring to which one or more sugars are attached. There are all weak bases. The most common side effect produced by the family of macrolide antibiotics is gastrointestinal discomfort. Supra-infections may occur although these are rare. Several macrolides produced allergic sensitization but, again, these are rare. Symptoms include watery eyes, shortness of breath, nasal congestion, choking, coughing and wheezing. Allergic skin reactions have also occurred. Exposure to at least one member of the family, erythromycin, at high concentrations, has produced reversible deafness (ototoxicity). Systemic reactions including fever, rash and lymph-node pain or swelling have been minimal.

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particles less than 0.5 micron penetrating and remaining in the lung. Prime symptom is breathlessness; lung shadows show on X-ray. Repeated or long-term occupational exposure is likely to produce cumulative health effects involving organs or biochemical systems.

Section 3 - COMPOSITION / INFORMATION ON INGREDIENTS

HAZARD RATINGS

<table>
<thead>
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<th>Min</th>
<th>Max</th>
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<tbody>
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<td>2</td>
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</table>

NAME | CAS RN | %
---|-------|---
emamectin benzoate | 155569-91-8 | >98

Section 4 - FIRST AID MEASURES

SWALLOWED
- Give a slurry of activated charcoal in water to drink. NEVER GIVE AN UNCONSCIOUS PATIENT WATER TO DRINK.
- At least 3 tablespoons in a glass of water should be given.
- Although induction of vomiting may be recommended (IN CONSCIOUS PERSONS ONLY), such a first aid measure is dissuaded because to the risk of aspiration of stomach contents. (i) It is better to take the patient to a doctor who can decide on the necessity and method of emptying the stomach. (ii) Special circumstances may however exist; these include non-availability of charcoal and the ready availability of the doctor.

NOTE: If vomiting is induced, lean patient forward or place on left side (head-down position, if possible) to maintain open airway and prevent aspiration. NOTE: Wear protective gloves when inducing vomiting.
- REFER FOR MEDICAL ATTENTION WITHOUT DELAY.

Toxicity following accidental ingestion may be minimised by emesis-induction within one half hour of exposure. Since abamectin is thought to bind to glutamate-gated chloride ion channels, it is probably wise to avoid drugs that also interact with other ligand-gated chloride channels, including those that enhance GABA activity in patients with potentially toxic abamectin exposure.

Avoid drugs that enhance GABA activity (barbiturate, benzodiazepines, valproic acid, etc.).

EYE
- 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 Center or a doctor, or for at least 15 minutes.
  - Transport to hospital or doctor without delay.

SKIN
- If skin or hair contact occurs:
  - Quickly but gently, wipe material off skin with a dry, clean cloth.
  - Immediately 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 Center.
  - Transport to hospital or doctor.

INHALED
- 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.
- Transport to hospital, or doctor, without delay.

NOTES TO PHYSICIAN
- Treat symptomatically.
  For abamectin (avermectins):
  Toxicity following accidental ingestion may be minimised by emesis-induction within one half hour of exposure. Since abamectin is thought to bind to glutamate-gated chloride ion channels, it is probably wise to avoid drugs that also interact with other ligand-gated chloride channels, including those that enhance GABA activity in patients with potentially toxic abamectin exposure.

Avoid drugs that enhance GABA activity (barbiturate, benzodiazepines, valproic acid, etc.).
BASIC TREATMENT

- Establish a patent airway with suction where necessary.
- Watch for signs of respiratory insufficiency and assist ventilation as necessary.
- Administer oxygen by non-rebreather mask at 10 to 15 l/min.
- Monitor and treat, where necessary, for pulmonary edema.
- Monitor and treat, where necessary, for shock.
- Anticipate seizures.
- DO NOT use emetics. Where ingestion is suspected rinse mouth and give up to 200 ml water (5 ml/kg recommended) for dilution where patient is able to swallow, has a strong gag reflex and does not drool.

ADVANCED TREATMENT

- Consider orotracheal or nasotracheal intubation for airway control in unconscious patient or where respiratory arrest has occurred.
- Positive-pressure ventilation using a bag-valve mask might be of use.
- Monitor and treat, where necessary, for arrhythmias.
- Start an IV D5W TKO. If signs of hypovolemia are present use lactated Ringers solution. Fluid overload might create complications.
- Drug therapy should be considered for pulmonary edema.
- Hypotension with signs of hypovolemia requires the cautious administration of fluids. Fluid overload might create complications.
- Treat seizures with diazepam.
- Proparacaine hydrochloride should be used to assist eye irrigation.

