SAFETY DATA SHEET

Ivermectin / Abamectin Liquid Formulation

Version: 9.0  Revision Date: 2020/10/10  SDS Number: 1210011-00011  Date of last issue: 2020/03/23  Date of first issue: 2017/01/10

1. PRODUCT AND COMPANY IDENTIFICATION

   Chemical product name : Ivermectin / Abamectin Liquid Formulation

   Supplier’s company name, address and phone number
   Company name of supplier : MSD
   Address : Kumagaya, Saitama Prefecture, Xicheng 810 MSD Co., Ltd. Menuma factory
   Telephone : 048-588-8411
   E-mail address : EHSDATASTEWARD@msd.com
   Emergency telephone number : 1-908-423-6000

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

2. HAZARDS IDENTIFICATION

   GHS classification of chemical product
   Acute toxicity (Oral) : Category 4
   Acute toxicity (Inhalation) : Category 4
   Skin corrosion/irritation : Category 2
   Serious eye damage/eye irritation : Category 2
   Reproductive toxicity : Category 1B
   Specific target organ toxicity - single exposure (Oral) : Category 2 (Central nervous system)
   Specific target organ toxicity - single exposure : Category 3
   Specific target organ toxicity - repeated exposure : Category 2 (Central nervous system)
   Short-term (acute) aquatic hazard : Category 1
   Long-term (chronic) aquatic hazard : Category 1

   GHS label elements
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Hazard pictograms : 

Signal word : Danger

Hazard statements : H302 + H332 Harmful if swallowed or if inhaled.  
H315 Causes skin irritation.  
H319 Causes serious eye irritation.  
H335 May cause respiratory irritation.  
H360D May damage the unborn child.  
H371 May cause damage to organs (Central nervous system) if swallowed.  
H373 May cause damage to organs (Central nervous system) through prolonged or repeated 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 mist or vapours.  
P264 Wash skin thoroughly after handling.  
P270 Do not eat, drink or smoke when using this product.  
P271 Use only outdoors or in a well-ventilated area.  
P273 Avoid release to the environment.  
P280 Wear protective gloves/ protective clothing/ eye protection/ face protection.  

Response:  
P301 + P312 + P330 IF SWALLOWED: Call a POISON CENTER/ doctor if you feel unwell. Rinse mouth.  
P302 + P352 IF ON SKIN: Wash with plenty of water.  
P304 + P340 + P312 IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER/ doctor if you feel unwell.  
P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.  
P308 + P311 IF exposed or concerned: Call a POISON CENTER/ doctor.  
P332 + P313 If skin irritation occurs: Get medical advice/ attention.  
P337 + P313 If eye irritation persists: Get medical advice/ attention.  
P362 + P364 Take off contaminated clothing and wash it before reuse.  
P391 Collect spillage.

Storage:  
P405 Store locked up.

Disposal:  
P501 Dispose of contents/ container to an approved waste disposal plant.
Other hazards which do not result in classification
None known.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Substance / Mixture: Mixture

Components

<table>
<thead>
<tr>
<th>Chemical name</th>
<th>CAS-No.</th>
<th>Concentration (% w/w)</th>
<th>ENCS No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>N-Methyl-2-pyrrolidone</td>
<td>872-50-4</td>
<td>&gt;= 20 - &lt; 30</td>
<td>5-113</td>
</tr>
<tr>
<td>Ivermectin</td>
<td>70288-86-7</td>
<td>&gt;= 1 - &lt; 2.5</td>
<td></td>
</tr>
<tr>
<td>Abamectin (combination of avermectin B1a and avermectin B1b)</td>
<td>71751-41-2</td>
<td>&gt;= 1 - &lt; 2.5</td>
<td></td>
</tr>
<tr>
<td>(dl)-α-Tocopheryl acetate</td>
<td>7695-91-2</td>
<td>&lt; 0.1</td>
<td>9-487</td>
</tr>
</tbody>
</table>

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.
If not breathing, give artificial respiration.
If breathing is difficult, give oxygen.
Get medical attention.

