SAFETY DATA SHEET

Milbemycin Oxime / Lufenuron Formulation

SECTION 1. IDENTIFICATION

Product name: Milbemycin Oxime / Lufenuron 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
Skin sensitization: Category 1
Reproductive toxicity: Category 1B
Specific target organ toxicity - repeated exposure: Category 1 (Central nervous system)
Specific target organ toxicity - repeated exposure (Oral): Category 1 (Central nervous system, Lungs, Liver, Stomach)

GHS label elements
Hazard pictograms:

Signal Word: Danger
Hazard Statements:
H317 May cause an allergic skin reaction.
H360D May damage the unborn child.
H372 Causes damage to organs (Central nervous system) through prolonged or repeated exposure.
H372 Causes damage to organs (Central nervous system, Lungs, Liver, Stomach) through prolonged or repeated exposure if swallowed.

Precautionary Statements:
Prevention:
P201 Obtain special instructions before use.
P202 Do not handle until all safety precautions have been read and understood.
SAFETY DATA SHEET
Milbemycin Oxime / Lufenuron Formulation

P260 Do not breathe dust, fume, gas, mist, vapors or spray.
P264 Wash skin thoroughly after handling.
P270 Do not eat, drink or smoke when using this product.
P272 Contaminated work clothing should not be allowed out of the workplace.
P280 Wear protective gloves, protective clothing, eye protection and face protection.

Response:
P302 + P352 IF ON SKIN: Wash with plenty of water.
P308 + P313 IF exposed or concerned: Get medical attention.
P333 + P313 If skin irritation or rash occurs: Get medical attention.
P362 + P364 Take off contaminated clothing and wash it before reuse.

Storage:
P405 Store locked up.

Disposal:
P501 Dispose of contents and container to an approved waste disposal plant.

Other hazards
None known.

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>Lufenuron (ISO)</td>
<td>No data available</td>
<td>103055-07-8</td>
<td>30.7</td>
</tr>
<tr>
<td>Cellulose</td>
<td>No data available</td>
<td>9004-34-6</td>
<td>16</td>
</tr>
<tr>
<td>Starch</td>
<td>Sago starch</td>
<td>9005-25-8</td>
<td>5</td>
</tr>
<tr>
<td>Milbemycin Oxime</td>
<td>No data available</td>
<td>129496-10-2</td>
<td>1.6</td>
</tr>
</tbody>
</table>

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.
Get medical attention.

In case of skin contact : In case of contact, immediately flush skin with soap and plenty of water.
Remove contaminated clothing and shoes.
Get medical attention.
Wash clothing before reuse. Thoroughly clean shoes before reuse.

In case of eye contact: Flush eyes with water as a precaution. Get medical attention if irritation develops and persists.

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

Most important symptoms and effects, both acute and delayed: May cause an allergic skin reaction. May damage the unborn child. Causes damage to organs through prolonged or repeated exposure.

Protection of first-aiders: First Aid responders should pay attention to self-protection, and use the recommended personal protective equipment when the potential for exposure exists (see section 8).

Notes to physician: Treat symptomatically and supportively.

**SECTION 5. FIRE-FIGHTING MEASURES**

<table>
<thead>
<tr>
<th>Suitable extinguishing media</th>
<th>Water spray</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alcohol-resistant foam</td>
<td></td>
</tr>
<tr>
<td>Carbon dioxide (CO2)</td>
<td></td>
</tr>
<tr>
<td>Dry chemical</td>
<td></td>
</tr>
</tbody>
</table>

| Unsuitable extinguishing media | None known. |

| Specific hazards during fire fighting | Exposure to combustion products may be a hazard to health. |

<table>
<thead>
<tr>
<th>Hazardous combustion products</th>
<th>Carbon oxides</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Nitrogen oxides (NOx)</td>
</tr>
</tbody>
</table>

| 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 | In the event of fire, wear self-contained breathing apparatus. Use personal protective equipment. |