BRONSTEIN, A.C. and CURRANCE, P.L.
EMERGENCY CARE FOR HAZARDOUS MATERIALS EXPOSURE: 2nd Ed. 1994.

Section 5 - FIRE FIGHTING MEASURES

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<th>Vapour Pressure (mmHG):</th>
<th>Negligible</th>
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</tr>
<tr>
<td>Lower Explosive Limit (%):</td>
<td>Not Available</td>
</tr>
</tbody>
</table>

EXTINGUISHING MEDIA

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

FIRE FIGHTING

- Alert Emergency Responders 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.

GENERAL FIRE HAZARDS/HAZARDOUS COMBUSTIBLE PRODUCTS

- Combustible solid which burns but propagates flame with difficulty.
- Avoid generating dust, particularly clouds of dust in a confined or unventilated space as dusts may form an explosive mixture with air, and any source of ignition, i.e. flame or spark, will cause fire or explosion. Dust clouds generated by the fine grinding of the solid are a particular hazard; accumulations of fine dust may burn rapidly and fiercely if ignited.
- Dry dust can be charged electrostatically by turbulence, pneumatic transport, pouring, in exhaust ducts and during transpport.
- Build-up of electrostatic charge may be prevented by bonding and grounding.
- Powder handling equipment such as dust collectors, dryers and mills may require additional protection measures such as explosion venting.
- Combustion products include: carbon monoxide (CO), carbon dioxide (CO2), other pyrolysis products typical of burning organic material. May emit poisonous fumes.

FIRE INCOMPATIBILITY

- Avoid contamination with oxidizing agents i.e. nitrates, oxidizing acids, chlorine bleaches, pool chlorine etc. as ignition may result.

PERSONAL PROTECTION

Glasses:
Gloves:
Respirator:
Particulate
MINOR SPILLS
- Environmental hazard - contain spillage.
- Clean up waste regularly and abnormal spills immediately.
- Avoid breathing dust and contact with skin and eyes.
- Wear protective clothing, gloves, safety glasses and dust respirator.
- Use dry clean up procedures and avoid generating dust.
- Vacuum up or sweep up. NOTE: Vacuum cleaner must be fitted with an exhaust micro filter (HEPA type) (consider explosion-proof machines designed to be grounded during storage and use).
- Dampen with water to prevent dusting before sweeping.
- Place in suitable containers for disposal.

MAJOR SPILLS
- Environmental hazard - contain spillage.
- Clear area of personnel and move upwind.
- Alert Emergency Responders 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 labeled containers for recycling.
- Neutralize/decontaminate residue.
- Collect solid residues and seal in labeled 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.

ACUTE EXPOSURE GUIDELINE LEVELS (AEGL) (in ppm)
AEGL 1: The airborne concentration of a substance above which it is predicted that the general population, including susceptible individuals, could experience notable discomfort, irritation, or certain asymptomatic nonsensory effects. However, the effects are not disabling and are transient and reversible upon cessation of exposure.
AEGL 2: The airborne concentration of a substance above which it is predicted that the general population, including susceptible individuals, could experience irreversible or other serious, long-lasting adverse health effects or an impaired ability to escape.
AEGL 3: The airborne concentration of a substance above which it is predicted that the general population, including susceptible individuals, could experience life-threatening health effects or death.

Section 7 - HANDLING AND STORAGE

PROCEDURE FOR HANDLING
- Avoid all personal 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 contact humans, exposed food or food utensils.
- 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 storing and handling recommendations.
- Atmosphere should be regularly checked against established exposure standards to ensure safe working conditions are maintained.
- Empty containers may contain residual dust which has the potential to accumulate following settling. Such dusts may explode in the presence of an appropriate ignition source.
- Do NOT cut, drill, grind or weld such containers.
- In addition ensure such activity is not performed near full, partially empty or empty containers without appropriate workplace safety authorisation or permit.