In case of skin contact: In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes.
Get medical attention.
Wash clothing before reuse.
Thoroughly clean shoes before reuse.

In case of eye contact: In case of contact, immediately flush eyes with plenty of water for at least 15 minutes.
If easy to do, remove contact lens, if worn.
Get medical attention.

If swallowed: If swallowed, DO NOT induce vomiting.
Get medical attention.
Rinse mouth thoroughly with water.
Never give anything by mouth to an unconscious person.

Most important symptoms and effects, both acute and delayed: Harmful if swallowed or if inhaled.
 Causes skin irritation.
 Causes serious eye irritation.
 May cause respiratory irritation.
 May damage the unborn child.
 May cause damage to organs if swallowed.
 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.
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Notes to physician: when the potential for exposure exists (see section 8).
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
Nitrogen oxides (NOx)

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 dyking or other appropriate containment to keep material from spreading. If dyked 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 : If sufficient ventilation is unavailable, use with local exhaust ventilation.
Advice on safe handling : Do not get on skin or clothing.
Do not breathe mist or vapours.
Do not swallow.
Do not get in eyes.
Wash skin thoroughly after handling.
Handle in accordance with good industrial hygiene and safety practice, based on the results of the workplace exposure assessment
Keep container tightly closed.
Already sensitised individuals should consult their physician regarding working with respiratory irritants or sensitisers.
Do not eat, drink or smoke when using this product.
Take care to prevent spills, waste and minimize release to the environment.
Avoidance of contact : Oxidizing agents
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.

Storage
Conditions for safe storage : Keep in properly labelled containers.
Store locked up.
Keep tightly closed.
Keep in a cool, well-ventilated place.
Store in accordance with the particular national regulations.
Materials to avoid : Do not store with the following product types:
Oxidizing solids
Oxidizing liquids

Packaging material : Unsuitable material: None known.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Threshold limit value and permissible exposure limits for each component in the work environment

<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>N-Methyl-2-pyrrolidone</td>
<td>872-50-4</td>
<td>OEL-M</td>
<td>1 ppm</td>
<td>JP OEL</td>
</tr>
</tbody>
</table>
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<table>
<thead>
<tr>
<th>Components</th>
<th>CAS-No.</th>
<th>Target substance</th>
<th>Biological specimen</th>
<th>Sampling time</th>
<th>Permissible concentration</th>
<th>Basis</th>
</tr>
</thead>
<tbody>
<tr>
<td>N-Methyl-2-pyrrolidone</td>
<td>872-50-4</td>
<td>5-Hydroxy-N-methyl-2-pyrrolidone</td>
<td>Urine</td>
<td>End of shift (As soon as possible after exposure ceases)</td>
<td>100 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.

Containment technologies suitable for controlling compounds are required to control at source and to prevent migration of the compound to uncontrolled areas (e.g., open-face containment devices).

Minimize open handling.

**Personal protective equipment**

**Respiratory protection**

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

**Hand protection**

Chemical-resistant gloves

**Remarks**

Consider double gloving.

**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.
Additional body garments should be used based upon the task being performed (e.g., sleevelets, apron, gauntlets, disposable suits) to avoid exposed skin surfaces. Use appropriate degowning techniques to remove potentially contaminated clothing.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical state : liquid
Colour : light yellow
Odour : characteristic
Odour Threshold : No data available
Melting point/freezing point : No data available
Boiling point, initial boiling point and boiling range : No data available
Flammability (solid, gas) : Not applicable
Flammability (liquids) : Not applicable
Lower explosion limit and upper explosion limit / flammability limit
Upper explosion limit / Upper flammability limit : No data available
Lower explosion limit / Lower flammability limit : No data available
Flash point : > 100 °C
Decomposition temperature : No data available
pH : Not applicable
Evaporation rate : No data available
Auto-ignition temperature : No data available
Viscosity
Viscosity, kinematic : No data available
Solubility(ies)
Water solubility : insoluble
Partition coefficient: n-octanol/water : Not applicable
Vapour pressure : No data available
Density and / or relative density
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Relative density: No data available
Density: 0.91 - 1.00 mg/l
Relative vapour density: No data available
Explosive properties: Not explosive
Oxidizing properties: The substance or mixture is not classified as oxidizing.
Molecular weight: No data available
Particle characteristics:
Particle size: Not applicable

