SAFETY DATA SHEET

Fenbendazole Paste Formulation

SECTION 1. IDENTIFICATION

Product name : Fenbendazole Paste Formulation
Other means of identification : No data available

Manufacturer or supplier’s details
Company name of supplier : Merck & Co., Inc
Address : 126 E. Lincoln Avenue
Rahway, New Jersey U.S.A. 07065
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
Reproductive toxicity : Category 2
Specific target organ toxicity - repeated exposure (Oral) : Category 2 (Liver, Stomach, Nervous system, Lymph nodes)

GHS label elements
Hazard pictograms :

Signal Word : Warning
Hazard Statements :
H361fd Suspected of damaging fertility. Suspected of damaging the unborn child.
H373 May cause damage to organs (Liver, Stomach, Nervous system, Lymph nodes) 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.
P260 Do not breathe vapors.
P280 Wear protective gloves, protective clothing, eye protection and face protection.
Response:
P308 + P313 IF exposed or concerned: Get medical attention.
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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>fenbendazole</td>
<td>No data available</td>
<td>43210-67-9</td>
<td>&gt;= 10 - &lt;= 18.75</td>
</tr>
<tr>
<td>Propylene glycol</td>
<td>1,2-Propanediol</td>
<td>57-55-6</td>
<td>&gt;= 15 - &lt;= 15.16</td>
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<tr>
<td>Glycerine</td>
<td>1,2,3-Propanetriol</td>
<td>56-81-5</td>
<td>10</td>
</tr>
<tr>
<td>Ethanol#</td>
<td>Ethyl alcohol</td>
<td>64-17-5</td>
<td>&lt;= 0.04</td>
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<tr>
<td>Diethyl malonate#</td>
<td>Propanedioic acid, 1,3-diethyl ester</td>
<td>105-53-3</td>
<td>&lt;= 0.006</td>
</tr>
<tr>
<td>2-Furaldehyde#</td>
<td>2-Furancarboxaldehyde</td>
<td>98-01-1</td>
<td>&lt;= 0.006</td>
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<tr>
<td>Cinnamaldehyde#</td>
<td>3-Phenylacrylaldehyde</td>
<td>104-55-2</td>
<td>&lt;= 0.002</td>
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<tr>
<td>Isovaleraldehyde#</td>
<td>No data available</td>
<td>590-86-3</td>
<td>&lt;= 0.002</td>
</tr>
<tr>
<td>Acetaldehyde#</td>
<td>Ethanal</td>
<td>75-07-0</td>
<td>&lt;= 0.0002</td>
</tr>
<tr>
<td>Trans-hex-2-en-1-ol#</td>
<td>2-Hexen-1-ol, (2E)-</td>
<td>928-95-0</td>
<td>&lt;= 0.0002</td>
</tr>
</tbody>
</table>

# Voluntarily-disclosed substance

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.
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: Suspected of damaging fertility. Suspected of damaging the unborn child. May cause damage to organs through prolonged or repeated exposure if swallowed.

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

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

Unsuitable extinguishing media: None known.

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

Hazardous combustion products: Carbon oxides
Nitrogen oxides (NOx)
Sulfur 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: 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. Prevent spreading over a wide area (e.g., by containment or oil barriers). 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: Soak up with inert absorbent material. For large spills, provide diking or other appropriate containment to keep material from spreading. If diked material

Thoroughly clean shoes before reuse.
can be pumped, store recovered material in appropriate container.
Clean up remaining materials from spill with suitable absorbent.
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: Use only with adequate ventilation.
Advice on safe handling:
- Do not breathe vapors.
- Do not swallow.
- Avoid contact with eyes.
- Avoid prolonged or repeated contact with skin.
- Handle in accordance with good industrial hygiene and safety practice, based on the results of the workplace exposure assessment.
- Take care to prevent spills, waste and minimize release to the environment.

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

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

SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

<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>fenbendazole</td>
<td>43210-67-9</td>
<td>TWA</td>
<td>100 µg/m³ (OEB 2)</td>
<td>Internal</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 (aerosol)</td>
<td>10 mg/m³</td>
<td>CA ON OEL</td>
</tr>
<tr>
<td>Glycerine</td>
<td>56-81-5</td>
<td>TWA (Mist)</td>
<td>10 mg/m³</td>
<td>CA AB OEL</td>
</tr>
<tr>
<td></td>
<td></td>
<td>TWA (Mist)</td>
<td>10 mg/m³</td>
<td>CA BC OEL</td>
</tr>
<tr>
<td></td>
<td></td>
<td>TWA (Respirable mist)</td>
<td>3 mg/m³</td>
<td>CA BC OEL</td>
</tr>
<tr>
<td></td>
<td></td>
<td>TWADEV (Mist)</td>
<td>10 mg/m³</td>
<td>CA QC OEL</td>
</tr>
<tr>
<td>Ethanol</td>
<td>64-17-5</td>
<td>TWA</td>
<td>1,000 ppm</td>
<td>CA AB OEL</td>
</tr>
</tbody>
</table>
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Fenbendazole Paste Formulation

