1. PRODUCT AND COMPANY IDENTIFICATION

Chemical product name : Fluazuron / Citronellal 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

Flammable liquids : Category 3
Skin corrosion/irritation : Category 2
Serious eye damage/eye irritation : Category 2A
Skin sensitisation : Category 1
Reproductive toxicity : Category 1B
Specific target organ toxicity - single exposure : Category 3
Short-term (acute) aquatic hazard : Category 1
Long-term (chronic) aquatic hazard : Category 1

GHS label elements

Hazard pictograms :

Signal word : Danger
Hazard statements : H226 Flammable liquid and vapour.
H315 Causes skin irritation.
H317 May cause an allergic skin reaction.
H319 Causes serious eye irritation.
H335 May cause respiratory irritation.
H360D May damage the unborn child.
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.
P210 Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
P233 Keep container tightly closed.
P241 Use explosion-proof electrical/ ventilating/ lighting equipment.
P242 Use non-sparking tools.
P243 Take action to prevent static discharges.
P261 Avoid breathing mist or vapours.
P264 Wash skin thoroughly after handling.
P271 Use only outdoors or in a well-ventilated area.
P272 Contaminated work clothing should not be allowed out of the workplace.
P273 Avoid release to the environment.
P280 Wear protective gloves/ protective clothing/ eye protection/ face protection.

Response:
P303 + P361 + P353 IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with 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 + P313 IF exposed or concerned: Get medical advice/ attention.
P333 + P313 IF skin irritation or rash 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:
P403 + P235 Store in a well-ventilated place. Keep cool.
P405 Store locked up.

Disposal:
P501 Dispose of contents/ container to an approved waste disposal plant.
Other hazards which do not result in classification

Important symptoms and outlines of the emergency assumed:

Vapours may form explosive mixture with air.

3. COMPOSITION/INFORMATION ON INGREDIENTS

<table>
<thead>
<tr>
<th>Substance / Mixture</th>
<th>Components</th>
</tr>
</thead>
<tbody>
<tr>
<td>N-Methyl-2-pyrrolidone</td>
<td>872-50-4&lt;br&gt;Concentration (% w/w): &gt;= 40 - &lt; 50&lt;br&gt;ENCS No.: 5-113</td>
</tr>
<tr>
<td>Propan-2-ol</td>
<td>67-63-0&lt;br&gt;Concentration (% w/w): &gt;= 1 - &lt; 10&lt;br&gt;ENCS No.: 2-207</td>
</tr>
<tr>
<td>Butanone</td>
<td>78-93-3&lt;br&gt;Concentration (% w/w): &gt;= 1 - &lt; 10&lt;br&gt;ENCS No.: 2-542</td>
</tr>
<tr>
<td>6-Octenal, 3,7-dimethyl-</td>
<td>106-23-0&lt;br&gt;Concentration (% w/w): &gt;= 2.5 - &lt; 10&lt;br&gt;ENCS No.: 2-514</td>
</tr>
<tr>
<td>Fluazuron</td>
<td>86811-58-7&lt;br&gt;Concentration (% w/w): &gt;= 2.5 - &lt; 10&lt;br&gt;ENCS No.: 3-540, 9-1805</td>
</tr>
<tr>
<td>2,6-Di-tert-buty1-p-cresol</td>
<td>128-37-0&lt;br&gt;Concentration (% w/w): &gt;= 0.25 - &lt; 1&lt;br&gt;ENCS No.: 3-540, 9-1805</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. 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.

Most important symptoms and effects, both acute and delayed: Causes skin irritation. May cause an allergic skin reaction. Causes serious eye irritation. May cause respiratory irritation. May damage the unborn child.

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).
5. FIREFIGHTING MEASURES

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

Unsuitable extinguishing media: 
- High volume water jet

Specific hazards during firefighting: 
- Do not use a solid water stream as it may scatter and spread fire.
- Flash back possible over considerable distance.
- Vapours may form explosive mixtures with air.
- Exposure to combustion products may be a hazard to health.

Hazardous combustion products: 
- Carbon oxides
- Nitrogen oxides (NOx)
- Chlorine compounds
- Fluorine compounds

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: 
- Remove all sources of ignition.
- 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: 
- Non-sparking tools should be used.
- Soak up with inert absorbent material.
- Suppress (knock down) gases/vapours/mists with a water spray jet.
- 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 dis-
posal 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. Use explosion-proof electrical, ventilating and lighting equipment.

