SAFETY DATA SHEET
(±)-Warfarin

1. Identification of the Substance/Mixture and of the Company/Undertaking

1.1 Product Code: 13566
Product Name: (±)-Warfarin
Synonyms: 4-hydroxy-3-(3-oxo-1-phenylbutyl)-2H-1-benzopyran-2-one; WARF 42; Athrombine K; Coumadin; Coumafene; Zoocoumarin;

1.2 Relevant identified uses of the substance or mixture and uses advised against:

Relevant identified uses: For research use only, not for human or veterinary use.

1.3 Details of the Supplier of the Safety Data Sheet:
Company Name: Cayman Chemical Company
1180 E. Ellsworth Rd.
Ann Arbor, MI 48108

Web site address: www.caymanchem.com
Information: +1 (734)971-3335

1.4 Emergency telephone number:
Emergency Contact: CHEMTREC Within USA and Canada: +1 (800)424-9300
CHEMTREC Outside USA and Canada: +1 (703)527-3887

Section 2. Hazards Identification

2.1 Classification of the Substance or Mixture:

2.1.1 Classification according to Regulation (EC) No 1272/2008 [CLP]:
Acute Toxicity: Inhalation, Category 1
Acute Toxicity: Oral, Category 1
Acute Toxicity: Skin, Category 1
Toxic To Reproduction, Category 1A
Target Organ Systemic Toxicity (repeated exposure), Category 1
Aquatic Toxicity (Chronic), Category 3

2.1.2 Classification according to Directive 1999/45/EC:
T: Toxic
Reproductive Hazard: 1
Risk Phrases: R26/27/28, R48, R52/53, R61
For full text of R-phrases: see SECTION 15.

2.2 Label Elements:

2.2.1 Labeling according to Regulation (EC) No 1272/2008 [CLP]:

GHS Signal Word: Danger
GHS Hazard Phrases:
H330: Fatal if inhaled.
H300: Fatal if swallowed.
H310: Fatal in contact with skin.
H360: May damage fertility or the unborn child.
H372: Causes damage to organs through prolonged or repeated exposure.
H412: Harmful to aquatic life with long lasting effects.
GHS Precaution Phrases:
P260: Do not breathe dust/fume/gas/mist/vapours/spray.
P284: (In case of inadequate ventilation,) wear respiratory protection.
P264: Wash hands thoroughly after handling.
P262: Do not get in eyes, on skin, or on clothing.
P270: Do not eat, drink or smoke when using this product.
P280: Wear protective gloves/protective clothing/eye protection/face protection.
P361+364: Take off immediately all contaminated clothing and wash it before reuse.
P201: Obtain special instructions before use.
P202: Do not handle until all safety precautions have been read and understood.
P281: Use personal protective equipment as required.
P273: Avoid release to the environment.

GHS Response Phrases:
P304+340: IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.
P310: Immediately call a POISON CENTER/doctor/...
P301+310: IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician.
P330: Rinse mouth.
P361: Take off immediately all contaminated clothing.
P302+350: IF ON SKIN: Gently wash with plenty of soap and water.
P321: Specific treatment (see ... on this label).
P308+313: IF exposed or concerned: Get medical attention/advice.
P314: Get medical attention/advice if you feel unwell.

GHS Storage and Disposal Phrases:
Please refer to Section 7 for Storage and Section 13 for Disposal information.

2.2.2 Labeling according to Directive 1999/45/EC:

Reproductive Hazard: 1

2.3 Adverse Human Health Effects and Symptoms:
Causes damage to organs through prolonged or repeated exposure.
Fatal if inhaled.
Fatal if swallowed.
Fatal in contact with skin.
Harmful to aquatic life with long lasting effects.
Material may be irritating to the mucous membranes and upper respiratory tract.
May cause eye, skin, or respiratory system irritation.
May damage fertility or the unborn child.
The toxicological properties of this product have not been fully evaluated.

