SAFETY DATA SHEET

Fenbendazole Paste Formulation

Version 8.5  Revision Date: 04/04/2023  SDS Number: 887510-00022  Date of last issue: 08/15/2022  Date of first issue: 09/16/2016

SECTION 1. IDENTIFICATION

Product name: Fenbendazole Paste Formulation

Manufacturer or supplier's details
Company name of supplier: Merck & Co., Inc
Address: 126 E. Lincoln Avenue, Rahway, New Jersey U.S.A. 07065
Telephone: 908-740-4000
Emergency telephone: 1-908-423-6000
E-mail address: EHSDATASTEWARD@merck.com

Recommended use of the chemical and restrictions on use
Recommended use: Veterinary product
Restrictions on use: Not applicable

SECTION 2. HAZARDS IDENTIFICATION

GHS classification in accordance with the OSHA Hazard Communication Standard (29 CFR 1910.1200)
Reproductive toxicity: Category 2
Specific target organ toxicity - repeated exposure (Oral): Category 2 (Liver, Stomach, Nervous system, Lymph nodes)

GHS label elements
Hazard pictograms: Pictogram of if exposed or concerned: Get medical attention.

Signal Word: Warning
Hazard Statements: H361f Suspected of damaging fertility. Suspected of damaging the unborn child. H373 May cause damage to organs (Liver, Stomach, Nervous system, Lymph nodes) through prolonged or repeated exposure if swallowed.

Precautionary Statements: Prevention: P201 Obtain special instructions before use. P202 Do not handle until all safety precautions have been read and understood. P260 Do not breathe vapors. P280 Wear protective gloves, protective clothing, eye protection and face protection.
Response: P308 + P313 IF exposed or concerned: Get medical attention.
Storage:
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SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

<table>
<thead>
<tr>
<th>Substance / Mixture</th>
<th>Components</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Chemical name</td>
</tr>
<tr>
<td></td>
<td>fenbendazole</td>
</tr>
<tr>
<td></td>
<td>Propylene glycol</td>
</tr>
<tr>
<td></td>
<td>Glycerine</td>
</tr>
<tr>
<td></td>
<td>Ethanol#</td>
</tr>
<tr>
<td></td>
<td>Diethyl malonate#</td>
</tr>
<tr>
<td></td>
<td>2-Furaldehyde#</td>
</tr>
<tr>
<td></td>
<td>Cinnamaldehyde#</td>
</tr>
<tr>
<td></td>
<td>Isovaleraldehyde#</td>
</tr>
<tr>
<td></td>
<td>Acetaldehyde#</td>
</tr>
<tr>
<td></td>
<td>Trans-hex-2-en-1-ol#</td>
</tr>
</tbody>
</table>

# Voluntarily-disclosed substance

SECTION 4. FIRST AID MEASURES

General advice: In the case of accident or if you feel unwell, seek medical advice immediately. When symptoms persist or in all cases of doubt seek medical advice.

If inhaled: If inhaled, remove to fresh air. Get medical attention.

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

Protection of first-aiders: First Aid responders should pay attention to self-protection, and use the recommended personal protective equipment.
**SECTION 5. FIRE-FIGHTING MEASURES**

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

**Unsuitable extinguishing media**: None known.

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

**Hazardous combustion products**
- Carbon oxides
- Nitrogen oxides (NOx)
- Sulfur oxides

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

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

**SECTION 6. ACCIDENTAL RELEASE MEASURES**

**Personal precautions, protective equipment and emergency procedures**
- Use personal protective equipment.
- Follow safe handling advice (see section 7) and personal protective equipment recommendations (see section 8).

**Environmental precautions**
- Avoid release to the environment.
- Prevent further leakage or spillage if safe to do so.
- Prevent spreading over a wide area (e.g., by containment or oil barriers).
- Retain and dispose of contaminated wash water.
- Local authorities should be advised if significant spillages cannot be contained.

**Methods and materials for containment and cleaning up**
- Soak up with inert absorbent material.
- For large spills, provide diking or other appropriate containment to keep material from spreading. If diked material 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.
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Technical measures
See Engineering measures under EXPOSURE CONTROLS/PERSO

Local/Total ventilation
Use only with adequate ventilation.