Advice on safe handling: Do not get on skin or clothing. Avoid breathing 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. Non-sparking tools should be used. Keep container tightly closed. Already sensitised individuals should consult their physician regarding working with respiratory irritants or sensitisers. Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking. Take precautionary measures against static discharges. Take care to prevent spills, waste and minimize release to the environment.

Avoidance of contact

Hygiene measures: Oxidizing agents

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. Contaminated work clothing should not be allowed out of the workplace. 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


Materials to avoid: Do not store with the following product types:
SAFETY DATA SHEET

Fluazuron / Citronellal Formula

Version 3.1 Revision Date: 2021/08/27 SDS Number: 4624626-00006 Date of last issue: 2021/04/09 Date of first issue: 2019/07/09

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 / Reference concentration / 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 4 mg/m³</td>
<td>JP OEL JSOH</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Further information: Skin absorption</td>
<td></td>
</tr>
<tr>
<td>Propan-2-ol</td>
<td>67-63-0</td>
<td>ACL</td>
<td>200 ppm</td>
<td>JP OEL ISHL</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>OEL-C 400 ppm 980 mg/m³</td>
<td>JP OEL JSOH</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>TWA 200 ppm</td>
<td>ACGIH</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>STEL 400 ppm</td>
<td>ACGIH</td>
</tr>
<tr>
<td>Butanone</td>
<td>78-93-3</td>
<td>ACL</td>
<td>200 ppm</td>
<td>JP OEL ISHL</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>OEL-M 200 ppm 590 mg/m³</td>
<td>JP OEL JSOH</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>TWA 200 ppm</td>
<td>ACGIH</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>STEL 300 ppm</td>
<td>ACGIH</td>
</tr>
<tr>
<td>Fluazuron</td>
<td>86811-58-7</td>
<td>TWA</td>
<td>60 µg/m³ (OEB 3) Internal</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Wipe limit 600 µg/ 100cm²</td>
<td>JSOH</td>
</tr>
<tr>
<td>2,6-Di-tert-butyl-p-cresol</td>
<td>128-37-0</td>
<td>TWA (Inhalable fraction and vapor)</td>
<td>2 mg/m³</td>
<td>ACGIH</td>
</tr>
</tbody>
</table>

Biological occupational exposure limits

<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>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Propan-2-ol</td>
<td>67-63-0</td>
<td>Acetone</td>
<td>Urine</td>
<td>End of shift at end of work-week</td>
<td>40 mg/l</td>
<td>ACGIH BEI</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Butanone</td>
<td>78-93-3</td>
<td>Methylethylketone</td>
<td>Urine</td>
<td>End of shift or A few</td>
<td>5 mg/l</td>
<td>JSOH</td>
</tr>
</tbody>
</table>
## Engineering measures

Use appropriate engineering controls and manufacturing technologies to control airborne concentrations (e.g., dripless quick connections).

- All engineering controls should be implemented by facility design and operated in accordance with GMP principles to protect products, workers, and the environment.
- 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.
- Use explosion-proof electrical, ventilating and lighting equipment.

## 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**: Organic vapour type

### Hand protection

- **Material**: Chemical-resistant gloves
- **Remarks**: Consider double gloving. Take note that the product is flammable, which may impact the selection of hand protection.

