SAFETY DATA SHEET
Fenbendazole Paste Formulation

SECTION 1. IDENTIFICATION

Product name : Fenbendazole Paste Formulation

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

SECTION 2. HAZARDS IDENTIFICATION

GHS classification in accordance with the OSHA Hazard Communication Standard (29 CFR 1910.1200)

Reproductive toxicity : Category 2
Specific target organ toxicity - repeated exposure (Oral) : Category 2 (Liver, Lymph nodes, Stomach, Nervous system)

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, Lymph nodes, Stomach, Nervous system) 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.

Storage:
P405 Store locked up.

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

Other hazards
None known.

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

<table>
<thead>
<tr>
<th>Substance / Mixture</th>
<th>Components</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chemical name</td>
<td>CAS-No.</td>
</tr>
<tr>
<td>---------------------</td>
<td>------------</td>
</tr>
<tr>
<td>fenbendazole</td>
<td>43210-67-9</td>
</tr>
<tr>
<td>Propylene glycol</td>
<td>57-55-6</td>
</tr>
<tr>
<td>Glycerine</td>
<td>56-81-5</td>
</tr>
<tr>
<td>Ethanol#</td>
<td>64-17-5</td>
</tr>
<tr>
<td>Diethyl malonate#</td>
<td>105-53-3</td>
</tr>
<tr>
<td>2-Furaldehyde#</td>
<td>98-01-1</td>
</tr>
<tr>
<td>Cinnamaldehyde#</td>
<td>104-55-2</td>
</tr>
<tr>
<td>Isovaleraldehyde#</td>
<td>590-86-3</td>
</tr>
<tr>
<td>Acetaldehyde#</td>
<td>75-07-0</td>
</tr>
<tr>
<td>Trans-hex-2-en-1-ol#</td>
<td>928-95-0</td>
</tr>
</tbody>
</table>

# Voluntarily-disclosed non-hazardous 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. 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: Suspected of damaging fertility. Suspected of damaging the unborn child. May cause damage to organs through prolonged or repeated exposure if swallowed.

Protective equipment: 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

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 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.
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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

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>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</td>
<td>10 mg/m³</td>
<td>US WEEL</td>
</tr>
<tr>
<td>Ethanol</td>
<td>64-17-5</td>
<td>STEL</td>
<td>1,000 ppm</td>
<td>ACGIH</td>
</tr>
<tr>
<td></td>
<td></td>
<td>TWA</td>
<td>1,000 ppm 1,900 mg/m³</td>
<td>NIOSH REL</td>
</tr>
<tr>
<td></td>
<td></td>
<td>TWA</td>
<td>1,000 ppm 1,900 mg/m³</td>
<td>OSHA Z-1</td>
</tr>
<tr>
<td>2-Furaldehyde</td>
<td>98-01-1</td>
<td>TWA</td>
<td>0.2 ppm</td>
<td>ACGIH</td>
</tr>
<tr>
<td></td>
<td></td>
<td>TWA</td>
<td>5 ppm 20 mg/m³</td>
<td>OSHA Z-1</td>
</tr>
<tr>
<td>Acetaldehyde</td>
<td>75-07-0</td>
<td>C</td>
<td>25 ppm</td>
<td>ACGIH</td>
</tr>
<tr>
<td></td>
<td></td>
<td>TWA</td>
<td>200 ppm 360 mg/m³</td>
<td>OSHA Z-1</td>
</tr>
</tbody>
</table>

Biological occupational exposure limits

<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>
</tr>
</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 BEI</td>
</tr>
</tbody>
</table>

Engineering measures: Use appropriate engineering controls and manufacturing technologies to control airborne concentrations (e.g., drip-less 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**: General and local exhaust ventilation is recommended to maintain vapor exposures below recommended limits. Where concentrations are above recommended limits or are unknown, appropriate respiratory protection should be worn. Follow OSHA respirator regulations (29 CFR 1910.134) and use NIOSH/MSHA approved respirators. Protection provided by air purifying respirators against exposure to any hazardous chemical is limited. Use a positive pressure air supplied respirator if there is any potential for uncontrolled release, exposure levels are unknown, or any other circumstance where air purifying respirators may not provide adequate protection.