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
Information on likely routes of exposure:
Inhalation
Skin contact
Ingestion
Eye contact

Acute toxicity
Harmful if swallowed or if inhaled.
Product:
Acute oral toxicity: Acute toxicity estimate: 1,031 mg/kg
Method: Calculation method
Acute inhalation toxicity: Acute toxicity estimate: 1.84 mg/l
Exposure time: 4 h
Test atmosphere: dust/mist
Method: Calculation method
Acute dermal toxicity: Acute toxicity estimate: > 2,000 mg/kg
Method: Calculation method

Components:
N-Methyl-2-pyrrolidone:
Acute oral toxicity: LD50 (Rat): 4,150 mg/kg
Acute inhalation toxicity: LC50 (Rat): > 5.1 mg/l  
Exposure time: 4 h  
Test atmosphere: dust/mist  
Method: OECD Test Guideline 403

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

**Ivermectin:**

Acute oral toxicity: LD50 (Rat): 50 mg/kg  
LD50 (Mouse): 25 mg/kg  
LD50 (Monkey): > 24 mg/kg  
Target Organs: Central nervous system  
Symptoms: Vomiting, Dilatation of the pupil  
Remarks: No mortality observed at this dose.

Acute inhalation toxicity: LC50 (Rat): 5.11 mg/l  
Exposure time: 1 h  
Test atmosphere: dust/mist

Acute dermal toxicity: LD50 (Rabbit): 406 mg/kg  
LD50 (Rat): > 660 mg/kg

**Abamectin (combination of avermectin B1a and avermectin B1b):**

Acute oral toxicity: LD50 (Rat): 24 mg/kg  
LD50 (Mouse): 10 mg/kg  
LDLo (Monkey): 24 mg/kg  
Symptoms: Dilatation of the pupil

Acute inhalation toxicity: LC50 (Rat): 0.023 mg/l  
Exposure time: 4 h  
Test atmosphere: dust/mist

Acute dermal toxicity: LD50 (Rat): 330 mg/kg  
LD50 (Rabbit): 2,000 mg/kg

**(dl)-a-Tocopheryl acetate:**

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

Acute dermal toxicity: LD50 (Rat): > 3,000 mg/kg  
Assessment: The substance or mixture has no acute dermal toxicity

**Skin corrosion/irritation**

Causes skin irritation.
**Components:**

N-Methyl-2-pyrrolidone:
- Species: Rabbit
- Result: Skin irritation

Ivermectin:
- Species: Rabbit
- Result: No skin irritation

Abamectin (combination of avermectin B1a and avermectin B1b):
- Species: Rabbit
- Result: No skin irritation

(dl)-a-Tocopheryl acetate:
- Species: Rabbit
- Method: OECD Test Guideline 404
- Result: No skin irritation

**Serious eye damage/eye irritation**
Causes serious eye irritation.

**Components:**

N-Methyl-2-pyrrolidone:
- Species: Rabbit
- Result: Irritation to eyes, reversing within 21 days

Ivermectin:
- Species: Rabbit
- Result: Mild eye irritation

Abamectin (combination of avermectin B1a and avermectin B1b):
- Species: Rabbit
- Result: Mild eye irritation

(dl)-a-Tocopheryl acetate:
- Species: Rabbit
- Result: No eye irritation
- Method: OECD Test Guideline 405

**Respiratory or skin sensitisation**

Skin sensitisation
Not classified based on available information.

Respiratory sensitisation
Not classified based on available information.
Components:

**N-Methyl-2-pyrrolidone:**
- **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

**Ivermectin:**
- **Exposure routes:** Dermal
- **Species:** Humans
- **Result:** Does not cause skin sensitisation.

**Abamectin (combination of avermectin B1a and avermectin B1b):**
- **Test Type:** Maximisation Test
- **Exposure routes:** Skin contact
- **Result:** Not a skin sensitizer.