**SECTION 6. ACCIDENTAL RELEASE MEASURES**

| Personal precautions, protective equipment and emergency procedures | Use personal protective equipment. 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. 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: See Engineering measures under EXPOSURE CONTROLS/PERSONAL PROTECTION section.
Local/Total ventilation: If sufficient ventilation is unavailable, use with local exhaust ventilation.
Advice on safe handling: Do not get on skin or clothing.
Do not breathe dust, fume, gas, mist, vapors or spray.
Do not swallow.
Avoid contact with eyes.
Wash skin thoroughly after handling.
Handle in accordance with good industrial hygiene and safety practice, based on the results of the workplace exposure assessment
Keep container tightly closed.
Do not eat, drink or smoke when using this product.
Take care to prevent spills, waste and minimize release to the environment.

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

Materials to avoid:
Do not store with the following product types:
Strong oxidizing agents
Organic peroxides
Explosives
Gases

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>lufenuron (ISO)</td>
<td>103055-07-8</td>
<td>TWA</td>
<td>OEB 3 (&gt;= 10 &lt; 100 µg/m³)</td>
<td>Internal</td>
</tr>
<tr>
<td>Cellulose</td>
<td>9004-34-6</td>
<td>TWA (Total dust)</td>
<td>10 mg/m³</td>
<td>CA AB 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 BC OEL</td>
</tr>
<tr>
<td>Starch</td>
<td>9005-25-8</td>
<td>TWA</td>
<td>10 mg/m³</td>
<td>ACGIH</td>
</tr>
<tr>
<td></td>
<td></td>
<td>TWAEV (total dust)</td>
<td>10 mg/m³</td>
<td>CA AB OEL</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>CA QC OEL</td>
</tr>
</tbody>
</table>
## Engineering measures

All engineering controls should be implemented by facility design and operated in accordance with GMP principles to protect products, workers, and the environment. Containment technologies suitable for controlling compounds are required to control at source and to prevent migration of the compound to uncontrolled areas (e.g., open-face containment devices). Minimize open handling.

### Personal protective equipment

#### Respiratory protection

<table>
<thead>
<tr>
<th>Filter type</th>
<th>Hand protection</th>
<th>Material</th>
<th>Remarks</th>
<th>Eye protection</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>If adequate local exhaust ventilation is not available or exposure assessment demonstrates exposures outside the recommended guidelines, use respiratory protection.</td>
<td>Wear safety glasses with side shields or goggles. If the work environment or activity involves dusty conditions, mists or aerosols, wear the appropriate goggles. Wear a faceshield or other full face protection if there is a potential for direct contact to the face with dusts, mists, or aerosols.</td>
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<td></td>
<td></td>
<td></td>
<td>Consider double gloving.</td>
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</tr>
</tbody>
</table>

#### Skin and body protection

<table>
<thead>
<tr>
<th>Material</th>
<th>Remarks</th>
<th>Eye protection</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Work uniform or laboratory coat.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Additional body garments should be used based upon the task being performed (e.g., sleevelets, apron, gauntlets, disposable suits) to avoid exposed skin surfaces.</td>
<td>Wear safety glasses with side shields or goggles. If the work environment or activity involves dusty conditions, mists or aerosols, wear the appropriate goggles. Wear a faceshield or other full face protection if there is a potential for direct contact to the face with dusts, mists, or aerosols.</td>
</tr>
<tr>
<td></td>
<td>Use appropriate degowning techniques to remove potentially contaminated clothing.</td>
<td></td>
</tr>
</tbody>
</table>

#### 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. Contaminated work clothing should not be allowed out of the workplace. Wash contaminated clothing before re-use. The effective operation of a facility should include review of engineering controls, proper personal protective equipment, appropriate degowning and decontamination procedures, industrial hygiene monitoring, medical surveillance and the use of administrative controls.

