1 Identification

· Product identifier
  · Trade name: Amantadine (hydrochloride)
  · Article number: 21364
  · CAS Number: 665-66-7
  · EC number: 211-560-2

· Application of the substance / the mixture
  This product is for research use - Not for human or veterinary diagnostic or therapeutic use. It is the responsibility of the purchaser to determine suitability for other applications.

· Details of the supplier of the safety data sheet
  · Manufacturer/Supplier: Cayman Chemical Co.
    1180 E. Ellsworth Rd.
    Ann Arbor, MI 48108
    USA
  · Information department: Product safety department
  · Emergency telephone number:
    During normal opening times: +1 (734) 971-3335
    US/CANADA: 800-424-9300
    Outside US/CANADA: 703-741-5970

2 Hazard(s) identification

· Classification of the substance or mixture
  GHS08 Health hazard
  Repr. 2 H361 Suspected of damaging fertility or the unborn child.
  GHS05 Corrosion
  Skin Corr. 1A H314 Causes severe skin burns and eye damage.
  Eye Dam. 1 H318 Causes serious eye damage.
  GHS07

(Contd. on page 2)
Trade name: Amantadine (hydrochloride)

Acute Tox. 4 H302 Harmful if swallowed.

Aquatic Acute 3 H402 Harmful to aquatic life.

Aquatic Chronic 3 H412 Harmful to aquatic life with long lasting effects.

**Label elements**

**GHS label elements**
The substance is classified and labeled according to the Globally Harmonized System (GHS).

**Hazard pictograms**

GHS05  GHS07  GHS08

**Signal word** Danger

**Hazard statements**

H302 Harmful if swallowed.

H314 Causes severe skin burns and eye damage.

H361 Suspected of damaging fertility or the unborn child.

H402 Harmful to aquatic life.

H412 Harmful to aquatic life with long lasting effects.

**Precautionary statements**

P201 Obtain special instructions before use.

P202 Do not handle until all safety precautions have been read and understood.

P260 Do not breathe dusts or mists.

P264 Wash thoroughly after handling.

P270 Do not eat, drink or smoke when using this product.

P273 Avoid release to the environment.

P280 Wear protective gloves/protective clothing/eye protection/face protection.

P301+P312 If swallowed: Call a poison center/doctor if you feel unwell.

P301+P330+P331 If swallowed: Rinse mouth. Do NOT induce vomiting.

P303+P361+P353 If on skin (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower.

P304+P340 IF INHALED: Remove person to fresh air and keep comfortable for breathing.

P305+P351+P338 If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

P310 Immediately call a poison center/doctor.

P308+P313 IF exposed or concerned: Get medical advice/attention.

P321 Specific treatment (see on this label).

P363 Wash contaminated clothing before reuse.

P405 Store locked up.

P501 Dispose of contents/container in accordance with local/regional/national/international regulations.

**Classification system:**

**NFPA ratings (scale 0 - 4)**

Health = 3

Fire = 0

Reactivity = 0

**HMIS-ratings (scale 0 - 4)**

Health = *3

Fire = 0

Reactivity = 0
3 Composition/information on ingredients

- Chemical characterization: Substances
- CAS No. Description
  - 665-66-7 Amantadine (hydrochloride)
- Identification number(s)
  - EC number: 211-560-2

4 First-aid measures

- Description of first aid measures
  - General information:
    - Immediately remove any clothing soiled by the product.
    - Symptoms of poisoning may even occur after several hours; therefore medical observation for at least 48 hours after the accident.
  - After inhalation:
    - In case of unconsciousness place patient stably in side position for transportation.
  - After skin contact:
    - Immediately wash with water and soap and rinse thoroughly.
  - After eye contact:
    - Rinse opened eye for several minutes under running water. Then consult a doctor.
  - After swallowing:
    - Immediately call a doctor.
    - Drink copious amounts of water and provide fresh air. Immediately call a doctor.
- Information for doctor:
  - Most important symptoms and effects, both acute and delayed
    - May cause anemia, cough, CNS depression, drowsiness, headache, heart damage, lassitude (weakness, exhaustion), liver damage, narcosis, reproductive effects, teratogenic effects.
    - No further relevant information available.
  - Indication of any immediate medical attention and special treatment needed
    - No further relevant information available.