Advice on safe handling
Do not breathe vapors.
Do not swallow.
Avoid contact with eyes.
Avoid prolonged or repeated contact with skin.
Handle in accordance with good industrial hygiene and safety practice, based on the results of the workplace exposure assessment.
Take care to prevent spills, waste and minimize release to the environment.

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

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

SECTION 8. EXPOSURE CONTROLS/PERSO

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</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</td>
<td>OSHA Z-1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>20 mg/m³</td>
<td></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>
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Engineer 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:
- 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:
- Material: Chemical-resistant gloves

Eye protection:
- Wear safety glasses with side shields or goggles.
- If the work environment or activity involves dusty conditions, mists or aerosols, wear the appropriate goggles.
- Wear a faceshield or other full face protection if there is a potential for direct contact to the face with dusts, mists, or aerosols.

Skin and body protection:
- Material: 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

Flash point: No data available

Evaporation rate: No data available

Flammability (solid, gas): Not applicable

Flammability (liquids): No data available

Upper explosion limit / Upper flammability limit: No data available

Lower explosion limit / Lower flammability limit: No data available

Vapor pressure: No data available

Relative vapor density: No data available

Relative density: No data available

Density: No data available

Solubility(ies)
  Water solubility: insoluble

Partition coefficient: n-octanol/water: Not applicable

Autoignition temperature: No data available

Decomposition temperature: No data available

Viscosity
  Viscosity, kinematic: No data available

Explosive properties: Not explosive

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

Molecular weight: No data available

Particle size: No data available

SECTION 10. STABILITY AND REACTIVITY

Reactivity: Not classified as a reactivity hazard.

Chemical stability: Stable under normal conditions.

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

Conditions to avoid: None known.
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
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2-Furaldehyde:
Acute oral toxicity: LD50 (Rat): 108 mg/kg
Method: OECD Test Guideline 401
Acute inhalation toxicity: LC50 (Rat): 1 mg/l
Exposure time: 4 h
Test atmosphere: vapor
Acute dermal toxicity: Acute toxicity estimate: 300 mg/kg
Method: Expert judgment

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

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

Acetaldehyde:
Acute oral toxicity: LD50 (Rat): 661 mg/kg
Acute dermal toxicity: LD50 (Rabbit): 3,540 mg/kg

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

Skin corrosion/irritation
Not classified based on available information.

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

Propylene glycol:
Species: Rabbit
Method: OECD Test Guideline 404
<table>
<thead>
<tr>
<th>Component</th>
<th>Species</th>
<th>Method</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Glycerine</td>
<td>Rabbit</td>
<td></td>
<td>No skin irritation</td>
</tr>
<tr>
<td>Ethanol</td>
<td>Rabbit</td>
<td>OECD Test Guideline 404</td>
<td>No skin irritation</td>
</tr>
<tr>
<td>Diethyl malonate</td>
<td>Rabbit</td>
<td></td>
<td>No skin irritation</td>
</tr>
<tr>
<td>2-Furaldehyde</td>
<td>Rabbit</td>
<td>OECD Test Guideline 404</td>
<td>Mild skin irritation</td>
</tr>
<tr>
<td>Cinnamaldehyde</td>
<td>human skin</td>
<td></td>
<td>Skin irritation</td>
</tr>
<tr>
<td>Isovaleraldehyde</td>
<td>Rabbit</td>
<td>OECD Test Guideline 404</td>
<td>Mild skin irritation</td>
</tr>
<tr>
<td>Acetaldehyde</td>
<td>Rabbit</td>
<td>OECD Test Guideline 404</td>
<td>No skin irritation</td>
</tr>
<tr>
<td>Trans-hex-2-en-1-ol:</td>
<td>RhE</td>
<td>OECD Test Guideline 431</td>
<td>Corrosive after 3 minutes to 1 hour of exposure</td>
</tr>
<tr>
<td>Serious eye damage/eye irritation</td>
<td></td>
<td></td>
<td>Not classified based on available information.</td>
</tr>
</tbody>
</table>