**(dl)-a-Tocopheryl acetate:**
- **Test Type:** Draize Test
- **Exposure routes:** Skin contact
- **Species:** Humans
- **Result:** negative

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

Components:

**N-Methyl-2-pyrrolidone:**
- **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
    - Method: OECD Test Guideline 476
    - Result: negative
    - Test Type: DNA damage and repair, unscheduled DNA synthesis in mammalian cells (in vitro)
    - Result: negative

- **Genotoxicity in vivo**
  - **Test Type:** Mammalian erythrocyte micronucleus test (in vivo cytogenetic assay)
    - Species: Mouse
    - Application Route: Ingestion
    - Method: OECD Test Guideline 474
    - Result: negative
    - Test Type: Mutagenicity (in vivo mammalian bone-marrow
### Ivermectin:

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

**Genotoxicity in vivo**
- **Test Type:** Mutagenicity (in vivo mammalian bone-marrow cytogenetic test, chromosomal analysis)
  - **Species:** Mouse
  - **Application Route:** Intraperitoneal injection
  - Result: negative

### Abamectin (combination of avermectin B1a and avermectin B1b):

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

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

### (dl)-a-Tocopheryl acetate:

**Genotoxicity in vitro**
- **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:** Ingestion
  - Result: negative

### Carcinogenicity
Not classified based on available information.
Components:

**N-Methyl-2-pyrrolidone:**

<table>
<thead>
<tr>
<th>Species</th>
<th>Rat</th>
</tr>
</thead>
<tbody>
<tr>
<td>Application Route</td>
<td>Ingestion</td>
</tr>
<tr>
<td>Exposure time</td>
<td>2 Years</td>
</tr>
<tr>
<td>Result</td>
<td>negative</td>
</tr>
</tbody>
</table>

Species : Rat
Application Route : inhalation (vapour)
Exposure time    : 2 Years
Result         : negative

**Ivermectin:**

<table>
<thead>
<tr>
<th>Species</th>
<th>Rat</th>
</tr>
</thead>
<tbody>
<tr>
<td>Application Route</td>
<td>Oral</td>
</tr>
<tr>
<td>NOAEL</td>
<td>1.5 mg/kg body weight</td>
</tr>
<tr>
<td>Result</td>
<td>negative</td>
</tr>
<tr>
<td>Remarks</td>
<td>Based on data from similar materials</td>
</tr>
</tbody>
</table>

Species : Mouse
Application Route : Oral
NOAEL    : 2.0 mg/kg body weight
Result   : negative
Remarks  : Based on data from similar materials

**Abamectin (combination of avermectin B1a and avermectin B1b):**

<table>
<thead>
<tr>
<th>Species</th>
<th>Rat</th>
</tr>
</thead>
<tbody>
<tr>
<td>Application Route</td>
<td>Oral</td>
</tr>
<tr>
<td>Exposure time</td>
<td>105 weeks</td>
</tr>
<tr>
<td>Result</td>
<td>negative</td>
</tr>
</tbody>
</table>

Species : Mouse
Application Route : Oral
Exposure time    : 93 weeks
Result         : negative

**(dl)-a-Tocopheryl acetate:**

<table>
<thead>
<tr>
<th>Species</th>
<th>Rat</th>
</tr>
</thead>
<tbody>
<tr>
<td>Application Route</td>
<td>Ingestion</td>
</tr>
<tr>
<td>Exposure time</td>
<td>104 weeks</td>
</tr>
<tr>
<td>Result</td>
<td>negative</td>
</tr>
</tbody>
</table>

**Reproductive toxicity**

May damage the unborn child.

Components:

**N-Methyl-2-pyrrolidone:**

- Test Type: Two-generation reproduction toxicity study
- Species: Rat
- Application Route: Ingestion
Effects on foetal development:

Method: OECD Test Guideline 416
Result: negative

Test Type: Embryo-foetal development
Species: Rat
Application Route: Ingestion
Method: OECD Test Guideline 414
Result: positive

Test Type: Fertility/early embryonic development
Species: Rat
Application Route: Inhalation (vapour)
Result: positive

Test Type: Embryo-foetal development
Species: Rabbit
Application Route: Ingestion
Result: positive

Reproductive toxicity - Assessment:

: Clear evidence of adverse effects on development, based on animal experiments.