### TWA Values

<table>
<thead>
<tr>
<th>Compound</th>
<th>TWA (Total dust)</th>
<th>TWA (respirable dust fraction)</th>
<th>OEL</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 mg/m³</td>
<td>3 mg/m³</td>
<td>10 mg/m³</td>
<td>CA BC OEL</td>
</tr>
<tr>
<td>Milbemycin Oxime</td>
<td></td>
<td></td>
<td>ACGIH</td>
</tr>
</tbody>
</table>

## SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES
### Appearance
solid

### Color
brown

### Odor
odorless

### Odor Threshold
No data available

### pH
No data available

### Melting point/freezing point
No data available

### Initial boiling point and boiling range
No data available

### Flash point
Not applicable

### Evaporation rate
Not applicable

### Flammability (solid, gas)
No data available

### Flammability (liquids)
Not applicable

### Upper explosion limit / Upper flammability limit
No data available

### Lower explosion limit / Lower flammability limit
No data available

### Vapor pressure
Not applicable

### Relative vapor density
Not applicable

### Relative density
No data available

### Density
No data available

### Solubility(ies)
Water solubility: soluble

### Partition coefficient: n-octanol/water
Not applicable

### Autoignition temperature
No data available

### Decomposition temperature
No data available

### Viscosity
Viscosity, kinematic: Not applicable

### Explosive properties
Not explosive

### Oxidizing properties
The substance or mixture is not classified as oxidizing.

### Molecular weight
No data available
SAFETY DATA SHEET

Milbemycin Oxime / Lufenuron Formulation

SECTION 10. STABILITY AND REACTIVITY

**Reactivity**: Not classified as a reactivity hazard.

**Chemical stability**: Stable under normal conditions.

**Possibility of hazardous reactions**: Can react with strong oxidizing agents.

**Conditions to avoid**: None known.

**Incompatible materials**: Oxidizing agents

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

SECTION 11. TOXICOLOGICAL INFORMATION

**Information on likely routes of exposure**

Skin contact
Ingestion
Eye contact

**Acute toxicity**

<table>
<thead>
<tr>
<th>Route of exposure</th>
<th>Acute toxicity estimate</th>
<th>Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acute oral toxicity</td>
<td>&gt; 5,000 mg/kg</td>
<td>Calculation method</td>
</tr>
<tr>
<td>Acute inhalation toxicity</td>
<td>&gt; 10 mg/l</td>
<td>Calculation method</td>
</tr>
<tr>
<td>Acute dermal toxicity</td>
<td>&gt; 5,000 mg/kg</td>
<td>Calculation method</td>
</tr>
</tbody>
</table>

**Product**

<table>
<thead>
<tr>
<th>Route of exposure</th>
<th>Test atmosphere</th>
<th>Exposition time</th>
<th>Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acute dermal toxicity</td>
<td>Dust/mist</td>
<td>4 h</td>
<td>Calculation method</td>
</tr>
<tr>
<td>Acute inhalation toxicity</td>
<td>Dust/mist</td>
<td>4 h</td>
<td>Calculation method</td>
</tr>
</tbody>
</table>

**Components**

**Lufenuron (ISO):**

<table>
<thead>
<tr>
<th>Route of exposure</th>
<th>Test atmosphere</th>
<th>Exposition time</th>
<th>Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acute oral toxicity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LD50 (Rat): &gt; 2,000 mg/kg</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LD50 (Mouse): &gt; 2,000 mg/kg</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acute inhalation toxicity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LC50 (Rat): 2,350 mg/m³</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Test atmosphere: dust/mist</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acute dermal toxicity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LD50 (Rabbit): &gt; 2,000 mg/kg</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Cellulose:**

<table>
<thead>
<tr>
<th>Route of exposure</th>
<th>Test atmosphere</th>
<th>Exposition time</th>
<th>Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acute oral toxicity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LD50 (Rat): &gt; 5,000 mg/kg</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acute inhalation toxicity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LC50 (Rat): &gt; 5.8 mg/l</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exposure time: 4 h</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Acute dermal toxicity

