Material Safety Data Sheet (MSDS)
Version 2.1 Revision Date: 04/21/2017

1. PRODUCT AND COMPANY IDENTIFICATION
1.1 Product identifier
Product Name: Doxorubicin
Catalog No.: V2644
CAS No.: 23214-92-8

1.2 Relevant identified uses of the substance or mixture and uses advised against
Identified uses: Laboratory chemicals, synthesis of substances.

1.3 Details of the supplier of the safety data sheet
Company: InvivoChem LLC
Tel: +1 708 310-1919
Fax: +1 708 557-7486

1.4 Emergency telephone number
Emergency phone #: +1 708 310-1919

2. COMPOSITION/INFORMATION ON INGREDIENTS
2.1 Substances
Synonyms:
Formula: C27H29NO11
Molecular Weight: 543.52

3. PHYSICAL AND CHEMICAL PROPERTIES
3.1 Information on basic physical and chemical properties
(a) Appearance Solid
(b) Odor No data available
(c) Odor threshold No data available
(d) pH No data available
(e) Melting/freezing point No data available
(f) Boiling point/range No data available
(g) Flash point No data available
(h) Evaporation rate No data available
(i) Flammability (solid, gas) No data available
(j) Upper/lower flammability or explosive limits No data available
(k) Vapor pressure No data available
(l) Vapor density No data available
(m) Relative density No data available
(n) Water solubility <1 mg/mL
(o) Partition coefficient No data available
(p) Auto-ignition temperature No data available
(q) Decomposition temperature No data available
3.2 Other Safety Information
No data available

4. HAZARDS IDENTIFICATION

4.1 Classification of the substance or mixture
GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)
Skin irritation (Category 2), H315
Eye irritation (Category 2A), H319
Specific target organ toxicity - single exposure (Category 3), Respiratory system, H335

4.2 GHS Label elements, including precautionary statements

Pictogram

Signal word Danger

Hazard statement(s)
H315: Causes skin irritation.
H317: May cause an allergic skin reaction.
H318: Causes serious eye damage.
H334: May cause allergy or asthma symptoms or breathing difficulties if inhaled.
H335: May cause respiratory irritation.
H341: Suspected of causing genetic defects.
H361: Suspected of damaging fertility or the unborn child.
H370: Causes damage to organs.
H413: May cause long lasting harmful effects to aquatic life.

Precautionary statement(s)
P201 Obtain special instructions before use.
P202 Do not handle until all safety precautions have been read and understood.
P260 Do not breathe dust/ fume/ gas/ mist/ vapors/ spray.
P264 Wash skin thoroughly after handling.
P271 Use only outdoors or in a well-ventilated area.
P280 Wear protective gloves/ eye protection/ face protection.
P302 + P352 IF ON SKIN: Wash with plenty of soap and water.
P304 + P340 IF INHALED: Remove victim to fresh air and keep at rest in a position 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.
P312 Call a POISON CENTER or doctor/ physician if you feel unwell.
P321 Specific treatment (see supplemental first aid instructions on this label).
P332 + P313 If skin irritation occurs: Get medical advice/ attention.
P337 + P313 If eye irritation persists: Get medical advice/ attention.
P362 Take off contaminated clothing and wash before reuse.
P403 + P233 Store in a well-ventilated place. Keep container tightly closed.
Store locked up.
Dispose of contents/container to an approved waste disposal plant.

4.3 Other hazards
None.

5. FIRST AID MEASURES

5.1 Description of first aid measures
In case of eye contact
Remove any contact lenses, locate eye-wash station, and flush eyes immediately with large amounts of water for 15 minutes. Separate eyelids with fingers to ensure adequate flushing. Promptly consult a physician.

In case of skin contact
Wash off thoroughly with soap and large amounts of water. Remove contaminated clothing and shoes and call a physician.

If inhaled
Immediately relocate victim to fresh air. If breathing is difficult, give cardiopulmonary resuscitation (CPR). Avoid mouth-to-mouth resuscitation.

If swallowed
Wash out mouth with water; Do NOT induce vomiting; call a physician promptly.

5.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labeling (see section 4.2).

5.3 Indication of any immediate medical attention and special treatment needed
No data available.

6. FIRE FIGHTING MEASURES

6.1 Extinguishing media
Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical, foam, and carbon dioxide fire extinguisher.

6.2 Special hazards arising from the substance or mixture
No data available.

6.3 Advice for firefighters
Wear self-contained breathing apparatus and protective clothing if necessary.

7. ACCIDENTAL RELEASE MEASURES

7.1 Personal precautions, protective equipment and emergency procedures
Use full personal protective equipment. Avoid dust formation, avoid breathing vapors, mist, dust or gas. Ensure adequate ventilation. Evacuate personnel to safe areas.
Refer to protective measures listed in sections 9.

7.2 Environmental precautions
Try to prevent further leakage or spillage if safe to do so. Keep the product away from drains or water courses.

7.3 Methods and materials for containment and cleaning up
Absorb solutions with finely-powdered liquid-binding material (diatomite, universal binders); Decontaminate surfaces and equipment by scrubbing with alcohol; Pick up and arrange disposal without creating dust; Keep in suitable, closed containers for disposal; Dispose of contaminated material according to Section 13.

8. HANDLING AND STORAGE

8.1 Precautions for safe handling
Avoid inhalation, contact with eyes and skin. Avoid formation of dust and aerosols. Provide appropriate exhaust ventilation at places where dust is formed. Use only in areas with appropriate exhaust ventilation.

8.2 Conditions for safe storage, including any incompatibilities
Keep container tightly sealed in cool, dry, and well-ventilated area. Keep away from direct sunlight and
sources of ignition.
Recommended storage temperature: 2 - 8 °C for short term (weeks to 3 months) or -20°C for long term (3 months to years).

8.3 Specific end use(s)
No data available.

9. EXPOSURE CONTROLS/PERSONAL PROTECTION

9.1 Control parameters
Components with workplace control parameters
This product contains no substances with occupational exposure limit values.

9.2 Exposure controls
Engineering controls
Ensure adequate ventilation. Provide accessible safety shower and eye wash station. Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

<table>
<thead>
<tr>
<th>Protection Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eye/face protection</td>
<td>Face shield and safety goggles with side-shields.</td>
</tr>
<tr>
<td>Hand protection</td>
<td>Protective gloves.</td>
</tr>
<tr>
<td>Skin and body protection</td>
<td>Impervious clothing.</td>
</tr>
<tr>
<td>Respiratory protection</td>
<td>Suitable respirator.</td>
</tr>
<tr>
<td>Environmental exposure controls</td>
<td>Keep the product away from drains, water courses or the soil. Clean spillages in a safe way as soon as possible.</td>
</tr>
</tbody>
</table>

10. STABILITY AND REACTIVITY

10.1 Reactivity
No data available.

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
No data available.

10.4 Conditions to avoid
No data available.

10.5 Incompatible materials
Strong acids/alkalis, strong oxidizing/reducing agents.

10.6 Hazardous decomposition products
Under fire conditions, may decompose and emit toxic fumes.
Other decomposition products - no data available.

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity
Classified based on available data. For more details, see section 4.

Skin corrosion/irritation
Classified based on available data. For more details, see section 4.

Serious eye damage/irritation
Classified based on available data. For more details, see section 4.

Respiratory or skin sensitization
Classified based on available data. For more details, see section 4.

Germ cell mutagenicity
Classified based on available data. For more details, see section 4.
Carcinogenicity
IARC: No component of this product present at a level equal to or greater than 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.
ACGIH: No component of this product present at a level equal to or greater than 0.1% is identified as a potential or confirmed carcinogen by ACGIH.
NTP: No component of this product present at a level equal to or greater than 0.1% is identified as a anticipated or confirmed carcinogen by NTP.
OSHA: No component of this product present at a level equal to or greater than 0.1% is identified as a potential or confirmed carcinogen by OSHA.

Reproductive toxicity
Classified based on available data. For more details, see section 4.

Specific target organ toxicity - single exposure
Classified based on available data. For more details, see section 4.

Specific target organ toxicity - repeated exposure
Classified based on available data. For more details, see section 4.

Aspiration hazard
Classified based on available data. For more details, see section 4.

Additional information
RTECS No.: Unavailable
This information is based on our current knowledge. However the chemical, physical, and toxicological properties have not been completely investigated.

12. ECOLOGICAL INFORMATION
12.1 Toxicity
No data available.
12.2 Persistence and degradability
No data available.
12.3 Bioaccumulative potential
No data available.
12.4 Mobility in soil
No data available.
12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required or not conducted.
12.6 Other adverse effects
No data available.

13. DISPOSAL CONSIDERATIONS
13.1 Waste treatment methods
Product
Dispose substance in accordance with prevailing country, federal, state and local regulations. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.
Contaminated packaging
Conduct recycling or disposal in accordance with prevailing country, federal, state and local regulations.

14. TRANSPORT INFORMATION DOT
(US)
This substance is considered to be non-hazardous/not dangerous for transport.
IMDG
This substance is considered to be non-hazardous/not dangerous for transport.
IATA
This substance is considered to be non-hazardous/not dangerous for transport.
15. REGULATORY INFORMATION

SARA 302 Components:
No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components:
This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

SARA 311/312 Hazards:
Acute Health Hazard, Chronic Health Hazard.

Massachusetts Right To Know Components:
No components are subject to the Massachusetts Right to Know Act.

Pennsylvania Right To Know Components:
No components are subject to the Pennsylvania Right to Know Act.

New Jersey Right To Know Components:
No components are subject to the New Jersey Right to Know Act.

California Prop. 65 Components:
This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

16. OTHER INFORMATION

The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. The product is for research use only and for trained personnel. The burden of safe use of this material rests entirely with the user. InvivoChem LLC shall not be held liable for any damage resulting from handling or from contact with the above product.