Ivermectin:

Effects on fertility:

: Test Type: Fertility
Species: Rat
Application Route: Oral
Fertility: NOAEL: 0.6 mg/kg body weight
Result: Animal testing did not show any effects on fertility.

Effects on foetal development:

: Test Type: Development
Species: Mouse
Application Route: Oral
Developmental Toxicity: NOAEL: 0.2 mg/kg body weight
Result: Teratogenic effects, Embryotoxic effects and adverse effects on the offspring were detected only at high maternally toxic doses

Abamectin (combination of avermectin B1a and avermectin B1b):

Test Type: Development
Species: Rat
Application Route: Oral
Developmental Toxicity: LOAEL: 0.4 mg/kg body weight
Result: Embryotoxic effects and adverse effects on the offspring were detected.
Remarks: The mechanism or mode of action may not be relevant in humans.

Test Type: Development
Species: Rabbit
Application Route: Oral
Result: Teratogenic effects, embryotoxic effects and adverse effects on the offspring were detected only at high maternally toxic doses
Effects on fertility:
- Test Type: Fertility
  - Species: Rat, male
  - Application Route: Oral
  - Result: Effects on fertility

Test Type: Two-generation reproduction toxicity study
- Species: Rat
- Application Route: Oral
- Early Embryonic Development: NOAEL: 0.12 mg/kg body weight
- Result: Fetotoxicity

Effects on foetal development:
- Test Type: Embryo-foetal development
  - Species: Mouse
  - Application Route: Oral
- General Toxicity Maternal: NOAEL: 0.05 mg/kg body weight
- Developmental Toxicity: NOAEL: 0.2 mg/kg body weight
- Result: Cleft palate
- Remarks: Adverse developmental effects were observed

Test Type: Embryo-foetal development
- Species: Rabbit
  - Application Route: Oral
- Developmental Toxicity: LOAEL: 2 mg/kg body weight
- Result: Cleft palate, Teratogenic effects, Reduced embryonic survival
- Remarks: Adverse developmental effects were observed

Test Type: Development
- Species: Rat
  - Application Route: Oral
- Developmental Toxicity: LOAEL: 1.6 mg/kg body weight
- Result: Teratogenic effects

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.

(dl)-a-Tocopheryl acetate:

Effects on fertility:
- Test Type: Reproduction/Developmental toxicity screening test
  - Species: Rat
  - Application Route: Ingestion
  - Result: negative

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

STOT - single exposure
- May cause respiratory irritation.
- May cause damage to organs (Central nervous system) if swallowed.
Components:

**N-Methyl-2-pyrrolidone:**
- Assessment: May cause respiratory irritation.

**Ivermectin:**
- Target Organs: Central nervous system
- Assessment: Causes damage to organs through prolonged or repeated exposure.

**STOT - repeated exposure**
May cause damage to organs (Central nervous system) through prolonged or repeated exposure.

Components:

**Ivermectin:**
- Target Organs: Central nervous system
- Assessment: Causes damage to organs through prolonged or repeated exposure.

**Abamectin (combination of avermectin B1a and avermectin B1b):**
- Exposure routes: Ingestion
- Target Organs: Central nervous system
- Assessment: Causes damage to organs through prolonged or repeated exposure.

