SAFETY DATA SHEET

Emamectin Formulation

SECTION 1. IDENTIFICATION

Product name: Emamectin Formulation
Other means of identification: No data available

Manufacturer or supplier’s details
Company name of supplier: Merck & Co., Inc
Address: 2000 Galloping Hill Road
Kenilworth - New Jersey - U.S.A. 07033
Telephone: 908-740-4000
Emergency telephone: 1-908-423-6000
E-mail address: EHSDATASTEWARD@merck.com

Recommended use of the chemical and restrictions on use
Recommended use: Veterinary product
Restrictions on use: Not applicable

SECTION 2. HAZARDS IDENTIFICATION

GHS classification in accordance with the Hazardous Products Regulations
Not a hazardous substance or mixture.

GHS label elements
Not a hazardous substance or mixture.

Other hazards
Dust contact with the eyes can lead to mechanical irritation.
Contact with dust can cause mechanical irritation or drying of the skin.
May form explosive dust-air mixture during processing, handling or other means.

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

Substance / Mixture: Mixture

Components

<table>
<thead>
<tr>
<th>Chemical name</th>
<th>Common Name/Synonym</th>
<th>CAS-No.</th>
<th>Concentration (% w/w)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Starch</td>
<td>Sago starch</td>
<td>9005-25-8</td>
<td>&gt;= 30 - &lt; 60 *</td>
</tr>
<tr>
<td>Propylene glycol</td>
<td>1,2-Propanediol</td>
<td>57-55-6</td>
<td>&gt;= 1 - &lt; 5 *</td>
</tr>
<tr>
<td>Emamectin</td>
<td>No data available</td>
<td>137512-74-4</td>
<td>&gt;= 0.1 - &lt; 1 *</td>
</tr>
</tbody>
</table>

* Actual concentration or concentration range is withheld as a trade secret

SECTION 4. FIRST AID MEASURES

General advice: In the case of accident or if you feel unwell, seek medical advice immediately. When symptoms persist or in all cases of doubt seek medical advice.

If inhaled: If inhaled, remove to fresh air.
SAFETY DATA SHEET

Emamectin Formulation

Get medical attention if symptoms occur.

In case of skin contact:
Wash with water and soap.
Get medical attention if symptoms occur.

In case of eye contact:
If in eyes, rinse well with water.
Get medical attention if irritation develops and persists.

If swallowed:
If swallowed, DO NOT induce vomiting.
Get medical attention if symptoms occur.
Rinse mouth thoroughly with water.

Most important symptoms and effects, both acute and delayed:
Contact with dust can cause mechanical irritation or drying of the skin.
Dust contact with the eyes can lead to mechanical irritation.

Protection of first-aiders:
No special precautions are necessary for first aid responders.

Notes to physician:
Treat symptomatically and supportively.

SECTION 5. FIRE-FIGHTING MEASURES

Suitable extinguishing media:
Water spray
Alcohol-resistant foam
Carbon dioxide (CO2)
Dry chemical

Unsuitable extinguishing media:
None known.

Specific hazards during fire fighting:
Avoid generating dust; fine dust dispersed in air in sufficient concentrations, and in the presence of an ignition source is a potential dust explosion hazard.
Exposure to combustion products may be a hazard to health.

Hazardous combustion products:
Carbon oxides

Specific extinguishing methods:
Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.
Use water spray to cool unopened containers.
Remove undamaged containers from fire area if it is safe to do so.
Evacuate area.

Special protective equipment for fire-fighters:
Wear self-contained breathing apparatus for firefighting if necessary.
Use personal protective equipment.

SECTION 6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures:
Follow safe handling advice (see section 7) and personal protective equipment recommendations (see section 8).

Environmental precautions:
Avoid release to the environment.
Prevent further leakage or spillage if safe to do so.
Retain and dispose of contaminated wash water.
Local authorities should be advised if significant spills cannot be contained.

Methods and materials for containment and cleaning up:
Sweep up or vacuum up spillage and collect in suitable container for disposal.
Avoid dispersal of dust in the air (i.e., clearing dust surfaces
with compressed air). Dust deposits should not be allowed to accumulate on surfaces, as these may form an explosive mixture if they are released into the atmosphere in sufficient concentration. Local or national regulations may apply to releases and disposal of this material, as well as those materials and items employed in the cleanup of releases. You will need to determine which regulations are applicable. Sections 13 and 15 of this SDS provide information regarding certain local or national requirements.