<table>
<thead>
<tr>
<th>CAS # / RTECS #</th>
<th>Hazardous Components (Chemical Name)/REACH Registration No.</th>
<th>Concentration</th>
<th>EC No./EC Index No.</th>
<th>Risk Phrases/ GHS Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>81-81-2 GN4550000</td>
<td>Warfarin</td>
<td>100.0 %</td>
<td>201-377-6 607-056-00-0</td>
<td>T; Rp:1, R26/27/28-48-61-52/53 Acute Tox.(O) 1: H300 Acute Tox.(D) 1: H310 Acute Tox.(!) 1: H330 Toxic Repro. 1A: H360 TOST (RE) 1: H372 Aquatic (C) 3: H412</td>
</tr>
</tbody>
</table>
### Section 4. First Aid Measures

<table>
<thead>
<tr>
<th>4.1 Description of First Aid Measures:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>In Case of Inhalation:</strong> Remove to fresh air. If not breathing, give artificial respiration or give oxygen by trained personnel. Get immediate medical attention.</td>
</tr>
<tr>
<td><strong>In Case of Skin Contact:</strong> Immediately wash skin with soap and plenty of water for at least 15 minutes. Remove contaminated clothing. Get medical attention if symptoms occur. Wash clothing before reuse.</td>
</tr>
<tr>
<td><strong>In Case of Eye Contact:</strong> Hold eyelids apart and flush eyes with plenty of water for at least 15 minutes. Have eyes examined and tested by medical personnel.</td>
</tr>
<tr>
<td><strong>In Case of Ingestion:</strong> Wash out mouth with water provided person is conscious. Never give anything by mouth to an unconscious person. Get medical attention. Do NOT induce vomiting unless directed to do so by medical personnel.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>4.2 Important Symptoms and Effects, Both Acute and Delayed:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inhibits blood coagulation; Causes abnormal clotting, bruising, and/or bleeding.</td>
</tr>
<tr>
<td>Causes abnormal hematologic indices.</td>
</tr>
<tr>
<td>May cause back and/or abdominal pain, vomiting, and/or petechial rash.</td>
</tr>
<tr>
<td>May cause hematuria (blood in the urine), fecal blood, epistaxis (nosebleed), and mucous membrane and/or lip hemorrhage.</td>
</tr>
</tbody>
</table>

### Section 5. Fire Fighting Measures

<table>
<thead>
<tr>
<th>5.1 Suitable Extinguishing Media:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Use alcohol-resistant foam, carbon dioxide, water, or dry chemical spray.</td>
</tr>
<tr>
<td><strong>Unsuitable Extinguishing Media:</strong></td>
</tr>
<tr>
<td>A solid water stream may be inefficient.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>5.2 Flammable Properties and Hazards:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flash Pt: No data.</td>
</tr>
<tr>
<td>Explosive Limits: LEL: No data. UEL: No data.</td>
</tr>
<tr>
<td>Autoignition Pt: No data.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>5.3 Fire Fighting Instructions:</th>
</tr>
</thead>
<tbody>
<tr>
<td>As in any fire, wear self-contained breathing apparatus pressure-demand (NIOSH approved or equivalent), and full protective gear to prevent contact with skin and eyes.</td>
</tr>
</tbody>
</table>

### Section 6. Accidental Release Measures

<table>
<thead>
<tr>
<th>6.1 Protective Precautions, Protective Equipment and Emergency Procedures:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Avoid raising and breathing dust, and provide adequate ventilation.</td>
</tr>
<tr>
<td>As conditions warrant, wear a NIOSH approved self-contained breathing apparatus, or respirator, and appropriate personal protection (rubber boots, safety goggles, and heavy rubber gloves).</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>6.2 Environmental Precautions:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Take steps to avoid release into the environment, if safe to do so.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>6.3 Methods and Material For Containment and Cleaning:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contain spill and collect, as appropriate.</td>
</tr>
<tr>
<td>Transfer to a chemical waste container for disposal in accordance with local regulations.</td>
</tr>
</tbody>
</table>