Repeated dose toxicity

Components:

**N-Methyl-2-pyrrolidone:**
- Species: Rat, male
- NOAEL: 169 mg/kg
- LOAEL: 433 mg/kg
- Application Route: Ingestion
- Exposure time: 90 Days
- Method: OECD Test Guideline 408

- Species: Rat
- NOAEL: 0.5 mg/l
- LOAEL: 1 mg/l
- Application Route: Inhalation (dust/mist/fume)
- Exposure time: 96 Days
- Method: OECD Test Guideline 413

- Species: Rabbit
- NOAEL: 826 mg/kg
- LOAEL: 1,653 mg/kg
- Application Route: Skin contact
- Exposure time: 20 Days

**Ivermectin:**
- Species: Dog
NOAEL: 0.5 mg/kg
LOAEL: 1 mg/kg
Application Route: Oral
Exposure time: 14 Weeks
Target Organs: Central nervous system
Symptoms: Dilatation of the pupil, Tremors, Lack of coordination, anorexia

Species: Monkey
NOAEL: 1.2 mg/kg
Application Route: Oral
Exposure time: 2 Weeks
Remarks: No significant adverse effects were reported

Species: Rat
NOAEL: 0.4 mg/kg
LOAEL: 0.8 mg/kg
Application Route: Oral
Exposure time: 3 Months
Target Organs: spleen, Bone marrow, Kidney

Species: Monkey
NOAEL: 1.0 mg/kg
Application Route: Oral
Exposure time: 14 Weeks
Target Organs: Central nervous system

Species: Rat
NOAEL: 500 mg/kg
Application Route: Ingestion

Abamectin (combination of avermectin B1a and avermectin B1b):
Species: Rat
NOAEL: 1.5 mg/kg
Application Route: Oral
Exposure time: 24 Months
Target Organs: Central nervous system
Symptoms: Tremors, ataxia

Species: Mouse
NOAEL: 4.0 mg/kg
Application Route: Oral
Exposure time: 24 Months
Target Organs: Central nervous system
Symptoms: Tremors, ataxia

Species: Dog
NOAEL: 0.25 mg/kg
LOAEL: 0.5 mg/kg
Application Route: Oral
Exposure time: 53 Weeks
Target Organs: Central nervous system
Symptoms: Tremors, weight loss
Remarks: mortality observed

Species: Monkey
NOAEL: 1.0 mg/kg
Application Route: Oral
Exposure time: 14 Weeks
Target Organs: Central nervous system

(dl)-a-Tocopheryl acetate:
Species: Rat
NOAEL: 500 mg/kg
Application Route: Ingestion
ASPIRATION TOXICITY
Not classified based on available information.

Experience with Human Exposure

Components:

N-Methyl-2-pyrrolidone:
Skin contact:
Symptoms: Skin irritation

Ivermectin:
Skin contact:
Remarks: Can be absorbed through skin.

Eye contact:
Remarks: May irritate eyes.

Ingestion:
Symptoms: Drowsiness, Dilatation of the pupil, Tremors, Vomiting, anorexia, Lack of coordination

Abamectin (combination of avermectin B1a and avermectin B1b):
Ingestion:
Symptoms: May cause, Tremors, Diarrhoea, central nervous system effects, Salivation, tearing

12. ECOLOGICAL INFORMATION

Ecotoxicity

Components:

N-Methyl-2-pyrrolidone:
Toxicity to fish:
LC50 (Oncorhynchus mykiss (rainbow trout)): > 500 mg/l
Exposure time: 96 h

Toxicity to daphnia and other aquatic invertebrates:
EC50 (Daphnia magna (Water flea)): > 1,000 mg/l
Exposure time: 24 h
Method: DIN 38412

Toxicity to algae/aquatic plants:
ErC50 (Desmodesmus subspicatus (green algae)): 600.5 mg/l
Exposure time: 72 h

EC10 (Desmodesmus subspicatus (green algae)): 92.6 mg/l
Exposure time: 72 h

Toxicity to daphnia and other aquatic invertebrates (Chronic toxicity):
NOEC (Daphnia magna (Water flea)): 12.5 mg/l
Exposure time: 21 d
Method: OECD Test Guideline 211

Toxicity to microorganisms:
EC50: > 600 mg/l
Exposure time: 30 min
Method: ISO 8192
Ivermectin:

**Toxicity to fish**
- LC50 (Oncorhynchus mykiss (rainbow trout)): 0.003 mg/l
  Exposure time: 96 h
- LC50 (Lepomis macrochirus (Bluegill sunfish)): 0.0048 mg/l
  Exposure time: 96 h