---

<table>
<thead>
<tr>
<th>Components</th>
<th>CAS-No.</th>
<th>Control parameters</th>
<th>Biological specimen</th>
<th>Sampling time</th>
<th>Permissible concentration</th>
<th>Basis</th>
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</thead>
<tbody>
<tr>
<td>2-Furaldehyde</td>
<td>98-01-1</td>
<td>Furoic acid</td>
<td>Urine</td>
<td>End of shift (As soon as possible after exposure ceases)</td>
<td>200 mg/l</td>
<td>ACGIH</td>
</tr>
<tr>
<td>Acetaldehyde</td>
<td>75-07-0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

**Engineering measures**

- Use appropriate engineering controls and manufacturing technologies to control airborne concentrations (e.g., dripless quick connections).
- All engineering controls should be implemented by facility design and operated in accordance with GMP principles to protect products, workers, and the environment.
- Laboratory operations do not require special containment.

**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**

- Combined particulates and organic vapor type

**Hand protection Material**

- Chemical-resistant gloves

**Eye protection**

- 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.

**Skin and body protection**

- Work uniform or laboratory coat.

**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. 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.

**SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES**

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appearance</td>
<td>paste</td>
</tr>
<tr>
<td>Color</td>
<td>white to off-white</td>
</tr>
<tr>
<td>Odor</td>
<td>cinnamon-like</td>
</tr>
<tr>
<td>Odor Threshold</td>
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<tr>
<td>pH</td>
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<td>Melting point/freezing point</td>
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<td>Initial boiling point and boiling range</td>
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</tr>
<tr>
<td>Flash point</td>
<td>No data available</td>
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<tr>
<td>Evaporation rate</td>
<td>No data available</td>
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<tr>
<td>Flammability (solid, gas)</td>
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<tr>
<td>Flammability (liquids)</td>
<td>No data available</td>
</tr>
<tr>
<td>Upper explosion limit / Upper flammability limit</td>
<td>No data available</td>
</tr>
<tr>
<td>Lower explosion limit / Lower flammability limit</td>
<td>No data available</td>
</tr>
<tr>
<td>Vapor pressure</td>
<td>No data available</td>
</tr>
<tr>
<td>Relative vapor density</td>
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</tr>
<tr>
<td>Relative density</td>
<td>No data available</td>
</tr>
<tr>
<td>Density</td>
<td>No data available</td>
</tr>
<tr>
<td>Solubility(ies)</td>
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</tr>
<tr>
<td>Water solubility</td>
<td>insoluble</td>
</tr>
<tr>
<td>Partition coefficient: n-octanol/water</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Autoignition temperature</td>
<td>No data available</td>
</tr>
<tr>
<td>Decomposition temperature</td>
<td>No data available</td>
</tr>
</tbody>
</table>
Viscosity
Viscosity, kinematic : No data available

Explosive properties : Not explosive

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

Molecular weight : No data available

Particle size : No data available

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
Inhalation
Skin contact
Ingestion
Eye contact

Acute toxicity
Not classified based on available information.

Components:
fenbendazole:
Acute oral toxicity : LD50 (Rat): > 10,000 mg/kg
LD50 (Mouse): > 10,000 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
### Glycerine:
- **Acute oral toxicity**: LD50 (Rat): > 5,000 mg/kg
- **Acute dermal toxicity**: LD50 (Guinea pig): > 5,000 mg/kg

### Ethanol:
- **Acute oral toxicity**: LD50 (Rat): > 5,000 mg/kg
  - Method: OECD Test Guideline 401
- **Acute inhalation toxicity**: LC50 (Rat): 124.7 mg/l
  - Exposure time: 4 h
  - Test atmosphere: vapor

### Diethyl malonate:
- **Acute oral toxicity**: LD50 (Rat): > 5,000 mg/kg
- **Acute dermal toxicity**: LD50 (Rat): > 2,000 mg/kg
  - Method: OECD Test Guideline 402
  - Remarks: Based on data from similar materials

### 2-Furaldehyde:
- **Acute oral toxicity**: LD50 (Rat): 108 mg/kg
  - Method: OECD Test Guideline 401
- **Acute inhalation toxicity**: LC50 (Rat): 1 mg/l
  - Exposure time: 4 h
  - Test atmosphere: vapor
- **Acute dermal toxicity**: Acute toxicity estimate: 300 mg/kg
  - Method: Expert judgment