**LD50 (Rabbit):** > 2,000 mg/kg

### Starch:

**Acute oral toxicity:** LD50 (Rat): > 5,000 mg/kg

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

### Milbemycin Oxime:

**Acute oral toxicity:**
- LD50 (Rat): 532 - 863 mg/kg
- LD50 (Mouse): 722 - 946 mg/kg

**Acute inhalation toxicity:**
- LC50 (Rat): 1,200 mg/m³
  - Exposure time: 4h
  - Test atmosphere: dust/mist

**Acute dermal toxicity:** LD50 (Rat): > 2,000 mg/kg

### Skin corrosion/irritation

Not classified based on available information.

### Components:

#### lufenuron (ISO):

- **Species:** Rabbit
- **Method:** Draize Test
- **Result:** No skin irritation

#### Milbemycin Oxime:

- **Species:** Rabbit
- **Method:** OECD Test Guideline 404
- **Result:** No skin irritation

### Serious eye damage/eye irritation

Not classified based on available information.

### Components:

#### lufenuron (ISO):

- **Species:** Rabbit
- **Result:** No eye irritation
- **Method:** Draize Test

#### Starch:

- **Species:** Rabbit
- **Result:** No eye irritation

#### Milbemycin Oxime:

- **Species:** Rabbit
Result: No eye irritation

**Respiratory or skin sensitization**

**Skin sensitization**
- May cause an allergic skin reaction.

**Respiratory sensitization**
- Not classified based on available information.

**Components:**

**lufenuron (ISO):**
- Test Type: Maximization Test
- Species: Guinea pig
- Assessment: May cause sensitization by skin contact.
- Result: Sensitizer

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

**Milbemycin Oxime:**
- Routes of exposure: Skin contact
- Species: Guinea pig
- Result: negative

**Germ cell mutagenicity**
- Not classified based on available information.

**Components:**

**lufenuron (ISO):**
- Genotoxicity in vitro: Test Type: Ames test
  - Result: negative

  - Test Type: Mouse Lymphoma
    - Test system: Chinese hamster cells
    - Result: negative

  - Test Type: Cytogenetic assay
    - Test system: Chinese hamster ovary cells
    - Result: negative

  - Test Type: DNA damage and repair, unscheduled DNA synthesis in mammalian cells (in vitro)
    - Test system: rat hepatocytes
    - Result: negative

  - Test system: Human lymphocytes
    - Result: negative
### Genotoxicity in vivo

- **Test Type:** Mammalian erythrocyte micronucleus test (in vivo cytogenetic assay)
- **Species:** Mouse
- **Result:** negative

- **Test Type:** Unscheduled DNA synthesis test (UDS) in testicular cells
- **Species:** Rat
- **Result:** negative

### Germ cell mutagenicity - Assessment

Weight of evidence does not support classification as a germ cell mutagen.

---

### Cellulose:

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

  - **Test Type:** In vitro mammalian cell gene mutation test
  - **Result:** negative

### Starch:

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

### Milbemycin Oxime:

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

  - **Test Type:** Chromosome aberration test in vitro
  - **Result:** negative

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

### Carcinogenicity

Not classified based on available information.

### Components:

**Lufenuron (ISO):**

- **Species:** Rat
- **Application Route:** Ingestion
- **Exposure time:** 18 month(s)
**SAFETY DATA SHEET**

**Milbemycin Oxime / Lufenuron Formulation**

**Result**: negative

**Carcinogenicity - Assessment**: Weight of evidence does not support classification as a carcinogen

**Cellulose**:

<table>
<thead>
<tr>
<th>Species</th>
<th>Rat</th>
</tr>
</thead>
<tbody>
<tr>
<td>Application Route</td>
<td>Ingestion</td>
</tr>
<tr>
<td>Exposure time</td>
<td>72 weeks</td>
</tr>
<tr>
<td>Result</td>
<td>negative</td>
</tr>
</tbody>
</table>

**Reproductive toxicity**

- May damage the unborn child.