**Toxicity to daphnia and other aquatic invertebrates**
- EC50 (Daphnia magna (Water flea)): 0.000025 mg/l
  Exposure time: 48 h

**Toxicity to algae/aquatic plants**
- EC50 (Pseudokirchneriella subcapitata (green algae)): > 9.1 mg/l
  Exposure time: 72 h
  Method: OECD Test Guideline 201
- NOEC (Pseudokirchneriella subcapitata (green algae)): 9.1 mg/l
  Exposure time: 72 h
  Method: OECD Test Guideline 201

**M-Factor (Acute aquatic toxicity)**: 10,000

**M-Factor (Chronic aquatic toxicity)**: 10,000

Abamectin (combination of avermectin B1a and avermectin B1b):

**Toxicity to fish**
- LC50 (Oncorhynchus mykiss (rainbow trout)): 3.2 µg/l
  Exposure time: 96 h
- LC50 (Lepomis macrochirus (Bluegill sunfish)): 9.6 µg/l
  Exposure time: 96 h
- LC50 (Ictalurus punctatus (channel catfish)): 24 µg/l
  Exposure time: 96 h
- LC50 (Cyprinus carpio (Carp)): 42 µg/l
  Exposure time: 96 h
- LC50 (Cyprinodon variegatus (sheepshead minnow)): 15 µg/l
  Exposure time: 96 h

**Toxicity to daphnia and other aquatic invertebrates**
- EC50 (Americamysis): 0.022 µg/l
  Exposure time: 96 h
- EC50 (Daphnia magna (Water flea)): 0.34 µg/l
  Exposure time: 48 h

**Toxicity to algae/aquatic plants**
- EC50 (Pseudokirchneriella subcapitata (green algae)): 100 mg/l
  Exposure time: 72 h

**M-Factor (Acute aquatic toxicity)**: 10,000

**Toxicity to fish (Chronic toxicity)**
- NOEC (Pimephales promelas (fathead minnow)): 0.52 µg/l
  Exposure time: 32 d
Toxicity to daphnia and other aquatic invertebrates (Chronic toxicity):

- NOEC (Daphnia magna (Water flea)): 0.03 µg/l
  Exposure time: 21 d
- NOEC (Mysidopsis bahia (opossum shrimp)): 0.0035 µg/l
  Exposure time: 28 d

M-Factor (Chronic aquatic toxicity):

- 10,000

Toxicity to microorganisms:

- EC50: > 1,000 mg/l
  Exposure time: 3 h
  Test Type: Respiration inhibition

(dl)-a-Tocopheryl acetate:

Toxicity to fish:

- LC50 (Oncorhynchus mykiss (rainbow trout)): > 100 mg/l
  Exposure time: 96 h
  Method: OECD Test Guideline 203

Toxicity to daphnia and other aquatic invertebrates:

- EC50 (Daphnia magna (Water flea)): > 100 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

- NOEC (Pseudokirchneriella subcapitata (green algae)): >= 100 mg/l
  Exposure time: 72 h
  Method: OECD Test Guideline 201

Toxicity to fish (Chronic toxicity):

- NOEC (Oncorhynchus mykiss (rainbow trout)): 100 mg/l
  Exposure time: 28 d

Toxicity to microorganisms:

- EC50: > 927 mg/l
  Exposure time: 30 min
  Method: ISO 8192

Persistence and degradability:

Components:

N-Methyl-2-pyrrolidone:

Biodegradability: Result: Readily biodegradable.
  Biodegradation: 73%
  Exposure time: 28 d
  Method: OECD Test Guideline 301C

Ivermectin:

Biodegradability: Result: Not readily biodegradable.
  Biodegradation: 50%
  Exposure time: 240 d
Abamectin (combination of avermectin B1a and avermectin B1b):
Stability in water: Hydrolysis: 50% (< 12 h)

(dl)-α-Tocopheryl acetate:

Bioaccumulative potential

Components:

N-Methyl-2-pyrrolidone:
Partition coefficient: n-octanol/water: log Pow: -0.46 Method: OECD Test Guideline 107