5 Fire-fighting measures

- Extinguishing media
- Suitable extinguishing agents:
  - Use fire fighting measures that suit the environment.
  - A solid water stream may be inefficient.
- Special hazards arising from the substance or mixture
  - No further relevant information available.
- Advice for firefighters
- Protective equipment
  - No special measures required.

6 Accidental release measures

- Personal precautions, protective equipment and emergency procedures
  - Wear protective equipment. Keep unprotected persons away.
- Environmental precautions:
  - Inform respective authorities in case of seepage into water course or sewage system.
7 Handling and storage

- Handling:
  - Precautions for safe handling: Thorough dedusting.
  - Information about protection against explosions and fires: No special measures required.
- Conditions for safe storage, including any incompatibilities
  - Storage:
  - Requirements to be met by storerooms and receptacles: No special requirements.
  - Information about storage in one common storage facility: Not required.
  - Further information about storage conditions: Keep receptacle tightly sealed.
- Specific end use(s) No further relevant information available.

8 Exposure controls/personal protection

- Additional information about design of technical systems: No further data; see item 7.
- Control parameters
  - Components with limit values that require monitoring at the workplace: Not required.
  - Additional information: The lists that were valid during the creation were used as basis.
- Exposure controls
- Personal protective equipment:
  - General protective and hygienic measures:
    - Keep away from foodstuffs, beverages and feed.
    - Immediately remove all soiled and contaminated clothing.
    - Wash hands before breaks and at the end of work.
    - Avoid contact with the eyes.
    - Avoid contact with the eyes and skin.
  - Breathing equipment: Not required.
- Protection of hands:

  Protective gloves

The glove material has to be impermeable and resistant to the product/ the substance/ the preparation. Due to missing tests no recommendation to the glove material can be given for the product/ the preparation/ the chemical mixture.
Trade name: Amantadine (hydrochloride)

Selection of the glove material on consideration of the penetration times, rates of diffusion and the degradation

- **Material of gloves**
The selection of the suitable gloves does not only depend on the material, but also on further marks of quality and varies from manufacturer to manufacturer.

- **Penetration time of glove material**
The exact break through time has to be found out by the manufacturer of the protective gloves and has to be observed.

- **Eye protection:**
  Tightly sealed goggles

### 9 Physical and chemical properties

<table>
<thead>
<tr>
<th>Information on basic physical and chemical properties</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>General Information</strong></td>
</tr>
<tr>
<td><strong>Appearance:</strong></td>
</tr>
<tr>
<td>Form: Solid</td>
</tr>
<tr>
<td>Color: Not determined</td>
</tr>
<tr>
<td>Odor: Characteristic</td>
</tr>
<tr>
<td>Structural Formula C10H17N • HCl</td>
</tr>
<tr>
<td>Molecular Weight 187.7 g/mol</td>
</tr>
<tr>
<td>Odor threshold: Not determined.</td>
</tr>
</tbody>
</table>

| pH-value:                                             |
| Not applicable.                                      |

<table>
<thead>
<tr>
<th>Change in condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Melting point/Melting range: &gt;300 °C (&gt;572 °F)</td>
</tr>
<tr>
<td>Boiling point/Boiling range: Undetermined.</td>
</tr>
</tbody>
</table>

| Flash point:                                         |
| Not applicable.                                      |

| Flammability (solid, gaseous):                       |
| Product is not flammable.                            |

| Decomposition temperature:                          |
| Not determined.                                      |

| Auto igniting:                                       |
| Not determined.                                      |

| Danger of explosion:                                 |
| Product does not present an explosion hazard.        |

| Explosion limits:                                    |
| Lower: Not determined.                               |
| Upper: Not determined.                               |

| Vapor pressure:                                      |
| Not applicable.                                      |

| Density:                                              |
| Not determined.                                      |

| Relative density:                                    |
| Not determined.                                      |

| Vapor density:                                       |
| Not applicable.                                      |

| Evaporation rate:                                    |
| Not applicable.                                      |

| Solubility in / Miscibility with Water:              |
| Not determined.                                      |

| Partition coefficient (n-octanol/water):             |
| Not determined.                                      |
Trade name: Amantadine (hydrochloride)

<table>
<thead>
<tr>
<th>Viscosity:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dynamic: Not applicable.</td>
</tr>
<tr>
<td>Kinematic: Not applicable.</td>
</tr>
<tr>
<td>SOLUBILITY:</td>
</tr>
<tr>
<td>DMF: 2 mg/ml; DMSO: 50 mg/ml; Ethanol: 5 mg/ml; PBS (pH 7.2): 5 mg/ml</td>
</tr>
</tbody>
</table>

Other information: No further relevant information available.

