1. PRODUCT AND COMPANY IDENTIFICATION

Product name: Emamectin Formulation

Manufacturer or supplier's details

Company: MSD
Address: 50 Tuas West Drive
          Singapore - Singapore 638408
Telephone: +1-908-740-4000
Emergency telephone number: 65 6697 2111 (24/7/365)
E-mail address: EHSDATASTEWARD@msd.com

Recommended use of the chemical and restrictions on use
Recommended use: Veterinary product

2. HAZARDS IDENTIFICATION

GHS Classification

Short-term (acute) aquatic hazard: Category 1
Long-term (chronic) aquatic hazard: Category 1

GHS label elements

Hazard pictograms:

Signal word: Warning
Hazard statements: H410 Very toxic to aquatic life with long lasting effects.
Precautionary statements:
Prevention: P273 Avoid release to the environment.
Response: P391 Collect spillage.
Disposal: P501 Dispose of contents/container to an approved waste disposal plant.
Other hazards which do not result in classification
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.

3. COMPOSITION/INFORMATION ON INGREDIENTS

<table>
<thead>
<tr>
<th>Substance / Mixture</th>
<th>Components</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Chemical name</td>
</tr>
<tr>
<td>Starch</td>
<td>9005-25-8</td>
</tr>
<tr>
<td>Emamectin</td>
<td>137512-74-4</td>
</tr>
</tbody>
</table>

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.
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.

5. FIREFIGHTING MEASURES

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

Unsuitable extinguishing media: None known.

Specific hazards during firefighting: 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 firefighters:
- Wear self-contained breathing apparatus for firefighting if necessary.
- Use personal protective equipment.

### 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 spillages 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. |

### 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 labelled containers. Store in accordance with the particular national regulations. |
| Materials to avoid | Do not store with the following product types:
8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Components 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>PEL (long term)</td>
<td>10 mg/m³</td>
<td>SG OEL</td>
</tr>
<tr>
<td></td>
<td></td>
<td>TWA</td>
<td>10 mg/m³</td>
<td>ACGIH</td>
</tr>
<tr>
<td>Emamectin</td>
<td>137512-74-4</td>
<td>TWA</td>
<td>15 µg/m³</td>
<td>Internal</td>
</tr>
</tbody>
</table>

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).

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: 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.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance: powder

Colour: white

Odour: No data available
10. STABILITY AND REACTIVITY

Reactivity: Not classified as a reactivity hazard.
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Chemical stability: Stable under normal conditions.
Possibility of hazardous reactions: May form explosive dust-air mixture during processing, handling or other means.
Can react with strong oxidizing agents.

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

Incompatible materials: Oxidizing agents

Hazardous decomposition products: No hazardous decomposition products are known.

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: > 2,000 mg/kg
Method: Calculation method

Acute inhalation toxicity: Acute toxicity estimate: > 5 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

Emamectin:
Acute oral toxicity: LD50 (Rat): 76 - 78 mg/kg
Symptoms: Irritability, Salivation, Lachrymation, Tremors
LD50 (Mouse): 22 - 31 mg/kg
Symptoms: Tremors
TDL0 (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:**

**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

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

Respiratory or skin sensitisation

**Skin sensitisation**
Not classified based on available information.

**Respiratory sensitisation**
Not classified based on available information.

**Components:**

**Starch:**
Test Type: Maximisation Test
Exposure routes: Skin contact
Species: Guinea pig
Result: negative

**Emamectin:**
Test Type: Local lymph node assay (LLNA)
Exposure routes: Skin contact
Species: Mouse
Assessment: Does not cause skin sensitisation.
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

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:

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:

Emamectin:
Effects on fertility: Test Type: Two-generation reproduction toxicity study
Species: Rat, male and female
Application Route: oral (feed)
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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
- Symptoms: Effect on reproduction capacity, Effects on fertility, Effects on F1 offspring
  Result: positive

Effects on foetal 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:
- Exposure routes: 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
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Version 1.16  Revision Date: 16.10.2020  SDS Number: 24937-00017  Date of last issue: 23.03.2020
Date of first issue: 23.10.2014

Application Route: Skin contact
Exposure time: 28 Days
Method: OECD Test Guideline 410

**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

12. ECOLOGICAL INFORMATION

**Ecotoxicity**

**Components:**

**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
Exposure time: 96 h
### 11. LC50

*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**
  *Exposure time: 48 h*

**M-Factor (Acute aquatic toxicity):** 10,000

**M-Factor (Chronic aquatic toxicity):** 10,000

### 13. Persistence and degradability

**No data available**

### 14. Bioaccumulative potential

**Components:**

**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**

### 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.

### 14. TRANSPORT INFORMATION

**UNRTDG**

- **UN number:** UN 3077
- **Proper shipping name:** ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (Emamectin)
- **Class:** 9
- **Packing group:** III
- **Labels:** 9
SAFETY DATA SHEET

Emamectin Formulation

Version 1.16  Revision Date: 16.10.2020  SDS Number: 24937-00017  Date of last issue: 23.03.2020  Date of first issue: 23.10.2014

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.