Ivermectin:
Bioaccumulation: Bioconcentration factor (BCF): 74 Partition coefficient: n-octanol/water: log Pow: 3.22

Abamectin (combination of avermectin B1a and avermectin B1b):
Bioaccumulation: Bioconcentration factor (BCF): 52 Partition coefficient: n-octanol/water: log Pow: 4

Mobility in soil

Components:

Abamectin (combination of avermectin B1a and avermectin B1b):
Distribution among environmental compartments: log Koc: > 3.6

Hazardous to the ozone layer
Not applicable

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.
(Abamectin (combination of avermectin B1a and avermectin B1b), Ivermectin)
Class : 9
Packing group : III
Labels : 9

IATA-DGR
UN/ID No. : UN 3082
Proper shipping name : Environmentally hazardous substance, liquid, n.o.s.
(Abamectin (combination of avermectin B1a and avermectin B1b), Ivermectin)
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.
(Abamectin (combination of avermectin B1a and avermectin B1b), Ivermectin)
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
Refer to section 15 for specific national regulation.

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

Related Regulations

Fire Service Law
Group 4, Type 3 petroleum, Water insoluble liquid, (2000 litre), Hazardous rank III

Chemical Substance Control Law

Chemical name: N-Methyl-2-pyrrolidone
Number: 136

Industrial Safety and Health Law

Harmful Substances Prohibited from Manufacture
Not applicable

Harmful Substances Required Permission for Manufacture
Not applicable

Substances Prevented From Impairment of Health
Not applicable

Circular concerning Information on Chemicals having Mutagenicity - Annex 2: Information on Existing Chemicals having Mutagenicity
Not applicable

Circular concerning Information on Chemicals having Mutagenicity - Annex 1: Information on Notified Substances having Mutagenicity
Not applicable

Substances Subject to be Notified Names
Article 57-2 (Enforcement Order Table 9)

<table>
<thead>
<tr>
<th>Chemical name</th>
<th>Number</th>
<th>Concentration (%)</th>
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<tr>
<td>N-Methyl-2-pyrrolidone</td>
<td>588</td>
<td>&gt;=20 - &lt;30</td>
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Substances Subject to be Indicated Names
Article 57 (Enforcement Order Article 18)

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<th>Chemical name</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>N-Methyl-2-pyrrolidone</td>
<td>588</td>
</tr>
</tbody>
</table>

Ordinance on Prevention of Hazards Due to Specified Chemical Substances
Not applicable

Ordinance on Prevention of Lead Poisoning
Not applicable

Ordinance on Prevention of Tetraalkyl Lead Poisoning
Not applicable

Ordinance on Prevention of Organic Solvent Poisoning
Not applicable

Enforcement Order of the Industrial Safety and Health Law - Attached table 1 (Dangerous Substances)
Not applicable
Poisonous and Deleterious Substances Control Law
Not applicable

Act on Confirmation, etc. of Release Amounts of Specific Chemical Substances in the Environment and Promotion of Improvements to the Management Thereof
Not applicable

High Pressure Gas Safety Act
Not applicable

Explosive Control Law
Not applicable

Vessel Safety Law
Miscellaneous dangerous substances and articles (Article 2 and 3 of rules on shipping and storage of dangerous goods and its Attached Table 1)

Aviation Law
Miscellaneous dangerous substances and articles (Article 194 of The Enforcement Rules of Aviation Law and its Attached Table 1)

Marine Pollution and Sea Disaster Prevention etc Law
Bulk transportation : Noxious liquid substance (Category Y)
Pack transportation : Classified as marine pollutant

Narcotics and Psychotropics Control Act
Narcotic or Psychotropic Raw Material (Export / Import Permission)
Not applicable

Specific Narcotic or Psychotropic Raw Material (Export / Import permission)
Not applicable

Waste Disposal and Public Cleansing Law
Industrial waste

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

16. OTHER INFORMATION

Further information
Sources of key data used to compile the Safety Data Sheet
Items where changes have been made to the previous version are highlighted in the body of this document by two vertical lines.

Date format : yyyy/mm/dd
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.