**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:** positive

**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-
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.

<table>
<thead>
<tr>
<th>Effects on fetal development</th>
<th>Test Type: Development</th>
<th>Species: Dog, female</th>
<th>Application Route: Oral</th>
<th>Developmental Toxicity: LOAEL: 100 mg/kg body weight</th>
<th>Result: Embryotoxic effects and adverse effects on the offspring were detected., No teratogenic effects.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Test Type: Embryo-fetal development</td>
<td>Species: Rabbit</td>
<td>Application Route: Oral</td>
<td>Developmental Toxicity: NOAEL: 25 mg/kg body weight</td>
<td>Result: Fetotoxicity.</td>
</tr>
<tr>
<td></td>
<td>Test Type: Embryo-fetal development</td>
<td>Species: Rabbit</td>
<td>Application Route: Oral</td>
<td>Developmental Toxicity: LOAEL: 63 mg/kg body weight</td>
<td></td>
</tr>
</tbody>
</table>

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

**Propylene glycol:**

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

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

**Glycerine:**

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

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

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

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

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

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

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

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

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

STOT-single exposure
Not classified based on available information.

Components:

2-Furaldehyde:
Assessment: May cause respiratory irritation.

Isovaleraldehyde:
Assessment: May cause respiratory irritation.

Acetaldehyde:
Assessment: May cause respiratory irritation.

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

Components:

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

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

Repeated dose toxicity

Components:

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

Species: Rat
NOAEL: > 2,500 mg/kg
Fenbendazole Paste Formulation

<table>
<thead>
<tr>
<th>Application Route</th>
<th>Oral</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exposure time</td>
<td>30 Days</td>
</tr>
<tr>
<td>Remarks</td>
<td>No significant adverse effects were reported</td>
</tr>
</tbody>
</table>

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

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

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

**Glycerine:**  
Species: Rat  
NOAEL: 0.167 mg/l  
LOAEL: 0.622 mg/l  
Application Route: Inhalation (dust/mist/fume)  
Exposure time: 13 Weeks  
Species: Rat  
NOAEL: 8,000 - 10,000 mg/kg  
Application Route: Ingestion  
Exposure time: 2 y  
Species: Rabbit  
NOAEL: 5,040 mg/kg  
Application Route: Skin contact  
Exposure time: 45 Weeks

**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

Remarks: Based on data from similar materials

Aspiration toxicity
Not classified based on available information.

Components:
fenbendazole:
No aspiration toxicity classification

Experience with human exposure

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

SECTION 12. ECOLOGICAL INFORMATION

Ecotoxicity

Components:
fenbendazole:
Toxicity to fish: LC50 (Lepomis macrochirus (Bluegill sunfish)): 0.009 mg/l
### Propylene glycol:

**Toxicity to fish**
- EC50 (Oncorhynchus mykiss (rainbow trout)): 40,613 mg/l  
  Exposure time: 96 h

**Toxicity to daphnia and other aquatic invertebrates**
- EC50 (Ceriodaphnia dubia (water flea)): 18,340 mg/l  
  Exposure time: 48 h

**Toxicity to algae/aquatic plants**
- ErC50 (Skeletonema costatum (marine diatom)): 19,300 mg/l  
  Exposure time: 72 h  
  Method: OECD Test Guideline 201

**Toxicity to daphnia and other aquatic invertebrates (Chronic toxicity)**
- NOEC (Ceriodaphnia dubia (water flea)): 13,020 mg/l  
  Exposure time: 7 d

**Toxicity to microorganisms**
- NOEC (Pseudomonas putida): > 20,000 mg/l  
  Exposure time: 18 h  
  Method: DIN 38 412 Part 8

### Glycerine:

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

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

**Toxicity to microorganisms**
- NOEC (Pseudomonas putida): > 10,000 mg/l  
  Exposure time: 16 h  
  Method: DIN 38 412 Part 8