SECTION 7. HANDLING AND STORAGE

Technical measures : Static electricity may accumulate and ignite suspended dust causing an explosion. Provide adequate precautions, such as electrical grounding and bonding, or inert atmospheres.

Local/Total ventilation : Use only with adequate ventilation.

Advice on safe handling : Do not breathe dust. Handle in accordance with good industrial hygiene and safety practice, based on the results of the workplace exposure assessment. Minimize dust generation and accumulation. Keep container closed when not in use. Keep away from heat and sources of ignition. Take precautionary measures against static discharges. Take care to prevent spills, waste and minimize release to the environment.

Conditions for safe storage : Keep in properly labeled containers. Store in accordance with the particular national regulations.

Materials to avoid : Do not store with the following product types: Strong oxidizing agents

SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Ingredients with workplace control parameters

<table>
<thead>
<tr>
<th>Components</th>
<th>CAS-No.</th>
<th>Value type (Form of exposure)</th>
<th>Control parameters / Permissible concentration</th>
<th>Basis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Starch</td>
<td>9005-25-8</td>
<td>TWA</td>
<td>10 mg/m³</td>
<td>CA AB OEL</td>
</tr>
<tr>
<td></td>
<td></td>
<td>TWA (Total dust)</td>
<td>10 mg/m³</td>
<td>CA BC OEL</td>
</tr>
<tr>
<td></td>
<td></td>
<td>TWA (respirable dust fraction)</td>
<td>3 mg/m³</td>
<td>CA BC OEL</td>
</tr>
<tr>
<td></td>
<td></td>
<td>TWAEV (total dust)</td>
<td>10 mg/m³</td>
<td>CA QC OEL</td>
</tr>
<tr>
<td></td>
<td></td>
<td>TWA</td>
<td>10 mg/m³</td>
<td>ACGIH</td>
</tr>
<tr>
<td>Propylene glycol</td>
<td>57-55-6</td>
<td>TWA (Vapour and aerosols)</td>
<td>50 ppm 155 mg/m³</td>
<td>CA ON OEL</td>
</tr>
<tr>
<td></td>
<td></td>
<td>TWA (aeroparticle)</td>
<td>10 mg/m³</td>
<td>CA ON OEL</td>
</tr>
</tbody>
</table>
Emamectin Formulation

Emamectin 137512-74-4 TWA 15 µg/m³ Internal
Further information: Skin Wipe limit 150 µg/100 cm² Internal

Engineering measures:
- Ensure adequate ventilation, especially in confined areas.
- Minimize workplace exposure concentrations.
- Apply measures to prevent dust explosions.
- Ensure that dust-handling systems (such as exhaust ducts, dust collectors, vessels, and processing equipment) are designed in a manner to prevent the escape of dust into the work area (i.e., there is no leakage from the equipment).
- Dust formation may be relevant in the processing of this product. In addition to substance-specific OELs, general limitations of concentrations of particulates in the air at workplaces have to be considered in workplace risk assessment. Relevant limits include: OSHA PEL for Particulates Not Otherwise Regulated of 15 mg/m³ - total dust, 5 mg/m³ - respirable fraction; and ACGIH TWA for Particles (insoluble or poorly soluble) Not Otherwise Specified of 3 mg/m³ - respirable particles, 10 mg/m³ - inhalable particles.

Personal protective equipment
Respiratory protection:
- If adequate local exhaust ventilation is not available or exposure assessment demonstrates exposures outside the recommended guidelines, use respiratory protection.
- Filter type: Particulates type

Hand protection:
- Material: Chemical-resistant gloves
- Remarks: For prolonged or repeated contact use protective gloves. Wash hands before breaks and at the end of workday.

Eye protection:
- Wear the following personal protective equipment: Safety goggles

Skin and body protection:
- Skin should be washed after contact.

Hygiene measures:
- If exposure to chemical is likely during typical use, provide eye flushing systems and safety showers close to the working place.
- When using do not eat, drink or smoke.
- Wash contaminated clothing before re-use.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance: powder
Color: white
Odor: No data available
Odor Threshold: No data available
SECTION 10. STABILITY AND REACTIVITY

Reactivity : Not classified as a reactivity hazard.
Chemical stability : Stable under normal conditions.
Possibility of hazardous reac- : May form explosive dust-air mixture during processing,
SAFETY DATA SHEET
Emamectin Formulation

Conditions to avoid:
- Heat, flames and sparks.
- Avoid dust formation.

Incompatible materials:
- Oxidizing agents

Hazardous decomposition products:
- No hazardous decomposition products are known.

SECTION 11. TOXICOLOGICAL INFORMATION

Information on likely routes of exposure
Inhalation
Skin contact
Ingestion
Eye contact

Acute toxicity
Not classified based on available information.

Product:
Acute oral toxicity:
- Acute toxicity estimate: > 5,000 mg/kg
  Method: Calculation method

Acute inhalation toxicity:
- Acute toxicity estimate: > 10 mg/l
  Exposure time: 4 h
  Test atmosphere: dust/mist
  Method: Calculation method

Components:
Starch:
Acute oral toxicity:
- LD50 (Rat): > 5,000 mg/kg

Acute dermal toxicity:
- LD50 (Rabbit): > 2,000 mg/kg

Propylene glycol:
Acute oral toxicity:
- LD50 (Rat): 22,000 mg/kg

Acute inhalation toxicity:
- LC50 (Rat): > 44.9 mg/l
  Exposure time: 4 h
  Test atmosphere: dust/mist

Acute dermal toxicity:
- LD50 (Rabbit): > 2,000 mg/kg
  Assessment: The substance or mixture has no acute dermal toxicity

Emamectin:
Acute oral toxicity:
- LD50 (Rat): 76 - 78 mg/kg
  Symptoms: Irritability, Salivation, Lachrymation, Tremors
  LD50 (Mouse): 22 - 31 mg/kg
  Symptoms: Tremors
Emamectin Formulation

TDLo (Rat): 0.5 - 25 mg/kg
Target Organs: Central nervous system, Peripheral nervous system

Acute inhalation toxicity
LC50 (Rat, male and female): > 0.663 - 1.049 mg/l
Exposure time: 4 h
Test atmosphere: dust/mist

Acute dermal toxicity
LD50 (Rat): > 2,000 mg/kg
LD0 (Rabbit): 500 - 1,000 mg/kg
Target Organs: Peripheral nervous system, Central nervous system
Symptoms: Tremors, Dilatation of the pupil

Skin corrosion/irritation
Not classified based on available information.

Components:

Propylene glycol:
Species: Rabbit
Method: OECD Test Guideline 404
Result: No skin irritation

Emamectin:
Species: Rabbit
Result: Mild skin irritation

Serious eye damage/eye irritation
Not classified based on available information.

Components:

Starch:
Species: Rabbit
Result: No eye irritation

Propylene glycol:
Species: Rabbit
Result: No eye irritation
Method: OECD Test Guideline 405

Emamectin:
Species: Rabbit
Result: Irreversible effects on the eye

Respiratory or skin sensitization

Skin sensitization
Not classified based on available information.
Respiratory sensitization
Not classified based on available information.

Components:

Starch:
Test Type: Maximization Test
Routes of exposure: Skin contact
Species: Guinea pig
Result: negative

Propylene glycol:
Test Type: Maximization Test
Routes of exposure: Skin contact
Species: Guinea pig
Result: negative

Emamectin:
Test Type: Local lymph node assay (LLNA)
Routes of exposure: Skin contact
Species: Mouse
Assessment: Does not cause skin sensitization.
Result: negative

Germ cell mutagenicity
Not classified based on available information.

Components:

Starch:
Genotoxicity in vitro: Test Type: Bacterial reverse mutation assay (AMES)
Result: negative

Propylene glycol:
Genotoxicity in vitro: Test Type: Bacterial reverse mutation assay (AMES)
Result: negative

Test Type: Chromosome aberration test in vitro
Method: OECD Test Guideline 473
Result: negative

Genotoxicity in vivo: Test Type: Mammalian erythrocyte micronucleus test (in vivo cytogenetic assay)
Species: Mouse
Application Route: Intraperitoneal injection
Result: negative

Emamectin:
Genotoxicity in vitro: Test Type: Bacterial reverse mutation assay (AMES)
Result: negative

Test Type: In vitro mammalian cell gene mutation test
Test system: Chinese hamster lung cells  
Result: negative

Test Type: Chromosomal aberration  
Test system: Chinese hamster ovary cells  
Result: negative

Test Type: Alkaline elution assay  
Test system: rat hepatocytes  
Result: negative

Genotoxicity in vivo  
Test Type: in vivo assay  
Species: Mouse  
Cell type: Bone marrow  
Result: negative

Carcinogenicity
Not classified based on available information.

