CIRCA GROUP Pty Ltd

SAFETY DATA SHEET

Version No. 012 Revision Date: 23.01.2017

SECTION 1. IDENTIFICATION OF THE SUBSTANCE AND OF THE COMPANY

1.1. Product Identifier

Product name : Cyrene
EC No. : 807-130-4
Synonyms : Dihydrolevoglucosenone (1S,5R)-6,8-Dioxabicyclo[3.2.1]octan-4-one
1,6-Anhydro-3,4-dideoxy-β-D-glycero-hexanopyranos-2-ulose
DOBCO
Formula : C_6H_8O_3
Molecular Weight : 128.13 g/mol
CAS Registry No. : 53716-82-8
IATA : Not dangerous goods
– PERMITTED FOR TRANSPORT BY AIR

1.2. Relevant identified uses of substance or mixture and uses advised against

Relevant identified uses: Manufacture of fine chemicals [SU9]; Formulation [mixing] of preparations and/or re-packaging (excluding alloys) [SU10]; Health services [SU20]; Scientific research and development [SU24]; Laboratory chemicals [PC21]; Pharmaceuticals [PC29];

1.3. Details of the supplier of the safety data sheet

Company : Circa Group Pty Ltd
Building 404, Bio21 Institute
University of Melbourne VIC 3010 AUSTRALIA
Telephone : +61 (0) 419 303 117
Email address : service@circagroup.com.au

1.4. Emergency Telephone Number

Emergency telephone : +61 (0) 448 020 179

Note: Data marked with an asterisk (*) has been provided by the F. Hoffmann-La Roche Ltd and remains the property of that company. It is included here in the interests of community safety.

SECTION 2. HAZARDS IDENTIFICATION

2.1. Classification of the substance or mixture according to EC Regulation No. 1272/2008

Eye Irrit. 2A, H319

Page 1 of 7
2.2. Label elements
Labelling according to EC Regulation No. 1272/2008

Hazard Pictogram

Signal Word
WARNING

Hazard Statement
H319: Causes serious eye irritation.

Precautionary Statements
P305+P351+P338: IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

P313: Get medical advice/attention.

2.3. Other Hazards
No data available

SECTION 3. COMPOSITION / INFORMATION ON INGREDIENTS

<table>
<thead>
<tr>
<th>CAS Number</th>
<th>Weight %</th>
<th>Chemical name</th>
</tr>
</thead>
<tbody>
<tr>
<td>53716-82-8</td>
<td>&gt;=99.5%</td>
<td>(1S,5R)-6,8-dioxabicyclo[3.2.1]octan-4-one</td>
</tr>
</tbody>
</table>

SECTION 4. FIRST AID MEASURES

4.1. Description of first aid measures

If inhaled:
If breathed in, move person into fresh air. If not breathing give artificial respiration. If symptoms are severe and/or persistent, SEEK MEDICAL ATTENTION

If in case of skin contact:
Remove all contaminated articles of clothing, shoes, gloves, safety glasses and immediately wash contaminated skin with soap and large amounts of water and continue flushing with water for at least 15 minutes - SEEK MEDICAL ATTENTION

In case of eye contact:
Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing for at least 15 minutes.* SEEK MEDICAL ATTENTION AS CYRENE IS KNOWN TO BE A SEVERE EYE IRRITANT *

If swallowed:
Rinse mouth out thoroughly with large amounts of water and continue to do so for at least 15 minutes. Never give anything by mouth to an unconscious person. If symptoms are severe and/or persistent, SEEK MEDICAL ATTENTION
4.2. Most important symptoms and effects, both acute and delayed
No data available

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

SECTION 5. FIRE FIGHTING MEASURES

5.1. Extinguishing media
Suitable extinguishing media
In the event of a fire involving this material, extinguish using water spray jet, dry powder, foam, carbon dioxide.

5.2. Special hazards arising from the substance or mixture
Hazardous combustion products
Formation of toxic combustion gases (carbon monoxide (CO)) possible
Vapours may be invisible and they are heavier than air. They spread on the soil and could penetrate into the sewerage system and into cellars.
Vapours can form an explosive mixture with air

5.3. Advice for firefighters
Special protective equipment for fire-fighters
Protective clothing and breathing apparatus should be worn if the fire is large.
Precipitate gases/vapours/mists with water spray

SECTION 6. ACCIDENTAL RELEASE MEASURES

6.1. Personal precautions, protective equipment and emergency procedures
For non-emergency personnel
Wear appropriate respiratory protection. Use personal protective clothing. Ensure adequate ventilation.
If a large quantity has been spilt, evacuate all personnel and only allow intervention by trained operators equipped with safety apparatus.

For emergency responders
Emergency responders will be equipped with safety apparatus.

6.2. Environmental precautions
Do not allow material to enter drains, water courses or to contaminate soil. Dispose of in compliance with the environmental protection requirements.

6.3. Methods and materials for containment and cleaning up
Absorb on sand, vermiculite, diatomaceous earth or any inert absorbent material then place in a suitable closed container for disposal. Store container containing spillage outdoors in a secure, cool, ventilated area away from people. Contact a licensed hazardous waste disposal company for disposal.

SECTION 7. HANDLING AND STORAGE

7.1. Precautions for safe handling
Ensure thorough ventilation of stores and work areas. Product should be worked up in closed equipment as far as possible.
Avoid contact with skin and eyes. Wear suitable gloves and eye/face protection.
Protection against fire and explosion:
The product is combustible.
This material should only be handled by persons suitably qualified and competent in the handling of
potentially hazardous chemicals. The full toxicological and physiological properties of this material are not
known and so normal chemical hygiene precautions should be exercised by all personnel handling this
material (see Section 8).

7.2. Conditions for safe storage, including any incompatibilities.
Store in a tightly closed container in a cool, dry and well ventilated area

SECTION 8. EXPOSURE CONTROLS / PERSONAL PROTECTION

8.1. Control Parameters
No occupational exposure limits known

8.2. Exposure Controls
Appropriate engineering controls
No information available

Personal protective equipment

Respiratory protection
This material has a low vapour pressure and respiratory protection is not required when handling
small quantities under ambient conditions. Manipulation of small samples of the material should be
performed in approved fume cupboards whenever possible. For large quantities, or handling at
elevated temperatures, use multi-purpose combination (US) or type ABEK (EN 14387) respirator
cartridges. Use respirators and components tested and approved under appropriate government
standards.

Hand protection
Protective gloves (eg made of neoprene, nitrile or butyl rubber)

Eye protection
Wear approved safety spectacles when handling small quantities and a full face shield for larger
quantities.

Body Protection
Body protection must be chosen depending on activity and possible exposure, e.g. head protection,
apron, protective boots, chemical-protection suit.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appearance</td>
<td>Clear, colourless to pale yellow liquid</td>
</tr>
<tr>
<td>Odour</td>
<td>Slight ketonic odour, can be lachrymatory at high concentrations</td>
</tr>
<tr>
<td>pH</td>
<td>no data available – not strongly acidic or basic.</td>
</tr>
<tr>
<td>Boiling point</td>
<td>62 - 64°C / 267 Pa (literature); 116 -116.5 °C/ 10 mbar</td>
</tr>
<tr>
<td>Melting point</td>
<td>&lt;-18°C</td>
</tr>
<tr>
<td>Purity</td>
<td>&gt;99.0% (gas chromatography)</td>
</tr>
<tr>
<td>Flash point</td>
<td>108°C (A.9. EG method)*</td>
</tr>
<tr>
<td>Ignition temperature</td>
<td>296 °C (A.15. EG method)*</td>
</tr>
<tr>
<td>Lower explosion limit</td>
<td>no data available</td>
</tr>
</tbody>
</table>
Upper explosion limit : no data available
Molecular formula : $\text{C}_6\text{H}_8\text{O}_3$
Molecular weight : 128.13 g/mol
Density : 1.25 g/cm$^3$
Solubility in water : completely miscible – hydrates to form gem diol.
Solubility in ethyl acetate : completely miscible

SECTION 10. STABILITY AND REACTIVITY

10.1. Reactivity
No hazardous reactions if stored and handled as prescribed/indicated

10.2. Chemical Stability
The product is stable if stored and handled as prescribed/indicated

10.3. Possibility of hazardous reactions
Reacts with strong acids, strong alkalis, strong oxidizing and reducing agents. Very strong exothermic decomposition with high decomposition power at temperatures above 200°C*

10.4. Conditions to avoid
Do not store under conditions of high (or variable) temperature. Keep away from sources of ignition. Exposure to moisture, direct sunlight and/or air should be kept to a minimum.

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

10.6. Hazardous decomposition products
Carbon monoxide and carbon dioxide

SECTION 11. TOXICOLOGICAL INFORMATION

Acute toxicity : LD50 > 2,000 mg/kg (oral, rat)
(OECD No. 423 (Acute Toxic Class Method))*

Irritation and corrosion : eye: irritant (In Vitro; OECD No. 437: BCOP Test)*
skin: non-irritant (rabbit; OECD No. 404)*

Sensitisation : not skin sensitizing (mouse - OECD No. 429, LLNA (Local Lymph Node Assay))*

Chronic exposure : no data available
Carcinogenicity : no data available
Mutagenicity : negative, both with and without metabolic activation
(OECD No.471 (Salmonella typhimurium))*
not mutagenic (OECD No. 487
(In vitro Mammalian Cell Micronucleus Test))*

Chromasomatic aberrations : no data available
### Potential Health Effects

<table>
<thead>
<tr>
<th>Component</th>
<th>Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inhalation</td>
<td>may be harmful if inhaled. May cause respiratory tract irritation</td>
</tr>
<tr>
<td>Skin</td>
<td>may be harmful if absorbed through skin. May cause skin irritation</td>
</tr>
<tr>
<td>Eyes</td>
<td>causes severe eye irritation*, vapour is mildly lachrymatory in some individuals</td>
</tr>
<tr>
<td>Ingestion</td>
<td>may be harmful if swallowed</td>
</tr>
</tbody>
</table>

### SECTION 12. ECOLOGICAL INFORMATION

**Elimination information (persistence and degradability)**
- readily biodegradable 99 %, 14 d (DOC Die-Away Test, OECD No. 301A)*

**Ecotoxicity effects**
- Barely toxic for algae (Pseudokirchneriella subcapitata - OECD No. 201)*
- Barely toxic for planktonic crustaceans (Daphnia magna - OECD No. 202)*
- Barely inhibitory on aerobic bacterial reproduction (Activated Sludge Respir. Inhib. Test, OECD No. 209)*

**Further information on ecology**
No data available

### SECTION 13. DISPOSAL CONSIDERATIONS

**Product**
Waste material should be collected and disposed of by a licensed disposal contractor. All waste disposal must be carried out in accord with all national, state, and local environmental regulations.

**Contaminated packaging**
Dispose of as for Product

### SECTION 14. TRANSPORT INFORMATION

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ARD/RID</td>
<td>Not dangerous goods</td>
</tr>
<tr>
<td>IMDG</td>
<td>Not dangerous goods</td>
</tr>
<tr>
<td>IATA</td>
<td>Not dangerous goods</td>
</tr>
<tr>
<td>UN Number</td>
<td>N/A</td>
</tr>
</tbody>
</table>

### SECTION 15. REGULATORY INFORMATION

Classified according to REGULATION (EC) No 1272/2008

Candidate List: Not Listed

Chemical Weapons: Not Listed (Schedule 1, 2 & 3)

EINECS Number: Not Listed

DIRECTIVE 2012/18/EU: Not a Named Substance. Not in scope based on Circa Group’s classification.
SECTION 16. OTHER INFORMATION

Circa Group believes the above information to be correct but does not claim that it is comprehensive. The information provided is intended to be used as a guide only. The information is based on the present state of Circa’s 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. Circa Group Pty. Ltd., shall not be held liable for any damage resulting from handling or from contact with the above product.