**Hand protection**: 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

**Appearance**: paste

**Color**: white to off-white

**Odor**: cinnamon-like

**Odor Threshold**: No data available

**pH**: 6 - 8

**Melting point/freezing point**: No data available

**Initial boiling point and boiling range**: No data available
<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flash point</td>
<td>No data available</td>
</tr>
<tr>
<td>Evaporation rate</td>
<td>No data available</td>
</tr>
<tr>
<td>Flammability (solid, gas)</td>
<td>Not applicable</td>
</tr>
<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>
<td>No data available</td>
</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>
<td></td>
</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>
<tr>
<td>Viscosity</td>
<td></td>
</tr>
<tr>
<td>Viscosity, kinematic</td>
<td>No data available</td>
</tr>
<tr>
<td>Explosive properties</td>
<td>Not explosive</td>
</tr>
<tr>
<td>Oxidizing properties</td>
<td>The substance or mixture is not classified as oxidizing.</td>
</tr>
<tr>
<td>Molecular weight</td>
<td>No data available</td>
</tr>
<tr>
<td>Particle size</td>
<td>No data available</td>
</tr>
</tbody>
</table>

**SECTION 10. STABILITY AND REACTIVITY**

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reactivity</td>
<td>Not classified as a reactivity hazard.</td>
</tr>
<tr>
<td>Chemical stability</td>
<td>Stable under normal conditions.</td>
</tr>
<tr>
<td>Possibility of hazardous reactions</td>
<td>Can react with strong oxidizing agents.</td>
</tr>
<tr>
<td>Conditions to avoid</td>
<td>None known.</td>
</tr>
<tr>
<td>Incompatible materials</td>
<td>Oxidizing agents</td>
</tr>
<tr>
<td>Hazardous decomposition products</td>
<td>No hazardous decomposition products are known.</td>
</tr>
</tbody>
</table>
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 : LD50 (Rat): > 2,000 mg/kg
Method: OECD Test Guideline 402
Assessment: The substance or mixture has no acute dermal toxicity

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

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

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

Glycerine:
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

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

Genotoxicity in vivo:
Test Type: Rodent dominant lethal test (germ cell) (in vivo)  
Species: Mouse  
Application Route: Ingestion  
Result: equivocal

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  
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)
  Species: Mouse
  Application Route: Ingestion
  Result: negative

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

Isovaleraldehyde:

Genotoxicity in vitro:

- Test Type: Bacterial reverse mutation assay (AMES)
  Method: OECD Test Guideline 471
  Result: negative
  Remarks: Based on data from similar materials

- Test Type: DNA damage and repair, unscheduled DNA syn-
thesis in mammalian cells (in vitro)
Result: positive
Remarks: Based on data from similar materials

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

Acetaldehyde:
Genotoxicity in vitro
: Test Type: Bacterial reverse mutation assay (AMES)
   Result: negative
   Test Type: In vitro mammalian cell gene mutation test
   Result: positive
   Test Type: Chromosome aberration test in vitro
   Result: positive
   Test Type: In vitro micronucleus test
   Result: positive
   Test Type: In vitro sister chromatid exchange assay in mammalian cells
   Result: positive
   Test Type: DNA damage and repair, unscheduled DNA synthesis in mammalian cells (in vitro)
   Result: positive

Genotoxicity in vivo
: Test Type: In vivo micronucleus test
   Species: Rat
   Application Route: Intraperitoneal injection
   Result: positive
   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.

Species: Hamster
Application Route: inhalation (vapor)
Exposure time: 52 weeks
Result: negative
Species: Mouse  
Application Route: Skin contact  
Exposure time: 47 weeks  
Result: positive  

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

- Species: Mouse  
  Application Route: Intraperitoneal injection  
  Exposure time: 24 weeks  
  Result: negative

**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

**IARC**  
No ingredient of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

**OSHA**  
No component of this product present at levels greater than or equal to 0.1% is on OSHA’s list of regulated carcinogens.