### Cinnamaldehyde:
- **Acute oral toxicity**: LD50 (Rat): 2,200 mg/kg
- **Acute dermal toxicity**: LD50 (Rabbit): 1,260 mg/kg

### Isovaleraldehyde:
- **Acute oral toxicity**: LD50 (Rat): 5,740 mg/kg
- **Acute inhalation toxicity**: LC50 (Rat): 42.7 mg/l
  - Exposure time: 4 h
  - Test atmosphere: vapor
- **Acute dermal toxicity**: LD50 (Rabbit): 2,534 mg/kg

### Acetaldehyde:
- **Acute oral toxicity**: LD50 (Rat): 661 mg/kg
- **Acute dermal toxicity**: LD50 (Rabbit): 3,540 mg/kg
Trans-hex-2-en-1-ol:
Acute oral toxicity : LD50 (Rat): 3,500 mg/kg
Acute inhalation toxicity : Assessment: Corrosive to the respiratory tract.
Acute dermal toxicity : LD50 (Rabbit): 4,500 mg/kg

Skin corrosion/irritation
Not classified based on available information.

Components:
fenbendazole:
Species : Rabbit
Result : No skin irritation

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

Glycerine:
Species : Rabbit
Result : No skin irritation

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

Diethyl malonate:
Species : Rabbit
Result : No skin irritation

2-Furaldehyde:
Species : Rabbit
Method : OECD Test Guideline 404
Result : Mild skin irritation

Cinnamaldehyde:
Species : human skin
Result : Skin irritation

Isovaleraldehyde:
Species : Rabbit
Method : OECD Test Guideline 404
Result : Mild skin irritation

Acetaldehyde:
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Version: 5.8
Revision Date: 04/04/2023
SDS Number: 887495-00019
Date of last issue: 07/26/2022
Date of first issue: 09/16/2016

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

Trans-hex-2-en-1-ol:
Species: reconstructed human epidermis (RhE)
Method: OECD Test Guideline 431
Result: Corrosive after 3 minutes to 1 hour of exposure

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

Components:

fenbendazole:
Species: Rabbit
Result: No eye irritation

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

Glycerine:
Species: Rabbit
Result: No eye irritation

Ethanol:
Species: Rabbit
Result: Irritation to eyes, reversing within 21 days
Method: OECD Test Guideline 405

Diethyl malonate:
Species: Rabbit
Result: Irritation to eyes, reversing within 21 days

2-Furaldehyde:
Species: Rabbit
Result: Irritation to eyes, reversing within 21 days
Method: OECD Test Guideline 405

Cinnamaldehyde:
Species: Rabbit
Result: Irritation to eyes, reversing within 21 days
Method: OECD Test Guideline 405

Isovaleraldehyde:
Species: Rabbit
Result : Irritation to eyes, reversing within 21 days

Acetaldehyde:
Species : Rabbit
Result : Irritation to eyes, reversing within 21 days

Trans-hex-2-en-1-ol:
Result : Irreversible effects on the eye
Remarks : Based on skin corrosivity.

Respiratory or skin sensitization

Skin sensitization
Not classified based on available information.

Respiratory sensitization
Not classified based on available information.

Components:

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

Ethanol:
Test Type : Local lymph node assay (LLNA)
Routes of exposure : Skin contact
Species : Mouse
Result : negative

Diethyl malonate:
Test Type : Buehler Test
Routes of exposure : Skin contact
Species : Guinea pig
Method : OECD Test Guideline 406
Result : negative
Remarks : Based on data from similar materials

2-Furaldehyde:
Test Type : Maximization Test
Routes of exposure : Skin contact
Species : Guinea pig
Method : OECD Test Guideline 406
Result : negative

Cinnamaldehyde:
Test Type : Local lymph node assay (LLNA)
Routes of exposure : Skin contact
Species : Mouse
Result : positive

Assessment : Probability or evidence of low to moderate skin sensitization rate in humans

**Isovaleraldehyde:**
Test Type : Maximization Test
Routes of exposure : Skin contact
Species : Guinea pig
Method : OECD Test Guideline 406
Result : positive
Remarks : Based on data from similar materials
Assessment : Probability or evidence of low to moderate skin sensitization rate in humans

**Acetaldehyde:**
Test Type : Maximization Test
Routes of exposure : Skin contact
Species : Guinea pig
Method : OECD Test Guideline 406
Result : negative

**Trans-hex-2-en-1-ol:**
Test Type : Local lymph node assay (LLNA)
Routes of exposure : Skin contact
Species : Mouse
Method : OECD Test Guideline 429
Result : negative
Remarks : Based on data from similar materials