### Section 7. Handling and Storage

<table>
<thead>
<tr>
<th>7.1 Precautions To Be Taken in Handling:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Avoid breathing dust/fume/gas/mist/vapours/spray.</td>
</tr>
<tr>
<td>Avoid prolonged or repeated exposure.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>7.2 Precautions To Be Taken in Storing:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Keep container tightly closed.</td>
</tr>
<tr>
<td>Store in accordance with information listed on the product insert.</td>
</tr>
</tbody>
</table>
Section 8. Exposure Controls/Personal Protection

8.1 Exposure Parameters:

<table>
<thead>
<tr>
<th>CAS #</th>
<th>Partial Chemical Name</th>
<th>Britain EH40</th>
<th>France VL</th>
<th>Europe</th>
</tr>
</thead>
<tbody>
<tr>
<td>81-81-2</td>
<td>Warfarin</td>
<td>No data.</td>
<td>TWA: 0.1 mg/m3</td>
<td>No data.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CAS #</th>
<th>Partial Chemical Name</th>
<th>OSHA TWA</th>
<th>ACGIH TWA</th>
<th>Other Limits</th>
</tr>
</thead>
<tbody>
<tr>
<td>81-81-2</td>
<td>Warfarin</td>
<td>PEL: 0.1 mg/m3</td>
<td>TLV: 0.1 mg/m3</td>
<td>No data.</td>
</tr>
</tbody>
</table>

8.2 Exposure Controls:

8.2.1 Engineering Controls

Use process enclosures, local exhaust ventilation, or other engineering controls to control airborne levels below recommended exposure limits.

8.2.2 Personal protection equipment:

- **Eye Protection:** Safety glasses
- **Protective Gloves:** Compatible chemical-resistant gloves
- **Respiratory Equipment:** NIOSH approved respirator, as conditions warrant.
- **Other Protective Clothing:** Lab coat

Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower.

Wash thoroughly after handling.

No data available.

Section 9. Physical and Chemical Properties

9.1 Information on Basic Physical and Chemical Properties

- **Physical States:** [ ] Gas     [ ] Liquid     [ X ] Solid
- **Appearance and Odor:** A crystalline solid
- **Melting Point:** No data.
- **Boiling Point:** No data.
- **Flash Pt:** No data.
- **Evaporation Rate:** No data.
- **Explosive Limits:** LEL: No data. UEL: No data.
- **Vapor Pressure (vs. Air or mm Hg):** No data.
- **Vapor Density (vs. Air = 1):** No data.
- **Specific Gravity (Water = 1):** No data.
- **Solubility in Water:** No data.
- **Solubility Notes:** ~5 mg/ml in EtOH; ~25 mg/ml in DMF & DMSO;
- **Autoignition Pt:** No data.
## 9.2 Other Information

- **Percent Volatile:** No data.
- **Molecular Formula & Weight:** C19H16O4, 308.3

### Section 10. Stability and Reactivity

<table>
<thead>
<tr>
<th>Section 10. Stability and Reactivity</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>10.1 Reactivity:</strong> No data available.</td>
</tr>
<tr>
<td><strong>10.2 Stability:</strong> Stable [X]</td>
</tr>
<tr>
<td><strong>10.3 Stability Note(s):</strong> Stable if stored in accordance with information listed on the product insert.</td>
</tr>
<tr>
<td><strong>Polymerization:</strong> Will not occur [X]</td>
</tr>
<tr>
<td><strong>10.4 Conditions To Avoid:</strong> No data available.</td>
</tr>
<tr>
<td><strong>10.5 Incompatibility - Materials</strong></td>
</tr>
<tr>
<td><strong>To Avoid:</strong> strong acids</td>
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<tr>
<td></td>
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<tr>
<td></td>
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<tr>
<td><strong>10.6 Hazardous</strong></td>
</tr>
<tr>
<td><strong>Decomposition Or</strong></td>
</tr>
<tr>
<td><strong>Byproducts:</strong></td>
</tr>
</tbody>
</table>