**NTP**  
No ingredient of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

**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:
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.

Species: Rabbit
Application Route: Oral
Developmental Toxicity: NOAEL: 25 mg/kg body weight
Result: Fetotoxicity.

Species: Rat
Application Route: Oral
Developmental Toxicity: NOAEL: 120 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:
Species: Mouse
Application Route: Ingestion
Result: negative

Effects on fetal development:
Species: Mouse
Application Route: Ingestion
Result: negative

Glycerine:
Effects on fertility:
Species: Rat
Application Route: Ingestion
Result: negative

Effects on fetal development:
Species: Rat
Application Route: Ingestion
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, Lymph nodes, Stomach, Nervous system) through prolonged or repeated exposure if swallowed.

Components:
fenbendazole:
- Routes of exposure: Ingestion
- Target Organs: Liver, Lymph nodes, Stomach, Nervous system
- 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
**SAFETY DATA SHEET**

Fenbendazole Paste Formulation

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<td>7.3</td>
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<td>887510-00016</td>
<td>04/09/2021</td>
<td>09/16/2016</td>
</tr>
</tbody>
</table>

- **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, Lymph nodes, Nervous system

**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

**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 (Oncorhynchus mykiss (rainbow trout)): > 7.5 mg/l
### Propylene glycol:

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<tr>
<td>Toxicity to daphnia and other</td>
<td>EC50 (Daphnia magna (Water flea)):</td>
<td>0.008 mg/l</td>
<td>48 h</td>
<td>OECD Test Guideline 202</td>
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<tr>
<td>Toxicity to daphnia and other</td>
<td>NOEC (Daphnia magna (Water flea)):</td>
<td>0.0015 mg/l</td>
<td>21 Days</td>
<td>OECD Test Guideline 211</td>
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<td>aquatic invertebrates (Chronic toxicity)</td>
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<td>Toxicity to algae/aquatic plants</td>
<td>EC50 (Skeletonema costatum (marine diatom)):</td>
<td>18,340 mg/l</td>
<td>48 h</td>
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<td>Toxicity to algae/aquatic plants</td>
<td>NOEC (Ceriodaphnia dubia (water flea)):</td>
<td>13,020 mg/l</td>
<td>7 d</td>
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<tr>
<td>Toxicity to microorganisms</td>
<td>NOEC (Pseudomonas putida):</td>
<td>&gt; 20,000 mg/l</td>
<td>18 h</td>
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### Glycerine:

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<tr>
<td>Toxicity to fish</td>
<td>LC50 (Oncorhynchus mykiss (rainbow trout)):</td>
<td>40,613 mg/l</td>
<td>96 h</td>
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<td>Toxicity to daphnia and other</td>
<td>EC50 (Daphnia magna (Water flea)):</td>
<td>1,955 mg/l</td>
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<tr>
<td>Toxicity to microorganisms</td>
<td>NOEC (Pseudomonas putida):</td>
<td>&gt; 10,000 mg/l</td>
<td>16 h</td>
<td>DIN 38 412 Part 8</td>
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### Ethanol:

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<tr>
<td>Toxicity to fish</td>
<td>LC50 (Pimephales promelas (fathead minnow)):</td>
<td>&gt; 1,000 mg/l</td>
<td>96 h</td>
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<tr>
<td>Toxicity to daphnia and other</td>
<td>EC50 (Ceriodaphnia (water flea)):</td>
<td>&gt; 1,000 mg/l</td>
<td>48 h</td>
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<tr>
<td>aquatic invertebrates</td>
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<td></td>
<td></td>
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<tr>
<td>Toxicity to algae/aquatic plants</td>
<td>EC50 (Chlorella vulgaris (Fresh water algae)):</td>
<td>275 mg/l</td>
<td>72 h</td>
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<tr>
<td>Toxicity to algae/aquatic plants</td>
<td>EC10 (Chlorella vulgaris (Fresh water algae)):</td>
<td>11.5 mg/l</td>
<td>72 h</td>
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<tr>
<td>Toxicity to daphnia and other</td>
<td>NOEC (Daphnia magna (Water flea)):</td>
<td>9.6 mg/l</td>
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</tbody>
</table>
### Diethyl malonate:

- **Toxicity to fish**
  - EC50 (Pimephales promelas (fathead minnow)): 179 mg/l
  - Exposure time: 48 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**
  - EC50 (Desmodesmus subspicatus (green algae)): 179 mg/l
  - Exposure time: 48 h

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

### 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

- **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

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**SAFETY DATA SHEET**

**Fenbendazole Paste Formulation**

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<tr>
<td>Toxicity to algae/aquatic plants</td>
<td>ErC50 (Chlorella vulgaris (Fresh water algae)): 16.09 mg/l</td>
<td>72 h</td>
<td>OECD Test Guideline 201</td>
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<tr>
<td>Toxicity to fish</td>
<td>LC50 (Pimephales promelas (fathead minnow)): 3.25 mg/l</td>
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<td>Isovaleraldehyde:</td>
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<td>EC50 (Daphnia magna (Water flea)): 177 mg/l</td>
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<tr>
<td>Toxicity to algae/aquatic plants</td>
<td>ErC50 (Desmodesmus subspicatus (green algae)): 137.37 mg/l</td>
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<td>EC10 (Desmodesmus subspicatus (green algae)): 101.83 mg/l</td>
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<td>Toxicity to microorganisms</td>
<td>EC10 (Pseudomonas putida): 310 mg/l</td>
<td>17 h</td>
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<td>Acetaldehyde:</td>
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<tr>
<td>Toxicity to fish</td>
<td>LC50 (Pimephales promelas (fathead minnow)): 30.8 mg/l</td>
<td>96 h</td>
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<td>EC50 (Daphnia magna (Water flea)): 57.4 mg/l</td>
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<td>Toxicity to algae/aquatic plants</td>
<td>ErC50 (Pseudokirchneriella subcapitata (green algae)): &gt; 100 mg/l</td>
<td>72 h</td>
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<td></td>
<td>EC10 (Pseudokirchneriella subcapitata (green algae)): &gt; 100 mg/l</td>
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<td>Trans-hex-2-en-1-ol:</td>
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<td>Toxicity to fish</td>
<td>LC50 (Oncorhynchus mykiss (rainbow trout)): &gt; 100 mg/l</td>
<td>96 h</td>
<td>OECD Test Guideline 203</td>
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<tr>
<td>Toxicity to daphnia and other</td>
<td>EC50 (Daphnia magna (Water flea)): 163 mg/l</td>
<td>48 h</td>
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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:
Bioaccumulation : Species: Lepomis macrochirus (Bluegill sunfish)
Bioconcentration factor (BCF): 240

Partition coefficient: n-octanol/water : log Pow: 2.3

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: 4.37

### 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**

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<td><strong>Packing group</strong></td>
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SAFETY DATA SHEET

Fenbendazole Paste Formulation

Version 7.3  Revision Date: 08/27/2021  SDS Number: 887510-00016  Date of last issue: 04/09/2021  Date of first issue: 09/16/2016

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

49 CFR
UN/ID/NA number : UN 3082
Proper shipping name : Environmentally hazardous substance, liquid, n.o.s. (fenbendazole)
Class : 9
Packing group : III
Labels : CLASS 9
ERG Code : 171
Marine pollutant : yes (fenbendazole)
Remarks : Above applies only to containers over 119 gallons or 450 liters., Shipment by ground under DOT is non-regulated; however it may be shipped per the applicable hazard classification to facilitate multi-modal transport involving ICAO (IATA) or IMO.

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

CERCLA Reportable Quantity
Listed substances in the product are at low enough levels to not be expected to exceed the RQ

SARA 304 Extremely Hazardous Substances Reportable Quantity
This material does not contain any components with a section 304 EHS RQ.