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

**Components:**

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

Test Type: DNA Repair
Result: negative

Test Type: Chromosomal aberration
Result: negative

Test Type: in vitro test
Test system: mouse lymphoma cells
Metabolic activation: Metabolic activation
Result: equivocal

**Propylene glycol:**
### Genotoxicity in vitro:

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<table>
<thead>
<tr>
<th>Version</th>
<th>Revision Date</th>
<th>SDS Number</th>
<th>Date of last issue</th>
<th>Date of first issue</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.8</td>
<td>04/04/2023</td>
<td>887495-00019</td>
<td>07/26/2022</td>
<td>09/16/2016</td>
</tr>
</tbody>
</table>

#### Glycerine:
- 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

#### Ethanol:
- Genotoxicity in vitro:
  - Test Type: In vitro mammalian cell gene mutation test
    - Result: negative
  - Test Type: Bacterial reverse mutation assay (AMES)
    - Result: negative
  - Test Type: Chromosome aberration test in vitro
    - Result: negative

#### Diethyl malonate:
- 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
    - Remarks: Based on data from similar materials

#### 2-Furaldehyde:
- Genotoxicity in vitro:
  - Test Type: Bacterial reverse mutation assay (AMES)
    - Method: OECD Test Guideline 471
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Result: negative

Test Type: In vitro mammalian cell gene mutation test
Result: positive

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

Test Type: DNA damage and repair, unscheduled DNA synthesis in mammalian cells (in vitro)
Result: positive

Test Type: In vitro sister chromatid exchange assay in mammalian cells
Result: positive

Genotoxicity in vivo:

Test Type: Unscheduled DNA synthesis (UDS) test with mammalian liver cells in vivo
Species: Rat
Application Route: Ingestion
Result: negative

Test Type: Transgenic rodent somatic cell gene mutation assay
Species: Mouse
Application Route: Ingestion
Result: negative

Cinnamaldehyde:

Genotoxicity in vitro:

Test Type: Bacterial reverse mutation assay (AMES)
Result: negative

Test Type: In vitro mammalian cell gene mutation test
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
Remarks: Based on data from similar materials

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

Test Type: Mutagenicity (in vivo mammalian bone-marrow cytogenetic test, chromosomal analysis)
<table>
<thead>
<tr>
<th>Species</th>
<th>Application Route</th>
<th>Result</th>
<th>Test Type</th>
<th>Method</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mouse</td>
<td>Ingestion</td>
<td>negative</td>
<td>Test Type: Unscheduled DNA synthesis (UDS) test with mammalian liver cells in vivo</td>
<td>OECD Test Guideline 471</td>
<td></td>
</tr>
<tr>
<td>Rat</td>
<td>Ingestion</td>
<td>negative</td>
<td>ISOvaleraldehyde: Test Type: Bacterial reverse mutation assay (AMES)</td>
<td>OECD Test Guideline 471</td>
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</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Species: Mouse</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Application Route: Intraperitoneal injection</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Result: negative</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Remarks: Based on data from similar materials</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rat</td>
<td>Intraperitoneal injection</td>
<td>positive</td>
<td>Test Type: Mammalian erythrocyte micronucleus test (in vivo cytogenetic assay)</td>
<td>OECD Test Guideline 474</td>
<td></td>
</tr>
<tr>
<td></td>
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<td>Species: Mouse</td>
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<td>Application Route: Intraperitoneal injection</td>
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<td></td>
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<td>Result: positive</td>
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<td>Remarks: Based on data from similar materials</td>
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<tr>
<td>Isovaleraldehyde:</td>
<td>Genotoxicity in vitro</td>
<td>:</td>
<td>Test Type: Bacterial reverse mutation assay (AMES)</td>
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<td>Genotoxicity in vitro</td>
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<td>Test Type: In vitro mammalian cell gene mutation test</td>
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<td>Result: positive</td>
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<td>Test Type: Chromosome aberration test in vitro</td>
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<td>Result: positive</td>
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<td>Test Type: in vitro micronucleus test</td>
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<td>Result: positive</td>
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<td></td>
<td>Test Type: In vitro sister chromatid exchange assay in mammalian cells</td>
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<td>Result: positive</td>
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<td>Test Type: DNA damage and repair, unscheduled DNA synthesis in mammalian cells (in vitro)</td>
<td>OECD Test Guideline 474</td>
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<td>Remarks: Based on data from similar materials</td>
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<td>Genotoxicity in vivo</td>
<td>:</td>
<td>Test Type: Mammalian erythrocyte micronucleus test (in vivo cytogenetic assay)</td>
<td>OECD Test Guideline 474</td>
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<td>Application Route: Intraperitoneal injection</td>
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<td>Result: positive</td>
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<td>Remarks: Based on data from similar materials</td>
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</table>
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Fenbendazole Paste Formulation

Test Type: Mammalian bone marrow sister chromatid exchange
Species: Mouse
Application Route: Intraperitoneal injection
Result: positive

Germ cell mutagenicity - Assessment
Positive result(s) from in vivo mammalian somatic cell mutagenicity tests.