**Components**:

**Lufenuron (ISO):**

- **Effects on fertility**: Test Type: Two-generation reproduction toxicity study
  - Species: Rat
  - Application Route: Oral
  - General Toxicity Parent: NOAEL: 8.3 mg/kg wet weight
  - Early Embryonic Development: NOAEL: 20.9 mg/kg body weight
  - Result: Animal testing did not show any effects on fertility.

- **Effects on fetal development**: Test Type: Development
  - Species: Rat
  - Application Route: Oral
  - General Toxicity Maternal: NOAEL: 500 mg/kg body weight
  - Developmental Toxicity: NOAEL: 1,000 mg/kg body weight
  - Symptoms: No adverse effects.
  - Remarks: No significant adverse effects were reported

- **Reproductive toxicity - Assessment**: Clear evidence of adverse effects on development, based on animal experiments.

**Cellulose**:

- **Effects on fertility**: Test Type: One-generation reproduction toxicity study
  - Species: Rat
  - Application Route: Ingestion
  - Result: negative

- **Effects on fetal development**: Test Type: Fertility/early embryonic development
  - Species: Rat
  - Application Route: Ingestion
  - Result: negative
Milbemycin Oxime:  
**Effects on fertility**  
Test Type: One-generation reproduction toxicity study  
Species: Dog  
Application Route: Ingestion  
Result: negative

**Effects on fetal development**  
Test Type: Embryo-fetal development  
Species: Rat  
Application Route: Ingestion  
Result: negative

Test Type: Embryo-fetal development  
Species: Rabbit  
Application Route: Ingestion  
Result: negative

Test Type: Embryo-fetal development  
Species: Dog  
Application Route: Ingestion  
Result: negative

STOT-single exposure

Not classified based on available information.

**Components:**

**Iufenuron (ISO):**

Assessment: The substance or mixture is not classified as specific target organ toxicant, single exposure.

STOT-repeated exposure

Causes damage to organs (Central nervous system) through prolonged or repeated exposure.  
Causes damage to organs (Central nervous system, Lungs, Liver, Stomach) through prolonged or repeated exposure if swallowed.

**Components:**

**Iufenuron (ISO):**

<table>
<thead>
<tr>
<th>Routes of exposure</th>
<th>Oral</th>
</tr>
</thead>
<tbody>
<tr>
<td>Target Organs</td>
<td>Central nervous system, Lungs, Liver, Stomach</td>
</tr>
<tr>
<td>Assessment</td>
<td>Shown to produce significant health effects in animals at concentrations of 10 mg/kg bw or less.</td>
</tr>
</tbody>
</table>

**Milbemycin Oxime:**

<table>
<thead>
<tr>
<th>Routes of exposure</th>
<th>Ingestion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Target Organs</td>
<td>Central nervous system</td>
</tr>
<tr>
<td>Assessment</td>
<td>Shown to produce significant health effects in animals at concentrations of 10 mg/kg bw or less.</td>
</tr>
</tbody>
</table>
Repeated dose toxicity

Components:

Lufenuron (ISO):