SARA 302 Extremely Hazardous Substances Threshold Planning Quantity
This material does not contain any components with a section 302 EHS TPQ.

SARA 311/312 Hazards : Reproductive toxicity
Specific target organ toxicity (single or repeated exposure)

SARA 313 : This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

US State Regulations
Pennsylvania Right To Know
SAFETY DATA SHEET

Fenbendazole Paste Formulation

Version 7.3  Revision Date: 08/27/2021  SDS Number: 887510-00016  Date of last issue: 04/09/2021

Water  7732-18-5
fenbendazole  43210-67-9
Propylene glycol  57-55-6
Glycerine  56-81-5
D-Glucitol  50-70-4
Sodium hydroxide  1310-73-2

California Prop. 65
WARNING: This product can expose you to chemicals including Acetaldehyde, which is/are known to the State of California to cause cancer. For more information go to www.P65Warnings.ca.gov.

California Permissible Exposure Limits for Chemical Contaminants
Glycerine  56-81-5

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

SECTION 16. OTHER INFORMATION

Further information

NFPA 704:  

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<th>HEALTH</th>
<th>FLAMMABILITY</th>
<th>PHYSICAL HAZARD</th>
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<td>0</td>
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<tr>
<td>Flammability</td>
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<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Instability</td>
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HMIS® IV:

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<th>FLAMMABILITY</th>
<th>PHYSICAL HAZARD</th>
</tr>
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<tr>
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<td>2</td>
<td>1</td>
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</tbody>
</table>

HMIS® ratings are based on a 0-4 rating scale, with 0 representing minimal hazards or risks, and 4 representing significant hazards or risks. The "*" represents a chronic hazard, while the "/" represents the absence of a chronic hazard.

Full text of other abbreviations

ACGIH : USA. ACGIH Threshold Limit Values (TLV)
ACGIH BEI : ACGIH - Biological Exposure Indices (BEI)
NIOSH REL : USA. NIOSH Recommended Exposure Limits
OSHA Z-1 : USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
US WEEL : USA. Workplace Environmental Exposure Levels (WEEL)
SAFETY DATA SHEET

Fenbendazole Paste Formulation

Version: 7.3
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SDS Number: 887510-00016
Date of last issue: 04/09/2021
Date of first issue: 09/16/2016

ACGIH / TWA: 8-hour, time-weighted average
ACGIH / STEL: Short-term exposure limit
ACGIH / C: Ceiling limit
NIOSH REL / TWA: Time-weighted average concentration for up to a 10-hour workday during a 40-hour workweek
OSHA Z-1 / TWA: 8-hour time weighted average
US WEEL / TWA: 8-hr TWA

AIIIC - Australian Inventory of Industrial Chemicals; ASTM - American Society for the Testing of Materials; bw - Body weight; CERCLA - Comprehensive Environmental Response, Compensation, and Liability Act; CMR - Carcinogen, Mutagen or Reproductive Toxicant; DIN - Standard of the German Institute for Standardisation; DOT - Department of Transportation; DSL - Domestic Substances List (Canada); ECx - Concentration associated with x% response; EHS - Extremely Hazardous Substance; 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; HMIS - Hazardous Materials Identification System; 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; MSHA - Mine Safety and Health Administration; n.o.s. - Not Otherwise Specified; NFPA - National Fire Protection Association; NO(A)EC - No Observed (Adverse) Effect Concentration; NO(A)EL - No Observed (Adverse) Effect Level; NOELR - No Observable Effect Loading Rate; 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; RCRA - Resource Conservation and Recovery Act; REACH - Regulation (EC) No 1907/2006 of the European Parliament and of the Council concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals; RO - Reportable Quantity; SADT - Self-Accelerating Decomposition Temperature; SAR - Superfund Amendments and Reauthorization Act; SDS - Safety Data Sheet; TCSI - Taiwan Chemical Substance Inventory; 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


Revision Date: 08/27/2021

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.

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