Trans-hex-2-en-1-ol:
Genotoxicity in vitro
Test Type: Bacterial reverse mutation assay (AMES)
Method: OECD Test Guideline 471
Result: negative

Test Type: in vitro micronucleus test
Method: OECD Test Guideline 487
Result: negative

Genotoxicity in vivo
Test Type: Mammalian erythrocyte micronucleus test (in vivo cytogenetic assay)
Species: Mouse
Application Route: Intraperitoneal injection
Method: OECD Test Guideline 474
Result: negative
Remarks: Based on data from similar materials

Carcinogenicity
Not classified based on available information.

Components:

fenbendazole:
Species: Mouse
Application Route: oral (feed)
Exposure time: 2 Years
NOAEL: 405 mg/kg body weight
Result: negative

Species: Rat
Application Route: Oral
Exposure time: 2 Years
NOAEL: 5 mg/kg body weight
Result: negative
Target Organs: Lymph nodes, Liver

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

2-Furaldehyde:
Species : Mouse
Application Route : Ingestion
Exposure time : 103 weeks
Method : OECD Test Guideline 451
Result : positive
Remarks : The mechanism or mode of action is not relevant in humans.

Carcinogenicity - Assessment : Limited evidence of carcinogenicity in animal studies

Cinnamaldehyde:
Species : Rat
Application Route : Ingestion
Exposure time : 106 weeks
Result : negative
Remarks : Based on data from similar materials

Isovaleraldehyde:
Species : Rat
Application Route : Inhalation (vapor)
Exposure time : 2 Years
Result : negative
Remarks : Based on data from similar materials

Acetaldehyde:
Species : Rat
Application Route : Inhalation
Exposure time : 121 weeks
Result : positive
Carcinogenicity - Assessment : Sufficient evidence of carcinogenicity in animal experiments
Reproductive toxicity
Suspected of damaging fertility. Suspected of damaging the unborn child.

Components:
fenbendazole:
Effects on fertility: Test Type: Three-generation reproduction toxicity study
Species: Rat
Application Route: oral (feed)
General Toxicity Parent: NOAEL: 15 mg/kg body weight
Fertility: LOAEL: 45 mg/kg body weight
Result: Effects on fertility.

Effects on fetal development: Test Type: Development
Species: Dog, female
Application Route: Oral
Developmental Toxicity: LOAEL: 100 mg/kg body weight
Result: Embryotoxic effects and adverse effects on the offspring were detected., No teratogenic effects.

Test Type: Embryo-fetal development
Species: Rabbit
Application Route: Oral
Developmental Toxicity: NOAEL: 25 mg/kg body weight
Result: Fetotoxicity.

Test Type: Embryo-fetal development
Species: Rabbit
Application Route: Oral
Developmental Toxicity: LOAEL: 63 mg/kg body weight
Result: No effects on fetal development.

Reproductive toxicity - Assessment: Some evidence of adverse effects on sexual function and fertility, based on animal experiments., Some evidence of adverse effects on development, based on animal experiments.

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
Result: negative
### Glycerine:

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

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

### Ethanol:

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

### Diethyl malonate:

**Effects on fertility:**
- **Test Type:** Combined repeated dose toxicity study with the reproduction/developmental toxicity screening test
- **Species:** Rat
- **Application Route:** Ingestion
- **Method:** OECD Test Guideline 422
- **Result:** negative
- **Remarks:** Based on data from similar materials

**Effects on fetal development:**
- **Test Type:** Combined repeated dose toxicity study with the reproduction/developmental toxicity screening test
- **Species:** Rat
- **Application Route:** Ingestion
- **Method:** OECD Test Guideline 422
- **Result:** negative
- **Remarks:** Based on data from similar materials

### 2-Furaldehyde:

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

### Cinnamaldehyde:

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

### Acetaldehyde:

**Effects on fetal development:**
- **Test Type:** Embryo-fetal development
- **Species:** Rat
- **Application Route:** Ingestion
- **Result:** negative
Trans-hex-2-en-1-ol:
Effects on fertility : Test Type: Combined repeated dose toxicity study with the reproduction/developmental toxicity screening test
Species: Rat
Application Route: Ingestion
Method: OECD Test Guideline 422
Result: negative
Remarks: Based on data from similar materials

Effects on fetal development : Test Type: Embryo-fetal development
Species: Rat
Application Route: Ingestion
Method: OECD Test Guideline 414
Result: negative
Remarks: Based on data from similar materials

STOT-single exposure
Not classified based on available information.

