SECTION 1. Identification

Product identifier

Product No 5927
Product name Doxorubicin

Recommended use of the chemical and restrictions on use

Identified uses This product is intended for research purposes only.

Manufacturer address

Cell Signaling Technology, Inc.
3 Trask Lane
Danvers, MA 01923
United States
TEL: +1 978 867 2300
FAX: +1 978 867 2400

Website www.cellsignal.com
Email address support@cellsignal.com
Emergency telephone number In case of emergency call CHEMTREC 1-800-424-9300

SECTION 2. Hazard(s) identification

Classification

This substance/mixture is considered hazardous by the 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200)

<table>
<thead>
<tr>
<th>Classification</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acute oral toxicity</td>
<td>Category 4</td>
</tr>
<tr>
<td>Germ cell mutagenicity</td>
<td>Category 1B</td>
</tr>
<tr>
<td>Carcinogenicity</td>
<td>Category 1B</td>
</tr>
<tr>
<td>Reproductive toxicity</td>
<td>Category 1B</td>
</tr>
</tbody>
</table>

GHS Label elements, including precautionary statements

Signal Word

Danger

Hazard statement(s)

Harmful if swallowed. May cause genetic defects. May cause cancer. May damage fertility or the unborn child.
Precautionary Statement(s)
Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Wash face, hands and any exposed skin thoroughly after handling. Do not eat, drink or smoke when using this product. Wear protective gloves/protective clothing/eye protection/face protection.
IF exposed or concerned: Get medical advice/attention.
IF SWALLOWED: Call a POISON CENTER or doctor/physician if you feel unwell. Rinse mouth. Store locked up. Dispose of contents/container to an approved waste disposal plant.

Supplementary Hazard Information

No information available.
Hazard not otherwise classified (HNOC)
Not applicable.

### SECTION 3. Composition/information on ingredients

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>CAS No</th>
<th>Weight %</th>
</tr>
</thead>
<tbody>
<tr>
<td>(8S-cis)-10-((3-Amino-2,3,6-trideoxy-alpha-L-lyxo-hexopyranosyl)oxy)-7,8,9,10-tetrahydro-6,8,11-trihydroxy-8-(hydroxyacetyl)-1-methoxynaphthacene-5,12-dione hydrochloride</td>
<td>25316-40-9</td>
<td>100</td>
</tr>
</tbody>
</table>

### SECTION 4. First-aid measures

- **Eye contact**: Rinse thoroughly with plenty of water, also under the eyelids. Keep eye wide open while rinsing.
- **Skin contact**: Immediate medical attention is required. Wash off immediately with soap and plenty of water removing all contaminated clothes and shoes.
- **Inhalation**: Immediate medical attention is required. Move to fresh air. If not breathing, give artificial respiration.
- **Ingestion**: Do NOT induce vomiting. Immediate medical attention is required. Never give anything by mouth to an unconscious person. Drink plenty of water.

**Most important symptoms and effects, both acute and delayed**

**Indication of any immediate medical attention and special treatment needed**
Treat symptomatically.

**Advice for emergency responders**

- **General advice**: Immediate medical attention is required. Show this safety data sheet to the doctor in attendance.
- **Protection of first-aiders**: Use personal protective equipment. Avoid contact with skin, eyes and clothing.

### SECTION 5. Fire-fighting measures

**Extinguishing media**
**Suitable Extinguishing Media**
Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.

**Unsuitable Extinguishing Media**
CAUTION: Use of water spray when fighting fire may be inefficient.

**Specific hazards arising from the chemical**
No information available.

**Explosion Data**

- **Sensitivity to Mechanical Impact**
  None.

- **Sensitivity to Static Discharge**
  None.

**Protective Equipment and Precautions for Firefighters**
As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

**SECTION 6. Accidental release measures**

**Personal precautions, protective equipment and emergency procedures**

- **For non-emergency personnel**
  Ensure adequate ventilation.