Components:

Propylene glycol:
Species: Rat  
Application Route: Ingestion  
Exposure time: 2 Years  
Result: negative

Emamectin:
Species: Mouse  
Application Route: Oral  
Exposure time: 79 weeks  
Dose: 0.5 - 7.5 mg/kg body weight  
Result: negative

Species: Rat  
Application Route: Oral  
Exposure time: 105 weeks  
Dose: 0.25 - 2.5 mg/kg body weight  
Result: negative

Reproductive toxicity
Not classified based on available information.

Components:

Propylene glycol:
Effects on fertility: Test Type: Two-generation reproduction toxicity study  
Species: Mouse  
Application Route: Ingestion  
Result: negative

Effects on fetal development: Test Type: Embryo-fetal development  
Species: Mouse  
Application Route: Ingestion
Emamectin:

Effects on fertility: Test Type: Two-generation reproduction toxicity study
Species: Rat, male and female
Application Route: oral (feed)
General Toxicity Parent: NOAEL: 0.6 mg/kg body weight
Fertility: NOAEL Parent: 0.6 mg/kg body weight
Early Embryonic Development: LOAEL F1: 0.6 mg/kg body weight
Result: negative

Effects on fetal development: Test Type: Development
Species: Rabbit
Application Route: Oral
Duration of Single Treatment: 12 d
General Toxicity Maternal: NOAEL: 3 mg/kg body weight
Developmental Toxicity: NOAEL F1: 6 mg/kg body weight
Result: No teratogenic effects., Embryotoxic effects and adverse effects on the offspring were detected only at high maternally toxic doses

Test Type: Development
Species: Rat
Application Route: Oral
Duration of Single Treatment: 13 d
Developmental Toxicity: NOAEL F1: 4 mg/kg body weight
Result: No teratogenic effects., Embryotoxic effects and adverse effects on the offspring were detected only at high maternally toxic doses

STOT-single exposure
Not classified based on available information.

Components:

Emamectin:
Routes of exposure: Ingestion, Skin contact
Target Organs: Peripheral nervous system, Central nervous system
Assessment: Causes damage to organs.

STOT-repeated exposure
Not classified based on available information.

Components:

Emamectin:
Target Organs: Peripheral nervous system, Central nervous system
Assessment: Causes damage to organs through prolonged or repeated exposure.
Repeated dose toxicity

**Components:**

**Starch:**
Species: Rat  
NOAEL: >= 2,000 mg/kg  
Application Route: Skin contact  
Exposure time: 28 Days  
Method: OECD Test Guideline 410

**Propylene glycol:**
Species: Rat, male  
NOAEL: >= 1,700 mg/kg  
Application Route: Ingestion  
Exposure time: 2 y

**Emamectin:**
Species: Rat  
NOAEL: 0.25 mg/kg  
LOAEL: 1 mg/kg  
Application Route: Oral  
Exposure time: 105 Weeks  
Target Organs: Central nervous system

Species: Mouse  
NOAEL: 2.5 mg/kg  
LOAEL: 12.5 mg/kg  
Application Route: Oral  
Exposure time: 79 Weeks  
Target Organs: Peripheral nervous system  
Symptoms: Tremors, Fatality

Species: Dog  
NOAEL: 0.25 mg/kg  
LOAEL: 0.5 mg/kg  
Application Route: Oral  
Exposure time: 53 Weeks  
Target Organs: Peripheral nervous system, Central nervous system  
Symptoms: Tremors, Dilatation of the pupil

Aspiration toxicity
Not classified based on available information.

**Experience with human exposure**

**Components:**

**Emamectin:**
Eye contact: Symptoms: Severe irritation  
Remarks: Based on Animal Evidence  
Ingestion: Target Organs: Gastro-intestinal system  
Symptoms: Nausea, Vomiting, Abdominal pain, confusion
**SECTION 12. ECOLOGICAL INFORMATION**