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.

15. REGULATORY INFORMATION

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

Workplace Safety and Health Act and Workplace Safety and Health (General Provisions) Regulations: This product is subjected to the SDS, labelling, PEL and other requirements in the Act/Regulations.

Environmental Protection and Management Act and Environmental Protection and Management (Hazardous Substances) Regulations : Not applicable

Fire Safety (Petroleum and Flammable Materials) Regulations : Not applicable

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

16. OTHER INFORMATION

Further information

Date format : dd.mm.yyyy

Full text of other abbreviations
AGCIIH : USA, ACGIH Threshold Limit Values (TLV)
SG OEL : Singapore, Workplace Safety and Health Act - First Schedule Permissible Exposure Limits of Toxic Substances

AIC - Australian Inventory of Industrial Chemicals; ANTT - National Agency for Transport by Land of Brazil; ASTM - American Society for the Testing of Materials; bw - Body weight; CMR - Carcinogen, Mutagen or Reproductive Toxicant; DIN - Standard of the German Institute for Standardisation; DSL - Domestic Substances List (Canada); ECx - Concentration associated with x% response; ELx - Loading rate associated with x% response; EmS - Emergency Schedule; ENCS - Existing and New Chemical Substances (Japan); ErCx - Concentration associated with x% growth rate response; ERG - Emergency Response Guide; GHS - Globally Harmonized System; GLP - Good Laboratory Practice; IARC - International Agency for Research on Cancer; IATA - International Air Transport Association; IBC - International Code for the Construction and Equipment of Ships carrying Dangerous Chemicals in Bulk; ICS0 - Half maximal inhibitory concentration; ICAO - International Civil Aviation Organization; IECSC - Inventory of Existing Chemical Substances in China; IMDG - International Maritime Dangerous Goods; IMO - International Maritime Organization; ISHL - Industrial Safety and Health Law (Japan); ISO - International Organisation for Standardisation; KECI - Korea Existing Chemicals Inventory; LC50 - Lethal Concentration to 50% of a test population; LD50 - Lethal Dose to 50% of a test population (Median Lethal Dose); MARPOL - International Convention for the Prevention of Pollution from Ships; n.o.s. - Not Otherwise Specified; Nch - Chilean Norm; NO(A)EC - No Observed (Adverse) Effect Concentration; NO(A)EL - No Observed (Adverse) Effect Level; NOELR - No Observable Effect Loading Rate; NOM - Official Mexican Norm; NTP - National Toxicology Program; NZIoC - New Zealand Inventory of Chemicals; OECD - Organization for Economic Co-operation and Development; OPPTS - Office of Chemical Safety and Pollution Prevention; PBT - Persistent, Bioaccumulative and Toxic substance; PICCS - Philippines Inventory of Chemicals and Chemical Substances; (Q)SAR - (Quantitative) Structure Activity Relationship; REACH - Regulation (EC) No 1907/2006 of the European Parliament and of the Council concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals; SADT - Self-Accelerating Decomposition Temperature; SDS - Safety Data Sheet; TCSI - Taiwan Chemical Substance Inventory; TDG - Transportation of Dangerous Goods; TSCA - Toxic Substances Control Act (United States); UN - United Nations; UNRTDG - United Nations Recommendations on the Transport of Dangerous Goods; vPvB - Very Persistent and Very Bioaccumulative; WHMIS - Workplace Hazardous Materials Information System

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and shall not be
considered a warranty or quality specification of any type. The information provided relates only
to the specific material identified at the top of this SDS and may not be valid when the SDS mate-
rial is used in combination with any other materials or in any process, unless specified in the text.
Material users should review the information and recommendations in the specific context of their
intended manner of handling, use, processing and storage, including an assessment of the ap-
propriateness of the SDS material in the user’s end product, if applicable.

SG / EN