RECOMMENDED STORAGE METHODS
- Glass container.
- Lined metal can, Lined metal pail/drum
- Plastic pail
- Polyliner drum
- Packing as recommended by manufacturer.
- Check all containers are clearly labeled 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 2690 cSt. (23 deg. C) and solids (between 15 C deg. and 40 deg C.):
  - Removable head packaging;
Cans with friction closures and 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 molded 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 REQUIREMENTS**

- 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 storing and handling recommendations.

**SAFE STORAGE WITH OTHER CLASSIFIED CHEMICALS**

<table>
<thead>
<tr>
<th></th>
<th>X</th>
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<th>+</th>
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</thead>
<tbody>
<tr>
<td>X: Must not be stored together</td>
<td>O: May be stored together with specific precautions</td>
<td>+: May be stored together</td>
<td></td>
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</table>

**Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION**

**EXPOSURE CONTROLS**

The following materials had no OELs on our records

- emamectin benzoate: CAS:155569-91-8 CAS:137512-74-4

**MATERIAL DATA**

EMAMECTIN BENZOATE:

- For abamectin (avermectins)
- CEL TWA: 0.04 mg/m³ [Manufacturer]

The acceptable daily intake (ADI) of 0.4 mg/day was derived using an NOAEL of 0.25 mg/kg/day from oral toxicity studies in dogs, adjusting for body weight (50 kg) and by applying a composite uncertainty factor of 30 to account for interindividual variability, interspecies extrapolation and the severity of the critical endpoint (neurotoxicity). The recommended exposure standard and a wipe test criteria of 0.4 mg/100 cm² were derived using the ADI.

Airborne particulate or vapor 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).

**PERSONAL PROTECTION**

Consult your EHS staff for recommendations

**EYE**

- Chemical protective goggles with full seal
- 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 lens or restrictions on use, should be created for each workplace or task. This should include a review of 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]

**HANDS/FEET**

- Suitability and durability of glove type is dependent on usage. Important factors in the selection of gloves include: such as: 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).
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) 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) is recommended. Contaminated gloves should be replaced. 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). Employees allergic to latex gloves should use nitrile gloves in preference. Double gloving should be considered. PVC gloves. Protective shoe covers. Head covering.

OTHER

- 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
- Respirators may be necessary when engineering and administrative controls do not adequately prevent exposures.
- The decision to use respiratory protection should be based on professional judgment that takes into account toxicity information, exposure measurement data, and frequency and likelihood of the worker's exposure - ensure users are not subject to high thermal loads which may result in heat stress or distress due to personal protective equipment (powered, positive flow, full face apparatus may be an option).
- Published occupational exposure limits, where they exist, will assist in determining the adequacy of the selected respiratory . These may be government mandated or vendor recommended.
- Certified respirators will be useful for protecting workers from inhalation of particulates when properly selected and fit tested as part of a complete respiratory protection program.
- Use approved positive flow mask if significant quantities of dust becomes airborne.
- Try to avoid creating dust conditions.

RESPIRATOR

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<th>Protection Factor</th>
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<th>Full-Face Respirator</th>
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<td>50 x PEL</td>
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<td>PAPR-P2</td>
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<td>-</td>
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</tr>
<tr>
<td>100+ x PEL</td>
<td>Air-line**</td>
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</table>

* - Negative pressure demand ** - Continuous flow

Explanation of Respirator Codes:
Class 1 low to medium absorption capacity filters.
Class 2 medium absorption capacity filters.
Class 3 high absorption capacity filters.
PAPR Powered Air Purifying Respirator (positive pressure) cartridge.
Type A for use against certain organic gases and vapors.
Type AX for use against low boiling point organic compounds (less than 65°C).
Type B for use against inorganic gases and other acid gases and vapors.
Type E for use against sulfur dioxide and other acid gases and vapors.
Type K for use against ammonia and organic ammonia derivatives
Class P1 intended for use against mechanically generated particulates of sizes most commonly encountered in industry, e.g. asbestos, silica.
Class P2 intended for use against both mechanically and thermally generated particulates, e.g. metal fume.
Class P3 intended for use against all particulates containing highly toxic materials, e.g. beryllium.
The local concentration of material, quantity and conditions of use determine the type of personal protective equipment required.

