SAFETY DATA SHEET
according to GB/T 16483 and GB/T 17519

Fenbendazole Paste Formulation

Version 4.2  Revision Date: 2021/08/27  SDS Number: 887498-00015  Date of last issue: 2021/04/27
Date of first issue: 2016/09/16

1. PRODUCT AND COMPANY IDENTIFICATION

Product name : Fenbendazole Paste Formulation

Manufacturer or supplier’s details
Company : MSD
Address : No. 485 Jing Tai Road
          Pu Tuo District - Shanghai - China 200331
Telephone : +1-908-740-4000
Emergency telephone number : 86-571-87268110
E-mail address : EHSDATASTEWARD@msd.com

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

2. HAZARDS IDENTIFICATION

Emergency Overview

| Appearance | paste |
| Colour     | white to off-white |
| Odour      | cinnamon-like |

Suspected of damaging fertility. Suspected of damaging the unborn child. May cause damage to organs through prolonged or repeated exposure. Very toxic to aquatic life with long lasting effects.

GHS Classification

| Reproductive toxicity : Category 2 |
| Specific target organ toxicity - repeated exposure : Category 2 |
| Short-term (acute) aquatic hazard : Category 1 |
| Long-term (chronic) aquatic hazard : Category 1 |

GHS label elements

Hazard pictograms :

Signal word : Warning
Hazard statements : H361fd Suspected of damaging fertility. Suspected of damage-
ing the unborn child.
H373 May cause damage to organs through prolonged or re-
peated exposure.
H410 Very toxic to aquatic life with long lasting effects.

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 vapours.
P273 Avoid release to the environment.
P280 Wear protective gloves/ protective clothing/ eye protec-
tion/ face protection.

**Response:**
P308 + P313 IF exposed or concerned: Get medical advice/
attention.
P391 Collect spillage.

**Storage:**
P405 Store locked up.

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

### Physical and chemical hazards
Not classified based on available information.

### Health hazards
Suspected of damaging fertility. Suspected of damaging the unborn child. May cause damage to
organs through prolonged or repeated exposure.

### Environmental hazards
Very toxic to aquatic life. Very toxic to aquatic life with long lasting effects.

### Other hazards which do not result in classification
None known.

## 3. COMPOSITION/INFORMATION ON INGREDIENTS

<table>
<thead>
<tr>
<th>Substance / Mixture</th>
<th>Mixture</th>
</tr>
</thead>
</table>

### Components

<table>
<thead>
<tr>
<th>Chemical name</th>
<th>CAS-No.</th>
<th>Concentration (% w/w)</th>
</tr>
</thead>
<tbody>
<tr>
<td>fenbendazole</td>
<td>43210-67-9</td>
<td>&gt;= 10 - &lt;= 18.75</td>
</tr>
<tr>
<td>Ethanol#</td>
<td>64-17-5</td>
<td>&lt;= 0.04</td>
</tr>
<tr>
<td>Diethyl malonate#</td>
<td>105-53-3</td>
<td>&lt;= 0.006</td>
</tr>
<tr>
<td>2-Furaldehyde#</td>
<td>98-01-1</td>
<td>&lt;= 0.006</td>
</tr>
<tr>
<td>Cinnamaldehyde#</td>
<td>104-55-2</td>
<td>&lt;= 0.002</td>
</tr>
<tr>
<td>Isovaleraldehyde#</td>
<td>590-86-3</td>
<td>&lt;= 0.002</td>
</tr>
<tr>
<td>Acetaldehyde#</td>
<td>75-07-0</td>
<td>&lt;= 0.0002</td>
</tr>
<tr>
<td>Trans-hex-2-en-1-ol#</td>
<td>928-95-0</td>
<td>&lt;= 0.0002</td>
</tr>
</tbody>
</table>

# Voluntarily-disclosed non-hazardous substance
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.

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.

5. FIREFIGHTING MEASURES

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

Unsuitable extinguishing media: None known.

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

Hazardous combustion products: Carbon oxides

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

Special protective equipment for firefighters: In the event of fire, wear self-contained breathing apparatus. Use personal protective equipment.

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 dyeing or other appropriate containment to keep material from spreading. If dyed 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.