### Ethanol:

**Toxicity to fish**
- LC50 (Pimephales promelas (fathead minnow)): > 1,000 mg/l  
  Exposure time: 96 h

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

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

**Toxicity to daphnia and other aquatic invertebrates (Chronic toxicity)**
- NOEC (Daphnia magna (Water flea)): 9.6 mg/l  
  Exposure time: 9 d
<table>
<thead>
<tr>
<th>Substance</th>
<th>Toxicity to microorganisms</th>
<th>Toxicity to fish</th>
<th>Toxicity to daphnia and other aquatic invertebrates</th>
<th>Toxicity to algae/aquatic plants</th>
<th>Toxicity to microorganisms</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Fenbendazole Paste</strong></td>
<td>EC50 (Pseudomonas putida): 6,500 mg/l Exposure time: 16 h</td>
<td>LC50 (Pimephales promelas (fathead minnow)): 12 - 17 mg/l Exposure time: 96 h</td>
<td>EC50 (Daphnia magna (Water flea)): 179 mg/l Exposure time: 48 h Method: Directive 67/548/EEC, Annex V, C.2.</td>
<td>ErC50 (Desmodesmus subspicatus (green algae)): &gt; 800 mg/l Exposure time: 72 h EC10 (Desmodesmus subspicatus (green algae)): 115 mg/l Exposure time: 72 h</td>
<td>EC50 (Pseudomonas putida): 3,097 mg/l Exposure time: 16 h Method: DIN 38 412 Part 8</td>
</tr>
<tr>
<td><strong>Diethyl malonate</strong></td>
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<td><strong>2-Furaldehyde</strong></td>
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<tr>
<td><strong>Cinnamaldehyde</strong></td>
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</tbody>
</table>
plants
Exposure time: 72 h
Method: OECD Test Guideline 201

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

Isovaleraldehyde:

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

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

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

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

Acetaldehyde:

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

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

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

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

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

Toxicity to daphnia and other aquatic invertebrates
: EC50 (Daphnia magna (Water flea)): 163 mg/l
Exposure time: 48 h
Method: OECD Test Guideline 202
Toxicity to algae/aquatic plants:
ErC50 (Pseudokirchneriella subcapitata (green algae)): 226 mg/l
Exposure time: 72 h
Method: OECD Test Guideline 201

Persistence and degradability

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

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

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

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

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

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

Isovaleraldehyde:
Biodegradability:
Result: Not readily biodegradable.
Biodegradation: 49.5 %
Exposure time: 28 d
Method: OECD Test Guideline 301D
Acetaldehyde:
Biodegradability: Result: Readily biodegradable.
Biodegradation: 80 %
Exposure time: 14 d
Method: OECD Test Guideline 301C

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

Bioaccumulative potential

Components:

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

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

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

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

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

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

Cinnamaldehyde:
Partition coefficient: n-octanol/water
: log Pow: 2.107

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

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

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

Components:

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

Other adverse effects
No data available

SECTION 13. DISPOSAL CONSIDERATIONS

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

SECTION 14. TRANSPORT INFORMATION

International Regulations

UNRTDG
UN number: UN 3082
Proper shipping name: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S.
(fenbendazole)
Class: 9
Packing group: III
Labels: 9

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

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
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:

HMIS® IV:

Flammability

HEALTH  ★  2

PHYSICAL HAZARD  0

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)
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
**SAFETY DATA SHEET**

**Fenbendazole Paste Formulation**

<table>
<thead>
<tr>
<th>Version</th>
<th>Revision Date</th>
<th>SDS Number</th>
<th>Date of last issue: 08/15/2022</th>
</tr>
</thead>
<tbody>
<tr>
<td>8.5</td>
<td>04/04/2023</td>
<td>887510-00022</td>
<td>Date of first issue: 09/16/2016</td>
</tr>
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AIIc - 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; RQ - Reportable Quantity; SADT - Self-Accelerating Decomposition Temperature; SARA - Superfund Amendments and Reauthorization Act; SDS - Safety Data Sheet; TCSI - Taiwan Chemical Substance Inventory; TECI - Taiwan 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

Sources of key data used to compile the Material Safety Data Sheet:


Revision Date: 04/04/2023

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.

US / Z8