Components:

2-Furaldehyde:
Assessment : May cause respiratory irritation.

Isovaleraldehyde:
Assessment : May cause respiratory irritation.

Acetaldehyde:
Assessment : May cause respiratory irritation.

STOT-repeated exposure
May cause damage to organs (Liver, Stomach, Nervous system, Lymph nodes) through prolonged or repeated exposure if swallowed.

Components:

fenbendazole:
Routes of exposure : Ingestion
Target Organs : Liver, Stomach, Nervous system, Lymph nodes
Assessment : May cause damage to organs through prolonged or repeated exposure.

2-Furaldehyde:
Assessment : No significant health effects observed in animals at concentrations of 100 mg/kg bw or less.
### Repeated dose toxicity

**Components:**

**fenbendazole:**
- **Species:** Rat
- **LOAEL:** 500 mg/kg
- **Application Route:** Oral
- **Exposure time:** 2 Weeks
- **Target Organs:** Kidney, Liver

- **Species:** Rat
- **NOAEL:** > 2,500 mg/kg
- **Application Route:** Oral
- **Exposure time:** 30 Days
- **Remarks:** No significant adverse effects were reported

- **Species:** Rat
- **LOAEL:** 1,600 mg/kg
- **Application Route:** Oral
- **Exposure time:** 90 Days
- **Target Organs:** Central nervous system
- **Symptoms:** Tremors

- **Species:** Dog
- **NOAEL:** 4 mg/kg
- **LOAEL:** 8 mg/kg
- **Exposure time:** 6 Months
- **Target Organs:** Stomach, Nervous system, Lymph nodes

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

**Glycerine:**
- **Species:** Rat
- **NOAEL:** 0.167 mg/l
- **LOAEL:** 0.622 mg/l
- **Application Route:** inhalation (dust/mist/fume)
- **Exposure time:** 13 Weeks

- **Species:** Rat
- **NOAEL:** 8,000 - 10,000 mg/kg
- **Application Route:** Ingestion
- **Exposure time:** 2 y

- **Species:** Rabbit
- **NOAEL:** 5,040 mg/kg
- **Application Route:** Skin contact
- **Exposure time:** 45 Weeks
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Version: 5.8  Revision Date: 04/04/2023  SDS Number: 887495-00019  Date of last issue: 07/26/2022  Date of first issue: 09/16/2016

Ethanol:
Species: Rat
NOAEL: 1,280 mg/kg
LOAEL: 3,156 mg/kg
Application Route: Ingestion
Exposure time: 90 Days

2-Furaldehyde:
Species: Rat
NOAEL: 53 mg/kg
Application Route: Ingestion
Exposure time: 13 Weeks

Cinnamaldehyde:
Species: Rat
NOAEL: 200 mg/kg
Application Route: Ingestion
Exposure time: 12 Weeks

Acetaldehyde:
Species: Rat
NOAEL: 125 mg/kg
LOAEL: 675 mg/kg
Application Route: Ingestion
Exposure time: 28 Days

Species: Rat
NOAEL: 0.3 mg/kg
LOAEL: 1 mg/kg
Application Route: Inhalation (vapor)
Exposure time: 13 Weeks

Trans-hex-2-en-1-ol:
Species: Rat
NOAEL: > 100 mg/kg
Application Route: Ingestion
Exposure time: 98 Days
Remarks: Based on data from similar materials

Aspiration toxicity
Not classified based on available information.

Components:
fenbendazole:
No aspiration toxicity classification
Experience with human exposure

**Components:**

**fenbendazole:**
Ingestion: Symptoms: Rapid respiration, Salivation, anorexia, Diarrhea

### SECTION 12. ECOLOGICAL INFORMATION

**Ecotoxicity**

**Components:**

**fenbendazole:**
- Toxicity to fish: LC50 (Lepomis macrochirus (Bluegill sunfish)): 0.009 mg/l
  Exposure time: 21 d

- Toxicity to daphnia and other aquatic invertebrates: EC50 (Daphnia magna (Water flea)): 0.008 mg/l
  Exposure time: 48 h
  Method: OECD Test Guideline 202

- Toxicity to daphnia and other aquatic invertebrates (Chronic toxicity): NOEC (Daphnia magna (Water flea)): 0.00113 mg/l
  Exposure time: 21 Days
  Method: OECD Test Guideline 211