Use appropriate NIOSH-certified respirator based on informed professional judgement. In conditions where no reasonable estimate of exposure can be made, assume the exposure is in a concentration IDLH and use NIOSH-certified full face pressure demand SCBA with a minimum service life of 30 minutes, or a combination full facepiece pressure demand SAR with auxiliary self-contained air supply. Respirators provided only for escape from IDLH atmospheres shall be NIOSH-certified for escape from the atmosphere in which they will be used.

ENGINEERING CONTROLS

- For potent pharmacological agents:
  Powders
  To prevent contamination and overexposure, no open handling of powder should be allowed.
  Powder handling operations are to be done in a powders weighing hood, a glove box, or other equivalent ventilated containment system.
  In situations where these ventilated containment hoods have not been installed, a non-ventilated enclosed containment hood should be used.
  Pending changes resulting from additional air monitoring data, up to 300 mg can be handled outside of an enclosure provided that no grinding, crushing or other dust-generating process occurs.
An air-purifying respirator should be worn by all personnel in the immediate area in cases where non-ventilated containment is used, where significant amounts of material (e.g., more than 2 grams) are used, or where the material may become airborne (as through grinding, etc.).

Powder should be put into solution or a closed or covered container after handling.

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.

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 vapors.
- 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 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.

Air should be supplied by an independent system.

Section 9 - PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL PROPERTIES

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<tr>
<th>State</th>
<th>Melting Range (°F)</th>
<th>Boiling Range (°F)</th>
<th>Flash Point (°F)</th>
<th>Decomposition Temp (°F)</th>
<th>Autoignition Temp (°F)</th>
<th>Upper Explosive Limit (%)</th>
<th>Lower Explosive Limit (%)</th>
<th>Volatile Component (%vol)</th>
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<td>Not Available</td>
<td>Not Available</td>
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<td>Light beige powder; does not mix well with water.</td>
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Section 10 - CHEMICAL STABILITY

CONDITIONS CONTRIBUTING TO INSTABILITY

- Presence of incompatible materials.
- Product is considered stable.
- Hazardous polymerization will not occur.

STORAGE INCOMPATIBILITY

- Avoid reaction with oxidizing agents.

For incompatible materials - refer to Section 7 - Handling and Storage.

Section 11 - TOXICOLOGICAL INFORMATION

| emamectin benzoate |

TOXICITY AND IRRITATION

- unless otherwise specified data extracted from RTECS - Register of Toxic Effects of Chemical Substances.

<table>
<thead>
<tr>
<th>TOXICITY</th>
<th>IRRITATION</th>
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<tr>
<td>Oral (Rat) LD50: 76 mg/kg</td>
<td>Skin : Mild</td>
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</table>
For abamectin (mixture of avermectins)

non-toxic to birds. Based upon terrestrial residue analysis, aquatic runoff modeling and cluster analysis it appears that certain

Avermectin is extremely toxic to mammals and aquatic invertebrates and highly toxic to fish and bees. Avermectin is relatively

Daphnia LC50 0.22 ppb

Fish LC50: bluegill 9.6 ppb; rainbow trout 3.2 ppb; fathead minnow 15 ppb

Abamectin (a mixture of avermectin isomers) is a reproductive toxin in laboratory animals at doses which are acutely toxic to

the mother. In development toxicity studies with abamectin, cleft palate were seen in mice and rabbits and clubbing of the

forepaws was seen in rabbits. The no-observed-adverse-effect-level (NOAEL) for maternal and developmental toxicity in

rabbits was 1 mg/kg/day. In CF-1 mice, a strain recognised to be particularly sensitive to avermectins, the NOAEL for maternal

toxicity was 0.05 mg/kg/day and the NOAEL for malformations was 0.2 mg/kg/day. Studies show that the sensitivity of a

subpopulation of CF-1 mice to avermectins is due to the absence of a transmembrane P-glycoprotein, a significant component

of the blood-brain interface that normally acts as a non-selective protective barrier in a wide range of species including

humans. CF-1 mice are therefore an unlikely candidate for assessing human risk. No evidence of developmental toxicity was

seen in oral studies in rats in the absence of maternal toxicity (NOAEL = 1.6 mg/kg/day). In a rat multigenerational reproduction study,
pup toxicity and deaths were seen at 0.4 mg/kg/day (NOAEL = 0.12 mg/kg/day). Neonatal rats are not an appropriate model for assessing human risk in humans because (a) rat milk has a greater fat

content than human breast milk and abamectin concentrates in fat; (b) on a weight basis, the neonatal rat consumes significantly greater quantities of milk than the newborn human and (c) the blood brain barrier in rodents is formed post-natally

(as evidenced by low P-glycoprotein levels) while in humans this membrane is formed pre-natally.