### 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

- **Aqueous solution**

### Colour

- **Yellow**
<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Odour</td>
<td>No data available</td>
</tr>
<tr>
<td>Odour Threshold</td>
<td>No data available</td>
</tr>
<tr>
<td>Melting point/freezing point</td>
<td>-4 °C</td>
</tr>
<tr>
<td>Boiling point, initial boiling point and boiling range</td>
<td>78 °C</td>
</tr>
<tr>
<td>Flammability (solid, gas)</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Flammability (liquids)</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Lower explosion limit and upper explosion limit / flammability limit</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>Flash point</td>
<td>52 °C</td>
</tr>
<tr>
<td>Decomposition temperature</td>
<td>No data available</td>
</tr>
<tr>
<td>pH</td>
<td>No data available</td>
</tr>
<tr>
<td>Evaporation rate</td>
<td>No data available</td>
</tr>
<tr>
<td>Auto-ignition temperature</td>
<td>No data available</td>
</tr>
<tr>
<td>Viscosity</td>
<td>5.3 - 5.7 mm²/s (25 °C)</td>
</tr>
<tr>
<td>Solubility(ies)</td>
<td>practically insoluble</td>
</tr>
<tr>
<td>Water solubility</td>
<td>practically insoluble</td>
</tr>
<tr>
<td>Solubility in other solvents</td>
<td>soluble</td>
</tr>
<tr>
<td>Solvent: Ethanol</td>
<td></td>
</tr>
<tr>
<td>Partition coefficient: n-octanol/water</td>
<td>log Pow: -0.54</td>
</tr>
<tr>
<td>Vapour pressure</td>
<td>No data available</td>
</tr>
<tr>
<td>Density and / or relative density</td>
<td>0.94 - 0.96</td>
</tr>
<tr>
<td>Relative density</td>
<td>0.94 - 0.96</td>
</tr>
<tr>
<td>Density</td>
<td>No data available</td>
</tr>
<tr>
<td>Relative vapour density</td>
<td>No data available</td>
</tr>
<tr>
<td>Explosive properties</td>
<td>Not explosive</td>
</tr>
</tbody>
</table>
10. STABILITY AND REACTIVITY

Reactivity : Not classified as a reactivity hazard.
Chemical stability : Stable under normal conditions.
Possibility of hazardous reactions : Flammable liquid and vapour. Vapours may form explosive mixture with air. Can react with strong oxidizing agents.

Conditions to avoid : Heat, flames and sparks.
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
Not classified based on available information.

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

Propan-2-ol:
Acute oral toxicity : LD50 (Rat): > 5,000 mg/kg
Acute inhalation toxicity : LC50 (Rat): > 25 mg/l
: Exposure time: 6 h
: Test atmosphere: vapour
Acute dermal toxicity : LD50 (Rabbit): > 5,000 mg/kg

Butanone:
<table>
<thead>
<tr>
<th>Substance</th>
<th>Acute oral toxicity</th>
<th>Acute inhalation toxicity</th>
<th>Acute dermal toxicity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fluazuron</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>LD50 (Rat): &gt; 5,000 mg/kg</td>
<td>LC50 (Rat): &gt; 6.0 mg/l</td>
<td>LD50 (Rat): &gt; 2,000 mg/kg</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Exposure time: 4 h</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Test atmosphere: dust/mist</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Method: OECD Test Guideline 401</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Method: OECD Test Guideline 402</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Remarks: Based on data from similar materials</td>
<td></td>
</tr>
<tr>
<td>6-Octenal, 3,7-dimethyl-:</td>
<td>LD50 (Rat): 2,423 mg/kg</td>
<td></td>
<td>LD50 (Rabbit): &gt; 2,500 - &lt; 5,000 mg/kg</td>
</tr>
<tr>
<td>Fluazuron:</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
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<td></td>
</tr>
<tr>
<td>Butanone:</td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

**Skin corrosion/irritation**

Causes skin irritation.

**Components:**

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

Result: Skin irritation

**Propan-2-ol:**

Species: Rabbit

Result: No skin irritation

**Assessment:** Repeated exposure may cause skin dryness or cracking.
SAFETY DATA SHEET

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Species: Rabbit
Method: OECD Test Guideline 404
Result: No skin irritation
Remarks: Based on data from similar materials

6-Octenal, 3,7-dimethyl-:
Species: Rabbit
Result: Skin irritation

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

2,6-Di-tert-butyl-p-cresol:
Species: Rabbit
Method: OECD Test Guideline 404
Result: No skin irritation
Remarks: Based on data from similar materials

Serious eye damage/eye irritation
Causes serious eye irritation.

Components:

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

Propan-2-ol:
Species: Rabbit
Result: Irritation to eyes, reversing within 21 days

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

6-Octenal, 3,7-dimethyl-:
Species: Rabbit
Result: Irritation to eyes, reversing within 21 days

Fluazuron:
Species: Rabbit
Result: Mild eye irritation
Method: OECD Test Guideline 405
2,6-Di-tert-butyl-p-cresol:
Species: Rabbit
Result: No eye irritation
Method: OECD Test Guideline 405
Remarks: Based on data from similar materials

Respiratory or skin sensitisation

Skin sensitisation
May cause an allergic skin reaction.