**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

**Glycerine:**
- Toxicity to fish: LC50 (Oncorhynchus mykiss (rainbow trout)): 54,000 mg/l
  Exposure time: 96 h

- Toxicity to daphnia and other aquatic invertebrates: EC50 (Daphnia magna (Water flea)): 1,955 mg/l
  Exposure time: 48 h

- Toxicity to microorganisms: NOEC (Pseudomonas putida): > 10,000 mg/l
  Exposure time: 18 h

Method: DIN 38 412 Part 8
Ethanol:
Toxicity to fish: LC50 (Pimephales promelas (fathead minnow)): > 1,000 mg/l
Exposure time: 96 h

Toxicity to daphnia and other aquatic invertebrates: EC50 (Ceriodaphnia (water flea)): > 1,000 mg/l
Exposure time: 48 h

Toxicity to algae/aquatic plants: ErC50 (Chlorella vulgaris (Fresh water algae)): 275 mg/l
Exposure time: 72 h
EC10 (Chlorella vulgaris (Fresh water algae)): 11.5 mg/l
Exposure time: 72 h

Toxicity to daphnia and other aquatic invertebrates (Chronic toxicity): NOEC (Daphnia magna (Water flea)): 9.6 mg/l
Exposure time: 9 d

Toxicity to microorganisms: EC50 (Pseudomonas putida): 6,500 mg/l
Exposure time: 16 h

Diethyl malonate:
Toxicity to fish: LC50 (Pimephales promelas (fathead minnow)): 12 - 17 mg/l
Exposure time: 96 h

Toxicity to daphnia and other aquatic invertebrates: EC50 (Daphnia magna (Water flea)): 179 mg/l
Exposure time: 48 h

Toxicity to algae/aquatic plants: ErC50 (Desmodesmus subspicatus (green algae)): > 800 mg/l
Exposure time: 72 h
EC10 (Desmodesmus subspicatus (green algae)): 115 mg/l
Exposure time: 72 h

Toxicity to microorganisms: EC50 (Pseudomonas putida): 3,097 mg/l
Exposure time: 16 h
Method: DIN 38 412 Part 8

2-Furaldehyde:
Toxicity to fish: EC50 (Leuciscus idus (Golden orfe)): 29 mg/l
Exposure time: 48 h

Toxicity to daphnia and other aquatic invertebrates: EC50 (Daphnia magna (Water flea)): 29 mg/l
Exposure time: 24 h

Toxicity to algae/aquatic plants: NOEC (Microcystis aeruginosa (blue-green algae)): 2.7 mg/l
Exposure time: 8 d

Toxicity to fish (Chronic toxicity): NOEC (Danio rerio (zebra fish)): 0.33 mg/l
Exposure time: 12 d

Toxicity to daphnia and other aquatic invertebrates (Chronic toxicity): NOEC (Daphnia magna (Water flea)): 1.9 mg/l
Exposure time: 21 d
Method: OECD Test Guideline 211
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Toxicity to microorganisms: EC50: 760 mg/l
Exposure time: 30 min
Method: OECD Test Guideline 209

Cinnamaldehyde:
Toxicity to fish: LC50 (Danio rerio (zebra fish)): 4.15 mg/l
Exposure time: 96 h

Toxicity to daphnia and other aquatic invertebrates: EC50 (Daphnia magna (Water flea)): 3.21 mg/l
Exposure time: 48 h
Method: OECD Test Guideline 202

Toxicity to algae/aquatic plants: ErC50 (Chlorella vulgaris (Fresh water algae)): 16.09 mg/l
Exposure time: 72 h
Method: OECD Test Guideline 201

Toxicity to microorganisms: EC50: 71 mg/l
Exposure time: 3 h
Method: ISO 8192

Isovaleraldehyde:
Toxicity to fish: LC50 (Pimephales promelas (fathead minnow)): 3.25 mg/l
Exposure time: 96 h

Toxicity to daphnia and other aquatic invertebrates: EC50 (Daphnia magna (Water flea)): 177 mg/l
Exposure time: 48 h

Toxicity to algae/aquatic plants: ErC50 (Desmodesmus subspicatus (green algae)): 137.37 mg/l
Exposure time: 96 h
EC10 (Desmodesmus subspicatus (green algae)): 101.83 mg/l
Exposure time: 96 h

Toxicity to microorganisms: EC10 (Pseudomonas putida): 310 mg/l
Exposure time: 17 h
Method: DIN 38 412 Part 8

Acetaldehyde:
Toxicity to fish: LC50 (Pimephales promelas (fathead minnow)): 30.8 mg/l
Exposure time: 96 h

Toxicity to daphnia and other aquatic invertebrates: EC50 (Daphnia magna (Water flea)): 57.4 mg/l
Exposure time: 48 h
Method: OECD Test Guideline 202