**Ecotoxicity**

**Components:**

**Propylene glycol:**

| Toxicity to fish                          | LC50 (Oncorhynchus mykiss (rainbow trout)): 40,613 mg/l  |
|                                         | Exposure time: 96 h                                      |

| Toxicity to daphnia and other aquatic invertebrates | EC50 (Ceriodaphnia dubia (water flea)): 18,340 mg/l  |
|                                                     | Exposure time: 48 h                                     |

| Toxicity to algae/aquatic plants                  | ErC50 (Skeletonema costatum (marine diatom)): 19,300 mg/l |
|                                                     | Exposure time: 72 h                                     |
|                                                     | Method: OECD Test Guideline 201                         |

| Toxicity to daphnia and other aquatic invertebrates (Chronic toxicity) | NOEC (Ceriodaphnia dubia (water flea)): 13,020 mg/l  |
|                                                                       | Exposure time: 7 d                                     |

| Toxicity to microorganisms | NOEC (Pseudomonas putida): > 20,000 mg/l |
|                           | Exposure time: 18 h                         |

**Emamectin:**

| Toxicity to fish                          | LC50 (Oncorhynchus mykiss (rainbow trout)): 0.174 mg/l  |
|                                         | Exposure time: 96 h                                  |

| LC50 (Cyprinodon variegatus (sheepshead minnow)): 1.34 mg/l  |
| Exposition time: 96 h                                    |

| LC50 (Lepomis macrochirus (Bluegill sunfish)): 0.18 mg/l  |
| Exposure time: 96 h                                     |

| Toxicity to daphnia and other aquatic invertebrates | EC50 (Daphnia magna (Water flea)): 0.00099 mg/l  |
|                                                     | Exposure time: 48 h                                  |

| EC50 (Americamysis): 0.000043 mg/l                    |
| Exposition time: 48 h                                |

**Persistence and degradability**

**Components:**

**Propylene glycol:**

| Biodegradability | Result: Readily biodegradable. |
| Biodegradation: 98.3 %                                  |

| Exposition time: 28 d                                    |

| Method: OECD Test Guideline 301F                         |
Bioaccumulative potential

Components:

Propylene glycol:
Partition coefficient: n-octanol/water : log Pow: -1.07

Emamectin:
Bioaccumulation : Species: Lepomis macrochirus (Bluegill sunfish)
Bioconcentration factor (BCF): 80
Partition coefficient: n-octanol/water : log Pow: 5

Mobility in soil
No data available

Other adverse effects
No data available

SECTION 13. DISPOSAL CONSIDERATIONS

Disposal methods
Waste from residues : Dispose of in accordance with local regulations.
Contaminated packaging : Empty containers should be taken to an approved waste handling site for recycling or disposal.
If not otherwise specified: Dispose of as unused product.

SECTION 14. TRANSPORT INFORMATION

International Regulations

UNRTDG
UN number : UN 3077
Proper shipping name : ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (Emamectin)

Class : 9
Packing group : III
Labels : 9

IATA-DGR
UN/ID No. : UN 3077
Proper shipping name : Environmentally hazardous substance, solid, n.o.s. (Emamectin)

Class : 9
Packing group : III
Labels : Miscellaneous
Packing instruction (cargo aircraft) : 956
Packing instruction (passenger aircraft) : 956
Environmentally hazardous : yes
IMDG-Code
UN number : UN 3077
Proper shipping name : ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (Emamectin)
Class : 9
Packing group : III
Labels : 9
EmS Code : F-A, S-F
Marine pollutant : yes

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code
Not applicable for product as supplied.

Domestic regulation

TDG
UN number : UN 3077
Proper shipping name : ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (Emamectin)
Class : 9
Packing group : III
Labels : 9
ERG Code : 171
Marine pollutant : yes (Emamectin)

Special precautions for user
The transport classification(s) provided herein are for informational purposes only, and solely based upon the properties of the unpackaged material as it is described within this Safety Data Sheet. Transportation classifications may vary by mode of transportation, package sizes, and variations in regional or country regulations.

SECTION 15. REGULATORY INFORMATION

The ingredients of this product are reported in the following inventories:
AICS : not determined
DSL : not determined
IECSC : not determined

SECTION 16. OTHER INFORMATION

Full text of other abbreviations
ACGIH : USA. ACGIH Threshold Limit Values (TLV)
CA BC OEL : Canada. British Columbia OEL
CA ON OEL : Ontario Table of Occupational Exposure Limits made under the Occupational Health and Safety Act.
CA QC OEL : Québec. Regulation respecting occupational health and safe-
context of their intended manner of handling, use, processing and storage, including an assessment of the appropriateness of the SDS material in the user’s end product, if applicable.

CA / Z8