1 Identification

· Product identifier
  · Trade name: Doxorubicin (hydrochloride)
  · Synonym: (8S,10S)-10-[(3-amino-2,3,6-trideoxy-α-L-lyxo-hexopyranosyl)oxy]-7,8,9,10-tetrahydro-6,8,11-trihydroxy-8-(2-hydroxyacetyl)-1-methoxy-5,12-naphthacenedione, monohydrochloride
  · Article number: 15007
  · CAS Number: 25316-40-9
  · EC number: 246-818-3
  · 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
  Carc. 1B H350 May cause cancer.

  GHS07
  Acute Tox. 4 H302 Harmful if swallowed.

· Label elements
  · GHS label elements
    The substance is classified and labeled according to the Globally Harmonized System (GHS).
Trade name: Doxorubicin (hydrochloride)

- **Hazard pictograms**
  - GHS07
  - GHS08

- **Signal word** Danger

- **Hazard statements**
  - H302 Harmful if swallowed.
  - H350 May cause cancer.

- **Precautionary statements**
  - P201 Obtain special instructions before use.
  - P202 Do not handle until all safety precautions have been read and understood.
  - P264 Wash thoroughly after handling.
  - P270 Do not eat, drink or smoke when using this product.
  - P280 Wear protective gloves/protective clothing/eye protection/face protection.
  - P301+P312 If swallowed: Call a poison center/doctor if you feel unwell.
  - P308+P313 IF exposed or concerned: Get medical advice/attention.
  - 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 = 1
    - Fire = 0
    - Reactivity = 0
  - **HMIS-ratings (scale 0 - 4)**
    - Health = *1
    - Fire = 0
    - Reactivity = 0

- **Other hazards**
- **Results of PBT and vPvB assessment**
  - PBT: Not applicable.
  - vPvB: Not applicable.

### 3 Composition/information on ingredients

- **Chemical characterization: Substances**
- **CAS No. Description**
  - 25316-40-9 Doxorubicin (hydrochloride)
- **Identification number(s)**
- **EC number:** 246-818-3
4 First-aid measures

- Description of first aid measures
  - General information:
    Symptoms of poisoning may even occur after several hours; therefore medical observation for at least 48 hours after the accident.
  - After inhalation: Supply fresh air; consult doctor in case of complaints.
  - After skin contact: Generally the product does not irritate the skin.
  - After eye contact: Rinse opened eye for several minutes under running water.
  - After swallowing: 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 Not required.
- Environmental precautions: Do not allow to enter sewers/ surface or ground water.
- Methods and material for containment and cleaning up:
  Dispose contaminated material as waste according to item 13.
  Ensure adequate ventilation.
- Reference to other sections
  See Section 7 for information on safe handling.
  See Section 8 for information on personal protection equipment.
  See Section 13 for disposal information.
- Protective Action Criteria for Chemicals
  - PAC-1: Substance is not listed.
  - PAC-2: Substance is not listed.
  - PAC-3: Substance is not listed.

7 Handling and storage

- Handling:
  - Precautions for safe handling Ensure good ventilation/exhaustion at the workplace.
  - Information about protection against explosions and fires: No special measures required.
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.
    Wash hands before breaks and at the end of work.
    Store protective clothing separately.
  - Breathing equipment:
    In case of brief exposure or low pollution use respiratory filter device. In case of intensive or longer exposure use respiratory protective device that is independent of circulating air.
  - 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.
    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

· Information on basic physical and chemical properties
  · General Information
    · Appearance:
      Form: Crystalline
      Color: Not determined.
    · Odor: Characteristic
    · Structural Formula: C27H29NO11 • HCl
    · Molecular Weight: 580 g/mol
    · Odor threshold: Not determined.
  · pH-value: Not applicable.
  · Change in condition
    Melting point/Melting range: Undetermined.
    Boiling point/Boiling range: Undetermined.
  · 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.
  · Viscosity:
    Dynamic: Not applicable.
    Kinematic: Not applicable.
    SOLUBILITY
    ~0.5 mg/ml in a 1:1 solution of DMSO:PBS (pH 7.2); ~1 mg/ml in DMSO; ~10 mg/ml in DMF
  · 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.
Safety Data Sheet
acc. to OSHA HCS

Trade name: Doxorubicin (hydrochloride)

- Conditions to avoid: No further relevant information available.
- Incompatible materials: strong oxidizing agents
- Hazardous decomposition products: carbon oxides, nitrogen oxides

11 Toxicological information

- RTECS Number: QI9295900
- Information on toxicological effects
  - Acute toxicity:
    - LD/LC50 values that are relevant for classification:
      | Oral  | LD50            |
      |       | Intraperitoneal | Subcutaneous |
      |       | LD50           | LD50         |
      |       | 11,160 µg/kg (mouse) | 7,678 µg/kg (mouse) |
      |       | 16,030 µg/kg (rat)  | 21,840 µg/kg (rat)  |
  - Primary irritant effect:
    - on the skin: No irritant effect.
    - on the eye: No irritating effect.
  - Sensitization: No sensitizing effects known.
  - Additional toxicological information:
    - 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.
- Additional ecological information:
  - General notes:
    - Water hazard class 3 (Self-assessment): extremely hazardous for water
    - Do not allow product to reach ground water, water course or sewage system, even in small quantities.
    - Danger to drinking water if even extremely small quantities leak into the ground.
  - 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: Not regulated

- UN proper shipping name
  - DOT, IMDG, IATA: Not regulated

- Transport hazard class(es)
  - DOT, ADN, IMDG, IATA: Not regulated

- Packing group
  - DOT, IMDG, IATA: Not regulated

- Environmental hazards: Not applicable.

- Special precautions for user: Not applicable.

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

- UN "Model Regulation": Not regulated

15 Regulatory information

- Safety, health and environmental regulations/legislation specific for the substance or mixture
  - Sara: Substance is not listed.
  - Section 355 (extremely hazardous substances): Substance is not listed.
  - Section 313 (Specific toxic chemical listings): Substance is not listed.
  - TSCA (Toxic Substances Control Act): Substance is not listed.
  - Hazardous Air Pollutants: Substance is not listed.
  - Proposition 65: Substance is listed.

- Chemicals known to cause cancer:
  - Substance is listed.

- Chemicals known to cause reproductive toxicity for females:
  - Substance is not listed.

- Chemicals known to cause reproductive toxicity for males:
  - Substance is listed.

- Chemicals known to cause developmental toxicity:
  - Substance is listed.

- Carcinogenic categories
  - Substance is not listed.

- 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.
Trade name: Doxorubicin (hydrochloride)

· National regulations:

· Information about limitation of use:
  Workers are not allowed to be exposed to this hazardous material. Exceptions can be made by the authorities in certain cases.

· 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 05/23/2021 / -
· 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
  Carc. 1B: Carcinogenicity – Category 1B