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 409
Result: negative
Remarks: Based on data from similar materials

Propan-2-ol:
Test Type: Buehler Test
Exposure routes: Skin contact
Species: Guinea pig
Method: OECD Test Guideline 406
Result: negative

Butanone:
Test Type: Buehler Test
Exposure routes: Skin contact
Species: Guinea pig
Method: OECD Test Guideline 406
Result: negative

6-Octenal, 3,7-dimethyl-:
Test Type: Maximisation Test
Exposure routes: Skin contact
Species: Guinea pig
Result: positive
Assessment: Probability or evidence of skin sensitisation in humans

Fluazuron:
Exposure routes: Skin contact
Species: Guinea pig
Result: negative
2,6-Di-tert-butyl-p-cresol:
- Test Type: Human repeat insult patch test (HRIPT)
- 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 cytogenetic test, chromosomal analysis)
  - Species: Hamster
  - Application Route: Ingestion
  - Method: OECD Test Guideline 475
  - Result: negative

Propan-2-ol:
- Genotoxicity in vitro:
  - Test Type: Bacterial reverse mutation assay (AMES)
  - Result: negative
  - Test Type: In vitro mammalian cell gene mutation test
  - Result: negative

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

Butanone:
- Genotoxicity in vitro:
  - Test Type: Bacterial reverse mutation assay (AMES)
Fluazuron / Citronellal Formulation

Result: negative

Test Type: In vitro mammalian cell gene mutation test
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

Test Type: Saccharomyces cerevisiae, gene mutation assay (in vitro)
Result: negative

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

6-Octenal, 3,7-dimethyl-:
Genotoxicity in vitro: Test Type: In vitro mammalian cell gene mutation test
Method: OECD Test Guideline 476
Result: negative

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

Test Type: DNA Repair
Result: negative

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

Genotoxicity in vivo: Test Type: Cytogenetic assay
Species: Hamster
Result: equivocal

2,6-Di-tert-butyl-p-cresol:
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: Mutagenicity (in vivo mammalian bone-marrow cytogenetic test, chromosomal analysis)
Species: Rat
Application Route: Ingestion
Result: negative

Carcinogenicity
Not classified based on available information.

Components:

N-Methyl-2-pyrrolidone:
Species: Rat
Application Route: Ingestion
Exposure time: 2 Years
Result: negative

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

Propan-2-ol:
Species: Rat
Application Route: inhalation (vapour)
Exposure time: 104 weeks
Method: OECD Test Guideline 451
Result: negative

6-Octenal, 3,7-dimethyl-:
Species: Rat
Application Route: Ingestion
Exposure time: 104 - 105 weeks
Result: negative
Remarks: Based on data from similar materials

Fluazuron:
Species: Rat
Application Route: Ingestion
Exposure time: 2 Years
Method: OECD Test Guideline 453
Result: negative

Species: Mouse
Application Route: Ingestion
Exposure time: 2 Years
Result: negative

2,6-Di-tert-butyl-p-cresol:
Species: Rat
Application Route: Ingestion
Exposure time: 22 Months
Result: negative
Reproductive toxicity
May damage the unborn child.

Components:

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

- **Effects on fertility**
  - Test Type: Two-generation reproduction toxicity study
  - Species: Rat
  - Application Route: Ingestion
  - Method: OECD Test Guideline 416
  - Result: negative

- **Effects on foetal development**
  - 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

**Propan-2-ol:**

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

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

**Butanone:**

- **Effects on fertility**
  - Test Type: Two-generation reproduction toxicity study
  - Species: Rat
  - Application Route: Ingestion
  - Result: negative
  - Remarks: Based on data from similar materials

- **Effects on foetal development**
  - Test Type: Embryo-foetal development
  - Species: Rat
  - Application Route: Inhalation
  - Method: OECD Test Guideline 414
  - Result: negative
6-Octenal, 3,7-dimethyl-:

Effects on fertility:  
- Test Type: Reproduction/Developmental toxicity screening test  
  - Species: Rat  
  - Application Route: Ingestion  
  - Method: OECD Test Guideline 421  
  - Result: negative  
  - Remarks: Based on data from similar materials

Effects on foetal development:  
- Test Type: Embryo-foetal development  
  - Species: Rat  
  - Application Route: Inhalation  
  - Result: negative  
  - Remarks: Based on data from similar materials

Fluazuron:

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

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

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

2,6-Di-tert-butyl-p-cresol:

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

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

STOT - single exposure
May cause respiratory irritation.