Abamectin is non-mutagenic in the Ames test and the micronucleus test.

Dietary carcinogenicity studies in mice and rats showed negative results. In a 14-week oral study in monkeys no effects were seen at 0.2, 0.5 or 1.0 mg/kg/day; emesis was seen at 2.0 mg/kg/day; delayed pupillary obstruction at 6 and 8 mg/kg/day and

mydriasis at 12 mg/kg/day.

In chronic oral toxicity, abamectin produced decreased body weight gain in mice (no-observed-adverse-effect-level (NOAEL) = 1.5 mg/kg/day); tremors in rats (NOAEL = 1.5 mg/kg/day), weight loss, tremors, mydriasis, liver and gall bladder changes and
death in dogs (NOAEL = 0.25 mg/kg/day); and emesis, mydriasis and sedation in monkeys (NOAEL = 1 mg/kg/day).

Section 12 - ECOLOGICAL INFORMATION

Refer to data for ingredients, which follows:

EMAMECTIN BENZOATE:

- On the basis of available evidence concerning either toxicity, persistence, potential to accumulate and/or observed

  environmental fate and behaviour, the material may present a danger, immediate or long-term and/or delayed, to the structure

  and/or function of natural ecosystems.

- Very toxic to aquatic organisms.

- 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.

- For avermectin:
  log Kow 4 (abamectin)

Environmental fate:

Avermectin undergoes rapid photolysis, is readily degraded by soil microorganisms and, due to its binding properties and low

water solubility, is expected to exhibit little or no potential for leaching. Both aquatic and terrestrial studies confirm the rapid

degradation of abamectin (a mixture of avermectins) in the environment and its lack of accumulation and persistence.

Abamectin is not degraded by sewage treatment organisms nor does it affect them.

Abamectin does not bioconcentrate in fish and is not taken up from soil into plants. Bioaccumulation does not occur

Avermectin is stable to hydrolysis at pH 5, 7, and 9 and thus is not expected to hydrolyse in the environment. It photodegrades

rapidly in water and soil with half-lives of less than 12 hours and 1 day respectively.

Avermectin hydrolyses rapidly in water when exposed to strong light and is metabolised in the soil (half-life 20-47 days)

Soil metabolism studies conducted in darkness indicate degradation of avermectin does occur with a half-life of 2 weeks to 2

months under aerobic conditions. Anaerobic degradation is slower. It is not expected to accumulate in fish. Avermectin's

solubility in water is determined to be 7.8 ppb. The field dissipation study indicates that avermectin, when applied in the bait

formulation directly to the soil, dissipates with a half-life of about a week but may persist longer if the bait is shaded. Due to its

binding properties and low water solubility, avermectin is expected to exhibit little or no potential for leaching. However

avermectin has shown conflicting results in soil thin-layer chromatographic (TLC) (immobile) and soil column studies.

Avermectin binds tightly to soil (Koc >6000)

Polar degradates of avermectin are largely unidentified, but are thought to be non-toxic

Ecotoxicity:

Bird Acute oral LD50: bobwhite quail >2000 mg/kg; LC50 3102 ppm

Bird Dietary LC50: mallard duck 383 ppm

Fish LC50: bluegill 9.6 ppb; rainbow trout 3.2 ppb; fathead minnow 15 ppb

Daphnia LC50 0.22 ppb

Mysis shrimp LC50: 0.02 ppb

Avermectin is extremely toxic to mammals and aquatic invertebrates and highly toxic to fish and bees. Avermectin is relatively

non-toxic to birds. Based upon terrestrial residue analysis, aquatic runoff modeling and cluster analysis it appears that certain

deranged species may be impacted by the use of avermectin on cotton.