<table>
<thead>
<tr>
<th>Species</th>
<th>Rat</th>
</tr>
</thead>
<tbody>
<tr>
<td>NOAEL</td>
<td>5.34 mg/kg</td>
</tr>
<tr>
<td>Application Route</td>
<td>oral (feed)</td>
</tr>
<tr>
<td>Exposure time</td>
<td>4 Months</td>
</tr>
<tr>
<td>Target Organs</td>
<td>Central nervous system, digestive system</td>
</tr>
<tr>
<td>Symptoms</td>
<td>central nervous system effects</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Species</th>
<th>Rat</th>
</tr>
</thead>
<tbody>
<tr>
<td>NOAEL</td>
<td>1.93 mg/kg</td>
</tr>
<tr>
<td>Application Route</td>
<td>oral (feed)</td>
</tr>
<tr>
<td>Exposure time</td>
<td>2 y</td>
</tr>
<tr>
<td>Symptoms</td>
<td>central nervous system effects, Convulsions</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Species</th>
<th>Mouse</th>
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</thead>
<tbody>
<tr>
<td>NOAEL</td>
<td>2.12 mg/kg</td>
</tr>
<tr>
<td>Application Route</td>
<td>oral (feed)</td>
</tr>
<tr>
<td>Exposure time</td>
<td>18 Months</td>
</tr>
<tr>
<td>Target Organs</td>
<td>Central nervous system, Liver, Prostate</td>
</tr>
<tr>
<td>Symptoms</td>
<td>central nervous system effects, Convulsions</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Species</th>
<th>Dog</th>
</tr>
</thead>
<tbody>
<tr>
<td>NOAEL</td>
<td>7.02 mg/kg</td>
</tr>
<tr>
<td>Application Route</td>
<td>oral (feed)</td>
</tr>
<tr>
<td>Exposure time</td>
<td>1 y</td>
</tr>
<tr>
<td>Target Organs</td>
<td>Central nervous system, Liver, Lungs</td>
</tr>
<tr>
<td>Symptoms</td>
<td>Convulsions, Fatality, Irregularities</td>
</tr>
</tbody>
</table>

Cellulose:

<table>
<thead>
<tr>
<th>Species</th>
<th>Rat</th>
</tr>
</thead>
<tbody>
<tr>
<td>NOAEL</td>
<td>&gt;= 9,000 mg/kg</td>
</tr>
<tr>
<td>Application Route</td>
<td>Ingestion</td>
</tr>
<tr>
<td>Exposure time</td>
<td>90 Days</td>
</tr>
</tbody>
</table>

Starch:

<table>
<thead>
<tr>
<th>Species</th>
<th>Rat</th>
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</thead>
<tbody>
<tr>
<td>NOAEL</td>
<td>&gt;= 2,000 mg/kg</td>
</tr>
<tr>
<td>Application Route</td>
<td>Skin contact</td>
</tr>
<tr>
<td>Exposure time</td>
<td>28 Days</td>
</tr>
<tr>
<td>Method</td>
<td>OECD Test Guideline 410</td>
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</table>

Milbemycin Oxime:

<table>
<thead>
<tr>
<th>Species</th>
<th>Rat</th>
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</thead>
<tbody>
<tr>
<td>NOAEL</td>
<td>3 mg/kg</td>
</tr>
<tr>
<td>LOAEL</td>
<td>15 mg/kg</td>
</tr>
<tr>
<td>Application Route</td>
<td>Ingestion</td>
</tr>
<tr>
<td>Exposure time</td>
<td>90 Days</td>
</tr>
<tr>
<td>Symptoms</td>
<td>Liver disorders, Blood disorders</td>
</tr>
</tbody>
</table>
Species: Dog
LOAEL: 8.6 mg/kg
Application Route: Ingestion
Exposure time: 3 Days
Symptoms: Tremors

Aspiration toxicity
Not classified based on available information.

Experience with human exposure

Components:

Lufenuron (ISO):
General Information: Remarks: May be harmful if swallowed. May cause neurotoxic effects.