Components:

N-Methyl-2-pyrrolidone:

Assessment:  
- May cause respiratory irritation.
SAFETY DATA SHEET

Fluazuron / Citronellal Formulation

<table>
<thead>
<tr>
<th>Version</th>
<th>Revision Date</th>
<th>SDS Number</th>
<th>Date of last issue</th>
<th>Date of first issue</th>
</tr>
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<tr>
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<td>4624626-00006</td>
<td>2021/04/09</td>
<td>2019/07/09</td>
</tr>
</tbody>
</table>

Propan-2-ol:
Assessment : May cause drowsiness or dizziness.

Butanone:
Assessment : May cause drowsiness or dizziness.

STOT - repeated exposure
Not classified based on available information.

Components:

2,6-Di-tert-butyl-p-cresol:
Assessment : No significant health effects observed in animals at concentrations of 100 mg/kg bw or less.

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

Propan-2-ol:
Species : Rat
NOAEL : 12.5 mg/l
Application Route : Inhalation (vapour)
Exposure time : 104 Weeks

Butanone:
Species : Rat
NOAEL : 14.84 mg/l
Application Route : Inhalation (vapour)
Exposure time : 90 Days
Method : OECD Test Guideline 413
### 6-Octenal, 3,7-dimethyl-:

**Species**: Rat  
**NOAEL**: 100 mg/kg  
**LOAEL**: 210 mg/kg  
**Application Route**: Ingestion  
**Exposure time**: 104 - 105 Weeks  
**Remarks**: Based on data from similar materials

**Species**: Rat  
**NOAEL**: 215 mg/m³  
**LOAEL**: 430 mg/m³  
**Application Route**: Inhalation  
**Exposure time**: 13 Weeks  
**Remarks**: Based on data from similar materials

### Fluazuron:

**Species**: Rat  
**LOAEL**: 240 mg/kg  
**Application Route**: Ingestion  
**Exposure time**: 13 Weeks  
**Target Organs**: Liver, Thyroid, Pituitary gland

**Species**: Rat  
**NOAEL**: 10 mg/kg  
**LOAEL**: 100 mg/kg  
**Application Route**: Skin contact  
**Exposure time**: 3 Weeks

**Species**: Dog  
**NOAEL**: 7.5 mg/kg  
**LOAEL**: 110 mg/kg  
**Application Route**: Ingestion  
**Exposure time**: 52 Weeks  
**Target Organs**: Liver

### 2,6-Di-tert-butyl-p-cresol:

**Species**: Rat  
**NOAEL**: 25 mg/kg  
**Application Route**: Ingestion  
**Exposure time**: 22 Months

### Aspiration toxicity

Not classified based on available information.

### Components:

**Butanone**:  
The substance or mixture causes concern owing to the assumption that it causes a human aspiration toxicity hazard.
Experience with human exposure

**Components:**

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

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

**Propan-2-ol:**
- **Toxicity to fish:** LC50 (Pimephales promelas (fathead minnow)): 9,640 mg/l
  Exposure time: 96 h
- **Toxicity to daphnia and other aquatic invertebrates:** EC50 (Daphnia magna (Water flea)): > 10,000 mg/l
  Exposure time: 24 h
- **Toxicity to microorganisms:** EC50 (Pseudomonas putida): > 1,050 mg/l
  Exposure time: 16 h

**Butanone:**
- **Toxicity to fish:** LC50 (Pimephales promelas (fathead minnow)): 2,993 mg/l
  Exposure time: 96 h
  Method: OECD Test Guideline 203
- **Toxicity to daphnia and other aquatic invertebrates:** EC50 (Daphnia magna (Water flea)): 308 mg/l
  Exposure time: 48 h
  Method: OECD Test Guideline 202
Toxicity to algae/aquatic plants:

- **ErC50** (Pseudokirchneriella subcapitata (green algae)): 2,029 mg/l
  - Exposure time: 96 h
  - Method: OECD Test Guideline 201
- **NOEC** (Pseudokirchneriella subcapitata (green algae)): 1,240 mg/l
  - Exposure time: 96 h
  - Method: OECD Test Guideline 201

6-Octenal, 3,7-dimethyl-:

- **Toxicity to fish**:
  - **LC50** (Leuciscus idus (Golden orfe)): 22 mg/l
    - Exposure time: 96 h
    - Method: DIN 38412
- **Toxicity to daphnia and other aquatic invertebrates**:
  - **EC50** (Daphnia magna (Water flea)): 8.7 mg/l
    - Exposure time: 48 h
- **Toxicity to algae/aquatic plants**:
  - **EC50** (Desmodesmus subspicatus (green algae)): 6.74 mg/l
    - Exposure time: 72 h

**Fluazuron**:

- **Toxicity to fish**:
  - **LC50** (Cyprinus carpio (Carp)): > 9.1 mg/l
    - Exposure time: 96 h
- **Toxicity to daphnia and other aquatic invertebrates**:
  - **EC50** (Daphnia sp. (water flea)): 0.0006 mg/l
    - Exposure time: 48 h
- **Toxicity to algae/aquatic plants**:
  - **NOEC** (Raphidocelis subcapitata (freshwater green alga)):
    - 27.9 mg/l
    - Exposure time: 72 h
- **M-Factor (Acute aquatic toxicity)**: 1,000
- **M-Factor (Chronic aquatic toxicity)**: 1,000

**2,6-Di-tert-butyl-p-cresol**:

- **Toxicity to fish**:
  - **LC50** (Danio rerio (zebra fish)): > 0.57 mg/l
    - Exposure time: 96 h
- **Toxicity to daphnia and other aquatic invertebrates**:
  - **EC50** (Daphnia magna (Water flea)): 0.48 mg/l
    - Exposure time: 48 h
    - Method: OECD Test Guideline 202
- **Toxicity to algae/aquatic plants**:
  - **ErC50** (Pseudokirchneriella subcapitata (green algae)): > 0.24 mg/l
    - Exposure time: 72 h
    - Method: OECD Test Guideline 201
  - **NOEC** (Pseudokirchneriella subcapitata (green algae)): 0.24 mg/l
Exposure time: 72 h  
Method: OECD Test Guideline 201

M-Factor (Acute aquatic toxicity): 1
Toxicity to fish (Chronic toxicity): NOEC (Oryzias latipes (Japanese medaka)): 0.053 mg/l  
Exposure time: 30 d  
Method: OECD Test Guideline 210

Toxicity to daphnia and other aquatic invertebrates (Chronic toxicity): NOEC (Daphnia magna (Water flea)): 0.316 mg/l  
Exposure time: 21 d

M-Factor (Chronic aquatic toxicity): 1
Toxicity to microorganisms: EC50: > 10,000 mg/l  
Exposure time: 3 h  
Method: OECD Test Guideline 209

Persistence and degradability

Components:

N-Methyl-2-pyrrolidone:
Biodegradability: Result: Readily biodegradable.  
Biodegradation: 73 %  
Exposure time: 28 d  
Method: OECD Test Guideline 301C

Propan-2-ol:
Biodegradability: Result: rapidly degradable
BOD/COD: BOD: 1.19 (BOD5:COD): 2.23BOD/COD: 53 %

Butanone:
Biodegradability: Result: Readily biodegradable.  
Biodegradation: 98 %  
Exposure time: 28 d  
Method: OECD Test Guideline 301D

6-Octenal, 3,7-dimethyl-:
Biodegradability: Result: Readily biodegradable.  
Biodegradation: 83 %  
Exposure time: 28 d  
Method: OECD Test Guideline 301B

2,6-Di-tert-butyl-p-cresol:
Biodegradability: Result: Not readily biodegradable.  
Biodegradation: 4.5 %  
Exposure time: 28 d  
Method: OECD Test Guideline 301C
Bioaccumulative potential

Components:

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

Propan-2-ol:
Partition coefficient: n-octanol/water : log Pow: 0.05

Butanone:
Partition coefficient: n-octanol/water : log Pow: 0.3

6-Octenal, 3,7-dimethyl-:
Partition coefficient: n-octanol/water : log Pow: 3.62

Fluazuron:
Partition coefficient: n-octanol/water : log Pow: 5.1

2,6-Di-tert-butyl-p-cresol:
Bioaccumulation : Species: Cyprinus carpio (Carp)
Bioconcentration factor (BCF): 330 - 1,800
Partition coefficient: n-octanol/water : log Pow: 5.1

Mobility in soil
No data available

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. Empty containers retain residue and can be dangerous. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose such containers to heat, flame, sparks, or other sources of ignition. They may explode and cause injury and/or death. If not otherwise specified: Dispose of as unused product.

14. TRANSPORT INFORMATION

International Regulations
SAFETY DATA SHEET
Fluazuron / Citronellal Formulation

UNRTDG
UN number : UN 1993
Proper shipping name : FLAMMABLE LIQUID, N.O.S.
(Propan-2-ol, Butanone)
Class : 3
Packing group : III
Labels : 3

IATA-DGR
UN/ID No. : UN 1993
Proper shipping name : Flammable liquid, n.o.s.
(Propan-2-ol, Butanone)
Class : 3
Packing group : III
Labels : Flammable Liquids
Packing instruction (cargo aircraft) : 366
Packing instruction (passenger aircraft) : 355

IMDG-Code
UN number : UN 1993
Proper shipping name : FLAMMABLE LIQUID, N.O.S.
(Propan-2-ol, Butanone, Fluazuron, 2,6-Di-tert-butyl-p-cresol)
Class : 3
Packing group : III
Labels : 3
EmS Code : F-E, S-E
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 2 petroleum, Water insoluble liquid, (1000 litre), Hazardous rank III

Chemical Substance Control Law
Priority Assessment Chemical Substance

<table>
<thead>
<tr>
<th>Chemical name</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>N-Methyl-2-pyrrolidone</td>
<td>136</td>
</tr>
<tr>
<td>Isopropyl alcohol</td>
<td>102</td>
</tr>
<tr>
<td>Methyl ethyl ketone</td>
<td>115</td>
</tr>
<tr>
<td>2,6-Di-tert-butyl-4-methylphenol</td>
<td>64</td>
</tr>
</tbody>
</table>
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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<tbody>
<tr>
<td>1-Methyl-2-pyrrolidone</td>
<td>588 2</td>
<td>&gt;=40 - &lt;50</td>
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<tr>
<td>Propyl alcohol</td>
<td>494</td>
<td>&gt;=1 - &lt;10</td>
</tr>
<tr>
<td>Methyl ethyl ketone</td>
<td>570</td>
<td>&gt;=1 - &lt;10</td>
</tr>
<tr>
<td>2,6-Di-tert-butyl-4-cresol</td>
<td>262</td>
<td>&gt;=0.1 - &lt;1</td>
</tr>
</tbody>
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Substances Subject to be Indicated Names
Article 57 (Enforcement Order Article 18)

<table>
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<tr>
<td>1-Methyl-2-pyrrolidone</td>
<td>588 2</td>
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<tr>
<td>Propyl alcohol</td>
<td>494</td>
</tr>
<tr>
<td>methyl ethyl ketone</td>
<td>570</td>
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</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
Organic Solvents Class 2

Enforcement Order of the Industrial Safety and Health Law - Attached table 1 (Dangerous Substances)
Inflammable Substance

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
SAFETY DATA SHEET

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Version: 3.1
Revision Date: 2021/08/27
SDS Number: 4624626-00006
Date of last issue: 2021/04/09
Date of first issue: 2019/07/09

High Pressure Gas Safety Act
Not applicable

Explosive Control Law
Not applicable

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

Aviation Law
Flammable liquid (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
Specially Controlled 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
Date format: yyyy/mm/dd

Full text of other abbreviations
ACGIH: USA. ACGIH Threshold Limit Values (TLV)
ACGIH BEI: ACGIH - Biological Exposure Indices (BEI)
JP OEL ISHL: Japan. Administrative Control Levels
JSOH: Occupational exposure limits based on biological monitoring (JSOH).
ACGIH / TWA: 8-hour, time-weighted average
ACGIH / STEL: Short-term exposure limit
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.

JP / EN