Toxicity to algae/aquatic plants: ErC50 (Pseudokirchneriella subcapitata (green algae)): > 100 mg/l
Exposure time: 72 h
Method: OECD Test Guideline 201
EC10 (Pseudokirchneriella subcapitata (green algae)): > 100 mg/l
Exposure time: 72 h
Method: OECD Test Guideline 201

**Trans-hex-2-en-1-ol:**

**Toxicity to fish**
- LC50 (Oncorhynchus mykiss (rainbow trout)): > 100 mg/l
- Exposure time: 96 h
- Method: OECD Test Guideline 203
- Remarks: Based on data from similar materials

**Toxicity to daphnia and other aquatic invertebrates**
- EC50 (Daphnia magna (Water flea)): 163 mg/l
- Exposure time: 48 h
- Method: OECD Test Guideline 202

**Toxicity to algae/aquatic plants**
- ErC50 (Pseudokirchneriella subcapitata (green algae)): 226 mg/l
- Exposure time: 72 h
- Method: OECD Test Guideline 201

**Persistence and degradability**

**Components:**

**Propylene glycol:**
- Biodegradability: Result: Readily biodegradable.
  - Biodegradation: 98.3 %
  - Exposure time: 28 d
  - Method: OECD Test Guideline 301F

**Glycerine:**
- Biodegradability: Result: Readily biodegradable.
  - Biodegradation: 92 %
  - Exposure time: 30 d
  - Method: OECD Test Guideline 301D

**Ethanol:**
- Biodegradability: Result: Readily biodegradable.
  - Biodegradation: 84 %
  - Exposure time: 20 d

**Diethyl malonate:**
- Biodegradability: Result: Readily biodegradable.
  - Biodegradation: 99 %
  - Exposure time: 28 d

**2-Furaldehyde:**
- Biodegradability: Result: Readily biodegradable.
  - Biodegradation: 93.5 %
Exposure time: 14 d

**Cinnamaldehyde:**
Biodegradability : Result: Readily biodegradable.  
Biodegradation: 100 %  
Exposure time: 28 d  
Method: OECD Test Guideline 301B

**Isovaleraldehyde:**
Biodegradability : Result: Not readily biodegradable.  
Biodegradation: 49.5 %  
Exposure time: 28 d  
Method: OECD Test Guideline 301D

**Acetaldehyde:**
Biodegradability : Result: Readily biodegradable.  
Biodegradation: 80 %  
Exposure time: 14 d  
Method: OECD Test Guideline 301C

**Trans-hex-2-en-1-ol:**
Biodegradability : Result: Readily biodegradable.  
Remarks: Based on data from similar materials

**Bioaccumulative potential**

**Components:**

**fenbendazole:**  
Partition coefficient: n-octanol/water : log Pow: 3.32

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

**Glycerine:**  
Partition coefficient: n-octanol/water : log Pow: -1.75

**Ethanol:**  
Partition coefficient: n-octanol/water : log Pow: -0.35

**Diethyl malonate:**  
Partition coefficient: n-octanol/water : log Pow: 0.96

**2-Furaldehyde:**  
Partition coefficient: n-octanol/water : log Pow: 0.83  
Remarks: Calculation
Cinnamaldehyde:
Partition coefficient: n-octanol/water : log Pow: 2.107

Isovaleraldehyde:
Partition coefficient: n-octanol/water : log Pow: 1.5

Acetaldehyde:
Partition coefficient: n-octanol/water : log Pow: 0.45

Trans-hex-2-en-1-ol:
Partition coefficient: n-octanol/water : log Pow: 1.61
Remarks: Calculation

Mobility in soil

Components:

fenbendazole:
Distribution among environmental compartments : log Koc: 3.8 - 4.7
Method: FDA 3.08

Other adverse effects
No data available

SECTION 13. DISPOSAL CONSIDERATIONS

Disposal methods
Waste from residues : Dispose of in accordance with local regulations.
Do not dispose of waste into sewer.
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 3082
Proper shipping name : ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S.
(fenbendazole)
Class : 9
Packing group : III
Labels : 9

IATA-DGR
UN/ID No. : UN 3082
Proper shipping name : Environmentally hazardous substance, liquid, n.o.s.
(fenbendazole)
Class : 9
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
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**Fenbendazole Paste Formulation**

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<td>Canada. British Columbia OEL</td>
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<td>Québec. Regulation respecting occupational health and safety, Schedule 1, Part 1: Permissible exposure values for airborne contaminants</td>
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</tbody>
</table>

ACGIH - 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; TECI - Thailand Existing Chemicals Inventory; 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
SAFETY DATA SHEET

Fenbendazole Paste Formulation

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