Milbemycin Oxime:
Ingestion: Symptoms: Salivation, Convulsions, Diarrhea, Weakness, Vomiting, Tremors, Coma
Remarks: Based on Animal Evidence

SECTION 12. ECOLOGICAL INFORMATION

Ecotoxicity

Components:

Lufenuron (ISO):
Toxicity to fish: LC50 (Oncorhynchus mykiss (rainbow trout)): > 73,100 µg/l
Exposure time: 96 h
Method: OECD Test Guideline 203

LC50 (Oncorhynchus mykiss (rainbow trout)): > 29,000 µg/l
Exposure time: 96 h
Method: OECD Test Guideline 203

LC50 (Oncorhynchus mykiss (rainbow trout)): 370 µg/l
Exposure time: 96 h
Method: OECD Test Guideline 203

Toxicity to daphnia and other aquatic invertebrates: EC50 (Americamysis): 0.042 µg/l
Exposure time: 96 h
Method: US-EPA OPPTS 850.1035

Toxicity to algae/aquatic plants: EC50 (Raphidocelis subcapitata (freshwater green alga)): 209 µg/l
Exposure time: 72 h
Method: OECD Test Guideline 201

EC50 (Scenedesmus subspicatus): 17 µg/l
Exposure time: 72 h
Method: OECD Test Guideline 201

Toxicity to fish (Chronic tox-: NOEC (Oncorhynchus mykiss (rainbow trout)): 80 µg/l
Toxicity to fish:

- LC50 (Oncorhynchus mykiss (rainbow trout)): 0.16 µg/l
  Exposure time: 96 h

Toxicity to daphnia and other aquatic invertebrates:

- EC50 (Daphnia magna (Water flea)): 0.03 µg/l
  Exposure time: 48 h

Toxicity to algae/aquatic plants:

- EC50: > 87 µg/l
  Exposure time: 72 h

Toxicity to daphnia and other aquatic invertebrates (Chronic toxicity):

- NOEC (Daphnia magna (Water flea)): 0.01 µg/l
  Exposure time: 21 d
  Method: OECD Test Guideline 211

Persistence and degradability

Components:

Cellulose:

Biodegradability: Result: Readily biodegradable.

Bioaccumulative potential

Components:

Lufenuron (ISO):

Bioaccumulation:
Species: Lepomis macrochirus (Bluegill sunfish)
Bioconcentration factor (BCF): 28
Method: OECD Test Guideline 305
SAFETY DATA SHEET

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Partition coefficient: n-octanol/water
Milbemycin Oxime:
- Bioaccumulation: Bioconcentration factor (BCF): 440
- Partition coefficient: n-octanol/water: log Pow: 7

Mobility in soil

Components:
lufenuron (ISO):
- Distribution among environmental compartments: log Koc: 5.38
  Method: OECD Test Guideline 106

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.
  (Milbemycin Oxime, lufenuron (ISO))
- Class: 9
- Packing group: III
- Labels: 9

IATA-DGR
- UN/ID No.: UN 3077
- Proper shipping name: Environmentally hazardous substance, solid, n.o.s.
  (Milbemycin Oxime, lufenuron (ISO))
- Class: 9
- Packing group: III
- Labels: Miscellaneous
- Packing instruction (cargo aircraft): 956
- Packing instruction (passenger aircraft): 956

IMDG-Code
- Environmentally hazardous: yes

Date of last issue: 09/21/2020
SAFETY DATA SHEET

Milbemycin Oxime / Lufenuron Formulation

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

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 QC OEL : Québec. Regulation respecting occupational health and safety, Schedule 1, Part 1: Permissible exposure values for airborne contaminants
ACGIH / TWA : 8-hour, time-weighted average
CA AB OEL / TWA : 8-hour Occupational exposure limit
SAFETY DATA SHEET

Milbemycin Oxime / Lufenuron Formulation

Version 2.0  Revision Date: 03/11/2021  SDS Number: 6365215-00002  Date of last issue: 09/21/2020
Date of first issue: 09/21/2020

CA BC OEL / TWA  :  8-hour time weighted average
CA QC OEL / TWAEV :  Time-weighted average exposure value

AllIC - 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; IC50 - 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 Standardization; 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


Revision Date : 03/11/2021
Date format : mm/dd/yyyy

Items where changes have been made to the previous version are highlighted in the body of this document by two vertical lines.

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 material 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 appropriateness of the SDS material in the user’s end product, if applicable.