For abamectin (mixture of avermectins)
Bird Acute oral LD50: 84.6 mg/kg; bobwhite quail >2000 mg/kg
Bird Dietary LC50 (8 days): bobwhite quail 3.1 mg/kg
Fish LC50 (96 h): for rainbow trout 3.2 ug/l; bluegill sunfish 9.6 ug/l; channel catfish 24 ug/l; carp 42 ug/l
Daphnia EC50 (48 h) 0.34 ppb
Other aquatic spp: LC50 (96 h) for pink shrimp 1.6 ppb; mysid shrimp 0.022 ppb; blue crab 153 ppb.
- The material is classified as an ecotoxic* because the Daphnia EC50 (48 hours) is less than or equal to 0.1 mg/l
* Classification of Substances as Ecotoxic (Dangerous to the Environment)
Appendix 8, Table 1
Fish LC50 (96 h): rainbow trout (Onchorhyncus mykiss) 0.17 mg/l; bluegill sunfish 0.18 mg/l
Daphnia EC50 (48 h): 0.001 mg/l
Animals: Emamectin benzoate is partially metabolised but rapidly cleared (DT 50 following oral dosing 34–51 h), indicating that it has no potential for bioaccumulation.
Plants Metabolism has been investigated in lettuce, cabbage and sweet corn. It is non-systemic, and rapidly degrades in sunlight to various complex residues in which undegraded parent is the only significant residue. The residues were very low.
Soil/Environment Rapidly degraded
Stable in sterile water, in the dark at pH 5 and 7, but degrades slowly at pH 9 (t1/2=4–5 months). In water at pH 7 degrades more rapidly in the light (t1/2<1–2 months) than in the dark. In laboratory soil, under aerobic conditions, degrades more rapidly in the light (t1/2<5 d) than in the dark (t1/2<50 d). Degradates more rapidly under aerobic conditions than under anaerobic conditions (t1/2<6 months).
Immobile in various solid (Koc=>25,000)

Section 13 - DISPOSAL CONSIDERATIONS

Disposal Instructions
All waste must be handled in accordance with local, state and federal regulations.
- Puncture containers to prevent re-use and bury at an authorized landfill.
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
  - 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. 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 equipment to enter drains. Collect all wash water for treatment before disposal.
- Recycle wherever possible. Special hazard may exist - specialist advice may be required.
- Consult manufacturer for recycling options.
- Consult Waste Management Authority for disposal.
- Bury or incinerate residue at an approved site.
- Decontaminate empty containers. Observe all label safeguards until containers are cleaned and destroyed.
- Puncture containers to prevent re-use and bury at an authorized landfill.

Section 14 - TRANSPORTATION INFORMATION

DOT:
Symbols: G
Hazard class or Division: 6.1
Identification Numbers: UN3462
Label Codes: 6.1
Packaging: Exceptions: None
Packaging: Non-bulk: 211
Packaging: Exceptions: None
Quantity limitations: 5 kg
Quantity Limitations: Cargo aircraft only: 50 kg
Vessel stowage: Location: B
Vessel stowage: Other: None
Hazardous materials descriptions and proper shipping names:
Toxins, extracted from living sources, solid, n.o.s.
Air Transport IATA:
ICAO/IATA Class: 6.1
ICAO/IATA Subrisk: None
UN/ID Number: 3462
Packing Group: I
Shipping Name: TOXINS, EXTRACTED FROM LIVING SOURCES, SOLID, N.O.S. *(CONTAINS EMAMECTIN BENZOATE)
Maritime Transport IMDG:
IMDG Class: 6.1  IMDG Subrisk: None
UN Number: 3462  Packing Group: I
EMS Number: F-A,S-A  Special provisions: 210 274
Limited Quantities: None
Shipping Name: TOXINS EXTRACTED FROM LIVING SOURCES, SOLID, N.O.S.(contains emamectin benzoate)

Section 15 - REGULATORY INFORMATION

No data for emamectin benzoate (CAS: 155569-91-8, 137512-74-4)

Section 16 - OTHER INFORMATION

LIMITED EVIDENCE
■ Skin contact may produce serious health damage*.
■ Inhalation may produce severe health damage*.
■ Cumulative effects may result following exposure*.
* (limited evidence).

Ingredients with multiple CAS Nos

<table>
<thead>
<tr>
<th>Ingredient Name</th>
<th>CAS</th>
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Classification of the mixture 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. A list of reference resources used to assist the committee may be found at: www.chemwatch.net/references.

The (M)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.

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