7. HANDLING AND STORAGE

Handling
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 vapours. 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.

Avoidance of contact: Oxidizing agents

Storage
Conditions for safe storage: Keep in properly labelled 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
Packaging material: Unsuitable material: None known.
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## 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

### Components with workplace control parameters

<table>
<thead>
<tr>
<th>Components</th>
<th>CAS-No.</th>
<th>Value type (Form of exposure)</th>
<th>Control parameters / Permissible concentration</th>
<th>Basis</th>
</tr>
</thead>
<tbody>
<tr>
<td>fenbendazole</td>
<td>43210-67-9</td>
<td>TWA</td>
<td>100 µg/m³ (OEB 2)</td>
<td>Internal</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>2-Furaldehyde</td>
<td>98-01-1</td>
<td>PC-TWA</td>
<td>5 mg/m³</td>
<td>CN OEL</td>
</tr>
</tbody>
</table>

Further information: Skin TWA 0.2 ppm ACGIH

<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>

### Biological occupational exposure limits

### 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 vapour type

Eye/face 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.

#### Hand protection

Material: Chemical-resistant gloves

#### 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.

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>Colour</td>
<td>white to off-white</td>
</tr>
<tr>
<td>Odour</td>
<td>cinnamon-like</td>
</tr>
<tr>
<td>Odour Threshold</td>
<td>No data available</td>
</tr>
<tr>
<td>pH</td>
<td>6 - 8</td>
</tr>
<tr>
<td>Melting point/freezing point</td>
<td>No data available</td>
</tr>
<tr>
<td>Initial boiling point and boiling range</td>
<td>No data available</td>
</tr>
<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>Vapour pressure</td>
<td>No data available</td>
</tr>
<tr>
<td>Relative vapour 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>
</tbody>
</table>

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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.

11. TOXICOLOGICAL INFORMATION

Exposure routes : 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

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: vapour

Diethyl malonate:
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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: vapour
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: vapour
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

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

Diethyl malonate:
Species: Rabbit
Result: No skin irritation

2-Furaldehyde:
Result: Skin irritation
Remarks: Based on the Catalogue of Hazardous Chemicals of China

Cinnamaldehyde:
Species: human skin
Result: Skin irritation

Isovaleraldehyde:
Result: Skin irritation
Remarks: Based on the Catalogue of Hazardous Chemicals of China

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
### 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 sensitisation

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

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

### Components:

#### Ethanol:
- **Test Type**: Local lymph node assay (LLNA)
- **Exposure routes**: Skin contact
- **Species**: Mouse
- **Result**: negative

#### Diethyl malonate:
- **Test Type**: Buehler Test
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<table>
<thead>
<tr>
<th>Exposure routes</th>
<th>Species</th>
<th>Method</th>
<th>Result</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Skin contact</td>
<td>Guinea pig</td>
<td>OECD Test Guideline 406</td>
<td>negative</td>
<td>Based on data from similar materials</td>
</tr>
</tbody>
</table>

##### 2-Furaldehyde:
- **Test Type**: Maximisation Test
- **Exposure routes**: Skin contact
- **Species**: Guinea pig
- **Method**: OECD Test Guideline 406
- **Result**: negative

##### Cinnamaldehyde:
- **Test Type**: Local lymph node assay (LLNA)
- **Exposure routes**: Skin contact
- **Species**: Mouse
- **Result**: positive
- **Assessment**: Probability or evidence of low to moderate skin sensitisation rate in humans

##### Isovaleraldehyde:
- **Test Type**: Maximisation Test
- **Exposure routes**: 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 sensitisation rate in humans

##### Acetaldehyde:
- **Test Type**: Maximisation Test
- **Exposure routes**: 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)
- **Exposure routes**: 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 assay
Test system: mouse lymphoma cells
Metabolic activation: Metabolic activation
Result: equivocal

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
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<tbody>
<tr>
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</tr>
</tbody>
</table>

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
### 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 synthesis in mammalian cells (in vitro)  
Result: positive  
Remarks: Based on data from similar materials

### 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**:  
Species: Rat  
Application Route: Intraperitoneal injection  
Result: positive

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

#### 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 (vapour)
- **Exposure time:** 52 weeks
- **Result:** negative
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</tr>
</tbody>
</table>

**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

### Isovaleraldehyde:

**Species**: Mouse  
**Application Route**: Intraperitoneal injection  
**Exposure time**: 24 weeks  
**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 foetal development**: Test Type: Development  
Species: Dog, female  
Application Route: Oral
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</tbody>
</table>

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

Test Type: Embryo-foetal development
Species: Rabbit
Application Route: Oral
Developmental Toxicity: LOAEL: 63 mg/kg body weight

Test Type: Embryo-foetal development
Species: Rat
Application Route: Oral
Developmental Toxicity: NOAEL: 120 mg/kg body weight
Result: No effects on foetal 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.