10 Stability and reactivity

- Reactivity: No further relevant information available.
- Chemical stability:
- Thermal decomposition / conditions to be avoided: No decomposition if used according to specifications.
- Possibility of hazardous reactions: No dangerous reactions known.
- Conditions to avoid: No further relevant information available.
- Incompatible materials: strong oxidizing agents
- Hazardous decomposition products: carbon dioxide, carbon monoxide, hydrogen chloride gas, hydrogen chloride gas

11 Toxicological information

- RTECS Number: AU4375000
- Information on toxicological effects:
- Acute toxicity:
  - LD/LC50 values that are relevant for classification:
    | Oral     | LD50       | LDLO       |
    |----------|------------|------------|
    | LDLO     | 50 mg/kg (wmn) |
    | LD50     | 800 mg/kg (rat) |
    | LDLO     | 28,571 µg/kg (man) |
    | Intraperitoneal LD50 | 150 mg/kg (rat) |
    | Subcutaneous LD50  | 500 mg/kg (rat)  |
- Primary irritant effect:
  - on the skin: Strong caustic effect on skin and mucous membranes.
  - on the eye: Strong caustic effect. Strong irritant with the danger of severe eye injury.
- Sensitization: No sensitizing effects known.
- Additional toxicological information:
  Swallowing will lead to a strong caustic effect on mouth and throat and to the danger of perforation of esophagus and stomach.
- Carcinogenic categories:
  - IARC (International Agency for Research on Cancer) Substance is not listed.
  - NTP (National Toxicology Program) Substance is not listed.
  - OSHA-Ca (Occupational Safety & Health Administration) Substance is not listed.
12 Ecological information

- **Toxicity**
- **Aquatic toxicity:** No further relevant information available.
- **Persistence and degradability** No further relevant information available.
- **Behavior in environmental systems:**
  - **Bioaccumulative potential** No further relevant information available.
  - **Mobility in soil** No further relevant information available.
- **Ecotoxicological effects:**
  - **Remark:** Harmful to fish
- **Additional ecological information:**
- **General notes:**
  - Water hazard class 2 (Assessment by list): hazardous for water
  - Do not allow product to reach ground water, water course or sewage system.
  - Must not reach bodies of water or drainage ditch undiluted or unneutralized.
  - Danger to drinking water if even small quantities leak into the ground.
  - Harmful to aquatic organisms
- **Results of PBT and vPvB assessment**
  - **PBT:** Not applicable.
  - **vPvB:** Not applicable.
- **Other adverse effects** No further relevant information available.

13 Disposal considerations

- **Waste treatment methods**
  - **Recommendation:** Must not be disposed of together with household garbage. Do not allow product to reach sewage system.
- **Uncleaned packagings:**
  - **Recommendation:** Disposal must be made according to official regulations.

14 Transport information

- **UN-Number**
  - DOT, IMDG, IATA UN1759
- **UN proper shipping name**
  - DOT Corrosive solids, n.o.s. (Amantadine (hydrochloride))
  - IMDG CORROSIVE SOLID, N.O.S. (Amantadine (hydrochloride))
  - IATA Corrosive solid, n.o.s. (Amantadine (hydrochloride))
- **Transport hazard class(es)**
  - **DOT**
    - Class 8 Corrosive substances
Trade name: Amantadine (hydrochloride)

| · Label                                      | 8 |
| · IMDG, IATA                                |   |

| · Class                                     | 8 Corrosive substances |
| · Label                                    | 8 |

| · Packing group                             | I |
| · DOT, IMDG, IATA                           |   |

| · Environmental hazards:                    | Not applicable. |

| · Special precautions for user              | Warning: Corrosive substances |
| · Hazard identification number (Kemler code): | 88 |
| · EMS Number:                               | F-A,S-B |
| · Stowage Category                          | B |

| · Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code | Not applicable. |

| · Transport/Additional information:         |   |
| · DOT                                       |   |
| · Quantity limitations                      | On passenger aircraft/rail: 1 kg On cargo aircraft only: 25 kg |

| · IMDG                                       |   |
| · Limited quantities (LQ)                   | 0 |
| · Excepted quantities (EQ)                  | Code: E0 Not permitted as Excepted Quantity |

| · IATA                                       |   |
| · Remarks:                                  | When sold in quantities of less than or equal to 1 mL, or 1 g, with an Excepted Quantity Code of E1, E2, E4, or E5, this item meets the De Minimis Quantities exemption, per IATA 2.6.10. Therefore packaging does not have to be labeled as Dangerous Goods/Excepted Quantity. |

| · UN "Model Regulation":                    | UN 1759 CORROSIVE SOLID, N.O.S. (AMANTADINE (HYDROCHLORIDE)), 8, I |

### 15 Regulatory information

| · Safety, health and environmental regulations/legislation specific for the substance or mixture | No further relevant information available. |
| · Sara                                                                                         |   |
| · Section 355 (extremely hazardous substances): Substance is not listed.                       |   |
| · Section 313 (Specific toxic chemical listings): Substance is not listed.                      |   |
| · TSCA (Toxic Substances Control Act): ACTIVE                                                  |   |
| · Hazardous Air Pollutants Substance is not listed.                                            |   |
| · Proposition 65                                                                               |   |
| · Chemicals known to cause cancer: Substance is not listed.                                    |   |

(Contd. on page 9)
Trade name: Amantadine (hydrochloride)

(Contd. from page 8)

- Chemicals known to cause reproductive toxicity for females: Substance is not listed.
- Chemicals known to cause reproductive toxicity for males: Substance is not listed.
- Chemicals known to cause developmental toxicity: Substance is listed.
- Carcinogenic categories
  - EPA (Environmental Protection Agency) Substance is not listed.
  - TLV (Threshold Limit Value) Substance is not listed.
  - NIOSH-Ca (National Institute for Occupational Safety and Health) Substance is not listed.
- Chemical safety assessment: A Chemical Safety Assessment has not been carried out.

16 Other information

All chemicals may pose unknown hazards and should be used with caution. This SDS applies only to the material as packaged. If this product is combined with other materials, deteriorates, or becomes contaminated, it may pose hazards not mentioned in this SDS. Cayman Chemical Company assumes no responsibility for incidental or consequential damages, including lost profits, arising from the use of these data. It shall be the user’s responsibility to develop proper methods of handling and personal protection based on the actual conditions of use. While this SDS is based on technical data judged to be reliable, Cayman Chemical Company assumes no responsibility for the completeness or accuracy of the information contained herein.

- Department issuing SDS: Environment protection department.
- Contact: -
- Date of preparation / last revision 12/01/2021 / -
- Abbreviations and acronyms:
  IMDG: International Maritime Code for Dangerous Goods
  DOT: US Department of Transportation
  IATA: International Air Transport Association
  EINECS: European Inventory of Existing Commercial Chemical Substances
  CAS: Chemical Abstracts Service (division of the American Chemical Society)
  NFPA: National Fire Protection Association (USA)
  HMIS: Hazardous Materials Identification System (USA)
  LC50: Lethal concentration, 50 percent
  LD50: Lethal dose, 50 percent
  PBT: Persistent, Bioaccumulative and Toxic
  vPvB: very Persistent and very Bioaccumulative
  NIOSH: National Institute for Occupational Safety
  OSHA: Occupational Safety & Health
  TLV: Threshold Limit Value
  PEL: Permissible Exposure Limit
  REL: Recommended Exposure Limit
  Acute Tox. 4: Acute toxicity – Category 4
  Skin Corr. 1A: Skin corrosion/irritation – Category 1A
  Eye Dam. 1: Serious eye damage/eye irritation – Category 1
  Repr. 2: Reproductive toxicity – Category 2
  Aquatic Acute 3: Hazardous to the aquatic environment - acute aquatic hazard – Category 3
  Aquatic Chronic 3: Hazardous to the aquatic environment - long-term aquatic hazard – Category 3