- **Other information**
  No information available.

**Environmental precautions**
Do not flush into surface water or sanitary sewer system.

**Methods and material for containment and cleaning up**

- **Methods for containment**
  Prevent further leakage or spillage if safe to do so.

- **Methods for cleaning up**
  Use personal protective equipment. Cover powder spill with plastic sheet or tarp to minimize spreading and keep powder dry. Take up mechanically, placing in appropriate containers for disposal. Avoid dust formation. Clean contaminated surface thoroughly.

**SECTION 7. Handling and storage**

**Precautions for safe handling**
Handle in accordance with good industrial hygiene and safety practice.

**Conditions for safe storage, including any incompatibilities**

- **Technical measures/Storage conditions**
  Keep containers tightly closed in a dry, cool and well-ventilated place.

- **Packaging material**
  No information available.

- **Incompatible products**
  None known based on information supplied.

**SECTION 8. Exposure controls/personal protection**

**Control parameters**

**Appropriate engineering controls**
Showers, eyewash stations, and ventilation systems.

**Individual protection measures, such as personal protective equipment**
Personal protective equipment (PPE) needs to be selected depending on the implemented engineering controls, frequency/duration of work activities and the concentrations of the hazardous substance.

Eye/face protection
- Tightly fitting safety goggles

Skin and body protection
- Wear protective gloves/clothing.

Respiratory protection
- If exposure limits are exceeded or irritation is experienced, NIOSH/MSHA approved respiratory protection should be worn. Positive-pressure supplied air respirators may be required for high airborne contaminant concentrations. Respiratory protection must be provided in accordance with current local regulations.

Hygiene measures
- When using, do not eat, drink or smoke. Provide regular cleaning of equipment, work area and clothing. Avoid contact with skin, eyes and clothing. Wash hands before breaks and immediately after handling the product. Keep away from food, drink and animal feeding stuffs.

SECTION 9. Physical and chemical properties

Information on basic physical and chemical properties

<table>
<thead>
<tr>
<th>Property</th>
<th>Values</th>
<th>Remarks</th>
<th>Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical state</td>
<td>Solid</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Appearance</td>
<td>Crystalline Powder</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Odor</td>
<td>No information available</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Color</td>
<td>Orange</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Odor Threshold</td>
<td>No information available</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Property</td>
<td>Values</td>
<td></td>
<td></td>
</tr>
<tr>
<td>pH</td>
<td>No information available</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Melting point/freezing point</td>
<td>No information available</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Initial boiling point and boiling range</td>
<td>No information available</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flash point</td>
<td>No information available</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Evaporation rate</td>
<td>No information available</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flammability (solid, gas)</td>
<td>No information available</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Upper flammability limit</td>
<td>No information available</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lower flammability limit</td>
<td>No information available</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vapor pressure</td>
<td>No information available</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vapor density</td>
<td>No information available</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Relative density</td>
<td>No information available</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Solubility</td>
<td>Practically insoluble</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Solubility in other solvents</td>
<td>No information available</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Partition coefficient: n-octanol/water</td>
<td>No information available</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Autoignition temperature</td>
<td>No information available</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Decomposition temperature</td>
<td>No information available</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Viscosity</td>
<td>No information available</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Viscosity, dynamic</td>
<td>No information available</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Explosive properties</td>
<td>No information available</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oxidizing properties</td>
<td>No information available</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Other information

<table>
<thead>
<tr>
<th>Softening point</th>
<th>No information available</th>
</tr>
</thead>
<tbody>
<tr>
<td>Molecular Weight</td>
<td>579.98</td>
</tr>
<tr>
<td>VOC content</td>
<td>No information available</td>
</tr>
<tr>
<td>Density</td>
<td>No information available</td>
</tr>
<tr>
<td>Bulk Density VALUE</td>
<td>No information available</td>
</tr>
</tbody>
</table>
Possibility of hazardous reactions

Hazardous reactions
None under normal processing.

Hazardous polymerization
None under normal processing.

Conditions to Avoid

No information available.

Incompatible Materials

None known based on information supplied.

Hazardous Decomposition Products

None known based on information supplied.

SECTION 11. Toxicological information

Information on likely routes of exposure

- **Inhalation**: There is no data available for this product.
- **Eye contact**: There is no data available for this product.
- **Skin contact**: There is no data available for this product.
- **Ingestion**: May be harmful if swallowed. May cause adverse cardiac effects. Reproductive Toxicity. Target Organ Effects.

Information on toxicological effects

This material should only be handled by, or under the close supervision of, those properly qualified in the handling and use of potentially hazardous chemicals. It should be borne in mind that the toxicological and physiological properties of this compound is not well defined.

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>LD50 Oral</th>
<th>LD50 Dermal</th>
<th>LC50 Inhalation</th>
</tr>
</thead>
<tbody>
<tr>
<td>(8S-cis)-10-((3-Amino-2,3,6-trIDEOXY-alpha-L-lyxo-hexopyranosyl)oxy)-7,8,9,10-tetrahydro-6,8,11-trihydroxy-8-(hydroxyacetyl)-1-methoxynaphthacene-5,12-dione hydrochloride</td>
<td>698 mg/kg (Mouse)</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

Delayed and immediate effects as well as chronic effects from short and long-term exposure

**Symptoms**


**Sensitization**

No information available.

**Mutagenic effects**

Possible risks of irreversible effects. Doxorubicin was shown to be mutagenic in the in vitro Ames assay, and clastogenic in multiple in vitro assays (CHO cell, V79 hamster cell, human lymphoblast, and SCE assays) and the in vivo mouse micronucleus assay.

**Carcinogenicity**

The table below indicates whether each agency has listed any ingredient as a carcinogen. Secondary oral cancers, primarily squamous cell carcinoma, have been reported from post-marketing experience in patients with long-term (more than one year) exposure.

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>IARC</th>
<th>NTP</th>
<th>OSHA</th>
</tr>
</thead>
<tbody>
<tr>
<td>(8S-cis)-10-((3-Amino-2,3,6-trIDEOXY-alpha-L-lyxo-hexopyranosyl)oxy)-7,8,9,10-tetrahydro-6,8,11-trihydroxy-8-(hydroxyacetyl)-1-methoxynaphthacene-5,12-dione hydrochloride</td>
<td>-</td>
<td>Reasonably Anticipated</td>
<td>X</td>
</tr>
</tbody>
</table>

\[NTP: (National Toxicity Program)\quad Reasonably Anticipated - Reasonably Anticipated to be a Human Carcinogen\]

\[OSHA: (Occupational Safety & Health Administration)\quad X - Present\]
Reproductive toxicity
This material is classified as a Pregnancy Category D: Positive evidence of risk. Embryotoxic at doses of 1 mg/kg/day in rats and was embryotoxic and abortifacient at 0.5 mg/kg/day in rabbits. Embryotoxicity was characterized by increased embryo-fetal deaths and reduced live litter sizes. In males, may result in oligospermia, azoospermia, damage to spermatozoa and testicular tissue, resulting in possible genetic fetal abnormalities and/or permanent loss of fertility. In females of reproductive potential, may cause infertility and result in amenorrhea.

STOT - single exposure No information available.
STOT - repeated exposure Doxorubicin HCl can result in myocardial damage, including acute left ventricular failure.
Target Organ Effects Heart, Liver, Reproductive system.
Neurological effects No information available.
Aspiration Hazard No information available.

SECTION 12. Ecological information
Ecotoxicity
100% of the mixture consists of components of unknown hazards to the aquatic environment.

Persistence and degradability No information available.
Bioaccumulation No information available.
Mobility No information available.

Other adverse effects
No information available.

SECTION 13. Disposal considerations
Waste Disposal Methods
Should not be released into the environment.

Disposal considerations
Do not empty into drains; dispose of this material and its container in a safe way.

SECTION 14. Transport information
This material is not subject to regulation as a hazardous material for shipping.

SECTION 15. Regulatory information
North American Inventory Listing

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>TSCA 8(b)</th>
<th>TSCA 12(b)</th>
<th>DSL</th>
<th>NDSL</th>
</tr>
</thead>
<tbody>
<tr>
<td>(8S-cis)-10-((3-Amino-2,3,6-trideoxy-alpha-L-lyxo-hexopyranosyl)oxy)-7,8,9,10-tetrahydro-6,8,11-trihydroxy-8-(hydroxyacetyl)-1-methoxynaphthacene-5,12-dione hydrochloride</td>
<td>Not Listed</td>
<td>Not Listed</td>
<td>Not Listed</td>
<td>Not Listed</td>
</tr>
</tbody>
</table>

Canadian Workplace Hazardous Materials Information System (WHMIS) Classification
SARA 313

Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA). This product does not contain any chemicals which are subject to the reporting requirements of the Act and Title 40 of the Code of Federal Regulations, Part 372.

SARA 311/312 Hazard Categories

<table>
<thead>
<tr>
<th>Hazard Category</th>
<th>Yes/No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acute Health Hazard</td>
<td>Yes</td>
</tr>
<tr>
<td>Chronic Health Hazard</td>
<td>Yes</td>
</tr>
<tr>
<td>Fire Hazard</td>
<td>No</td>
</tr>
<tr>
<td>Sudden Release of Pressure Hazard</td>
<td>No</td>
</tr>
<tr>
<td>Reactive Hazard</td>
<td>No</td>
</tr>
</tbody>
</table>

Clean Water Act

This product does not contain any substances regulated as pollutants pursuant to the Clean Water Act (40 CFR 122.21 and 40 CFR 122.42).

CERCLA

This material, as supplied, does not contain any substances regulated as hazardous substances under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) (40 CFR 302) or the Superfund Amendments and Reauthorization Act (SARA) (40 CFR 355). There may be specific reporting requirements at the local, regional, or state level pertaining to releases of this material.

California Proposition 65

This product contains chemicals known to the State of California to cause cancer or reproductive toxicity

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>California Prop. 65</th>
</tr>
</thead>
<tbody>
<tr>
<td>(8S-cis)-10-((3-Amino-2,3,6-trideoxy-alpha-L-lyxo-hexopyranosyl)oxy)-7,8,9,10-tetrahydro-6,8,11-trihydroxy-8-(hydroxyacetyl)-1-methoxynaphthacene-5,12-dione hydrochloride</td>
<td>Carcinogen Developmental Male Reproductive</td>
</tr>
</tbody>
</table>

U.S. State Right-to-Know Regulations

This product contains the following U.S. State Right to Know chemicals:

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>New Jersey</th>
<th>Massachusetts</th>
<th>Pennsylvania</th>
</tr>
</thead>
<tbody>
<tr>
<td>(8S-cis)-10-((3-Amino-2,3,6-trideoxy-alpha-L-lyxo-hexopyranosyl)oxy)-7,8,9,10-tetrahydro-6,8,11-trihydroxy-8-(hydroxyacetyl)-1-methoxynaphthacene-5,12-dione hydrochloride</td>
<td>Not Listed</td>
<td>Not Listed</td>
<td>Listed</td>
</tr>
</tbody>
</table>

U.S. FIFRA Label Information

This product does not contain any substances regulated as pesticides.

US Commerce Department - Export Administration Regulations Information

This product does not contain any substances regulated under the Chemical Weapons Convention (CWC).
U.S. Drug Enforcement Administration Information

This product does not contain any substances regulated under the DEA.

SECTION 16. Other information

Issuing Date: 2018-03-23

Disclaimer

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 given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.

End of Safety Data Sheet