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 foetal 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 foetal development:
- Test Type: Embryo-foetal development
  Species: Rat
Fenbendazole Paste Formulation

Application Route: Ingestion
Result: negative

Cinnamaldehyde:
Effects on foetal development: Test Type: Embryo-foetal development
Species: Mouse
Application Route: Ingestion
Result: negative

Acetaldehyde:
Effects on foetal development: Test Type: Embryo-foetal 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 foetal development: Test Type: Embryo-foetal 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 through prolonged or repeated exposure.
Fenbendazole Paste Formulation

### Components:

**fenbendazole:**
- Exposure routes: 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
- 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

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

**2-Furaldehyde:**
- Species: Rat
Fenbendazole Paste Formulation

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 (vapour)
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, Diarrhoea
12. ECOLOGICAL INFORMATION

Ecotoxicity

Components:

fenbendazole:
Toxicity to fish : LC50 (Oncorhynchus mykiss (rainbow trout)): > 7.5 mg/l
                     Exposure time: 96 h
                     Remarks: No toxicity at the limit of solubility

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

M-Factor (Acute aquatic toxicity) : 100

Toxicity to daphnia and other aquatic invertebrates (Chronic toxicity) : NOEC (Daphnia magna (Water flea)): 0.0015 mg/l
                     Exposure time: 21 Days
                     Method: OECD Test Guideline 211

M-Factor (Chronic aquatic toxicity) : 10

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
Fenbendazole Paste Formulation

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<thead>
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<th>Version</th>
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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

#### 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:

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

**Ethanol:**

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

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

13. DISPOSAL CONSIDERATIONS

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

14. TRANSPORT INFORMATION

International Regulations

UNRTDG
UN number : UN 3082
Proper shipping name : ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S. (fenbendazole)
Fenbendazole Paste Formulation

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
Packing group: III
Labels: Miscellaneous
Packing instruction (cargo aircraft): 964
Packing instruction (passenger aircraft): 964
Environmentally hazardous: yes

IMDG-Code
UN number: UN 3082
Proper shipping name: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S. (fenbendazole)
Class: 9
Packing group: III
Labels: 9
EmS Code: F-A, S-F
Marine pollutant: yes

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

National Regulations
GB 6944/12268
UN number: UN 3082
Proper shipping name: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S. (fenbendazole)
Class: 9
Packing group: III
Labels: 9

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

15. REGULATORY INFORMATION

National regulatory information
Law on the Prevention and Control of Occupational Diseases

The components of this product are reported in the following inventories:
AICS: not determined
## 16. OTHER INFORMATION

### Further information


**Date format**: yyyy/mm/dd

### Full text of other abbreviations

- **ACGIH**: USA, ACGIH Threshold Limit Values (TLV)
- **ACGIH BEI**: ACGIH - Biological Exposure Indices (BEI)
- **CN OEL**: Occupational exposure limits for hazardous agents in the workplace - Chemical hazardous agents.

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<thead>
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<tr>
<td>ACGIH / TWA</td>
<td>8-hour, time-weighted average</td>
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<tr>
<td>ACGIH / STEL</td>
<td>Short-term exposure limit</td>
</tr>
<tr>
<td>ACGIH / C</td>
<td>Ceiling limit</td>
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<tr>
<td>CN OEL / PC-TWA</td>
<td>Permissible concentration - time weighted average</td>
</tr>
<tr>
<td>CN OEL / MAC</td>
<td>Maximum allowable concentration</td>
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**AIIC**: 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
**Fenbendazole Paste Formulation**

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stances 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

**Disclaimer**

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.

CN / EN