### Section 11. Toxicological Information

#### 11.1 Information on Toxicological Effects:

- Warfarin - Toxicity Data: Oral LD50 (rat): 1.6 mg/kg; Skin LD50 (rat): 1,400 mg/kg; Inhalation LC50 (rat): 320 mg/m3;
- Chronic Toxicological Effects: Warfarin - Investigated as a reproductive effector.
- Only select Registry of Toxic Effects of Chemical Substances (RTECS) data is presented here.
- See actual entry in RTECS for complete information.
- Warfarin RTECS: GN4550000

#### Carcinogenicity:

- NTP? No
- IARC Monographs? No
- OSHA Regulated? No

### Section 12. Ecological Information

#### 12.1 Toxicity:

- Avoid release into the environment.
- Harmful to aquatic organisms, may cause long-term adverse effects in the aquatic environment.
- Runoff from fire control or dilution water may cause pollution.

#### 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:

- No data available.

### Section 13. Disposal Considerations

#### 13.1 Waste Disposal Method:

- Dispose in accordance with local, state, and federal regulations.
Section 14. Transport Information

14.1 LAND TRANSPORT (US DOT):
DOT Proper Shipping Name: Toxic solid, organic, n.o.s. (Warfarin)
DOT Hazard Class: 6.1 POISON
UN/NA Number: 2811 Packing Group: I

14.1 LAND TRANSPORT (European ADR/RID):
ADR/RID Shipping Name: Toxic solid, organic, n.o.s. (Warfarin)
UN Number: 2811 Packing Group: I
Hazard Class: 6.1 - POISON

14.3 AIR TRANSPORT (ICAO/IATA):
ICAO/IATA Shipping Name: Toxic solid, organic, n.o.s. (Warfarin)
UN Number: 2811 Packing Group: I
Hazard Class: 6.1 - POISON
IATA Classification: 6.1
Additional Transport Information: Transport in accordance with local, state, and federal regulations.

Section 15. Regulatory Information

EPA SARA (Superfund Amendments and Reauthorization Act of 1986) Lists

<table>
<thead>
<tr>
<th>CAS #</th>
<th>Hazardous Components (Chemical Name)</th>
<th>S. 302 (EHS)</th>
<th>S. 304 RQ</th>
<th>S. 313 (TRI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>81-81-2</td>
<td>Warfarin</td>
<td>Yes 500 LB</td>
<td>Yes 100 LB</td>
<td>Yes-Cat. N874</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CAS #</th>
<th>Hazardous Components (Chemical Name)</th>
<th>Other US EPA or State Lists</th>
</tr>
</thead>
<tbody>
<tr>
<td>81-81-2</td>
<td>Warfarin</td>
<td>CAA HAP,ODC: No; CWA NPDES: No; TSCA: Yes - Inventory; CA PROP.65: Yes</td>
</tr>
</tbody>
</table>

European Community Hazard Symbol codes:

Reproductive Hazard: 1

European Community Risk and Safety Phrases:

R26/27/28 Very toxic by inhalation, in contact with skin and if swallowed.
R48 Danger of serious damage to health by prolonged exposure.
R52/53 Harmful to aquatic organisms, may cause long-term adverse effects in the aquatic environment.
R61 May cause harm to the unborn child.
S22 Do not breathe dust.
S24/25 Avoid contact with skin and eyes.
S36/37/39 Wear suitable protective clothing, gloves and eye/face protection.
S45 In case of accident or if you feel unwell, seek medical advice immediately (show the label whenever possible.)
S53 Avoid exposure - obtain special instructions before use.
S61 Avoid release to the environment. Refer to special instructions / safety data sheets.
Section 16. Other Information

Revision Date: 08/18/2014
Additional Information About This Product: No data available.

Company Policy or Disclaimer: DISCLAIMER: This information is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes.