SAFETY DATA SHEET
(-)-Warfarin

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

1.1 Product Code: 13531
Product Name: (-)-Warfarin
Synonyms: 4-hydroxy-3-[(1S)-3-oxo-1-phenylbutyl]-2H-1-benzopyran-2-one; (S)-Warfarin;

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: Cayman Chemical Company +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]:
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: R48/25, 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:
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:
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.
P260: Do not breathe (dust/fume/gas/mist/vapours/spray).
P264: Wash (hands) thoroughly after handling.
P273: Avoid release to the environment.

GHS Response Phrases:
P308+313: IF exposed or concerned: Get medical attention/advice.
P314: Get medical attention/advice if you feel unwell.

GHS Storage and Disposal Phrases:
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.
- Harmful to aquatic life with long lasting effects.
- Material may be irritating to the mucous membranes and upper respiratory tract.
- May be harmful by inhalation, ingestion, or skin absorption.
- May cause eye, skin, or respiratory system irritation.
- May damage fertility or the unborn child.
- To the best of our knowledge, the toxicological properties have not been thoroughly investigated.

### Section 3. Composition/Information on Ingredients

<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>5543-57-7 NA</td>
<td>(S)-4-Hydroxy-3-(3-oxo-1-phenylbutyl)-2-benzopyrone</td>
<td>100.0 %</td>
<td>226-907-3 607-056-00-0</td>
<td>T; Rp:1, R61-48/25-52/53</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Toxic Repro. 1A: H360</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>TOST (RE) 1: H372</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Aquatic (C) 3: H412</td>
</tr>
</tbody>
</table>

### Section 4. First Aid Measures

#### 4.1 Description of First Aid Measures:

- **In Case of Inhalation:** Remove to fresh air. If not breathing, give artificial respiration or give oxygen by trained personnel. Get immediate medical attention.

- **In Case of Skin Contact:** 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.

- **In Case of Eye Contact:** Hold eyelids apart and flush eyes with plenty of water for at least 15 minutes. Have eyes examined and tested by medical personnel.

- **In Case of Ingestion:** 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.

#### 4.2 Important Symptoms and Effects, Both Acute and Delayed:

- **Inhibits blood coagulation; Causes abnormal clotting, bruising, and/or bleeding.**
- **Causes abnormal hematologic indices.**
- **May cause back and/or abdominal pain, vomiting, and/or petechial rash.**
- **May cause hematuria (blood in the urine), fecal blood, epistaxis (nosebleed), and mucous membrane and/or lip hemorrhage.**

Multi-region format
Section 5. Fire Fighting Measures

5.1 Suitable Extinguishing Media: Use alcohol-resistant foam, carbon dioxide, water, or dry chemical spray.

Unsuitable Extinguishing Media: Use water spray to cool fire-exposed containers.

5.2 Flammable Properties and Hazards:

Flash Pt: No data.

Explosive Limits:
- LEL: No data.
- UEL: No data.

Autoignition Pt: No data.

5.3 Fire Fighting Instructions: 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.

Section 6. Accidental Release Measures

6.1 Protective Precautions, Protective Equipment and Emergency Procedures: Avoid raising and breathing dust, and provide adequate ventilation.

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).

6.2 Environmental Precautions: Take steps to avoid release into the environment, if safe to do so.

6.3 Methods and Material For Containment and Cleaning: Contain spill and collect, as appropriate.

Transfer to a chemical waste container for disposal in accordance with local regulations.

Section 7. Handling and Storage

7.1 Precautions To Be Taken in Handling: Avoid breathing dust/fume/gas/mist/vapours/spray.

Avoid prolonged or repeated exposure.

7.2 Precautions To Be Taken in Storing: Keep container tightly closed.

Store in accordance with information listed on the product insert.

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>
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</thead>
<tbody>
<tr>
<td>5543-57-7</td>
<td>(S)-4-Hydroxy-3-(3-oxo-1-phenylbutyl)-2-benzopyrone</td>
<td>No data.</td>
<td>No data.</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>5543-57-7</td>
<td>(S)-4-Hydroxy-3-(3-oxo-1-phenylbutyl)-2-benzopyrone</td>
<td>No data.</td>
<td>No data.</td>
<td>No data.</td>
</tr>
</tbody>
</table>

8.2 Exposure Controls:

8.2.1 Engineering Controls (Ventilation etc.): 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
- **Other Protective Clothing:** Lab coat
- **Respiratory Equipment (Specify Type):** NIOSH approved respirator, as conditions warrant.
- **Work/Hygienic/Maintenance Practices:** Do not take internally.

Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety
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 DMSO & DMF;

Autoignition Pt:
- No data.

9.2 Other Information

Molecular Formula & Weight:
- C19H16O4
- 308.3

Section 10. Stability and Reactivity

10.1 Reactivity:
- No data available.

10.2 Stability:
- Unstable [ ]
- Stable [X]

10.3 Stability Note(s):
- Stable if stored in accordance with information listed on the product insert.

Polymerization:
- Will occur [ ]
- Will not occur [X]

10.4 Conditions To Avoid:
- No data available.

10.5 Incompatibility - Materials
- strong acids
- To Avoid:
  - strong bases
  - strong oxidizing agents

10.6 Hazardous Decomposition Or Byproducts:
- carbon dioxide
- carbon monoxide
Section 11. Toxicological Information

11.1 Information on Toxicological Effects: The toxicological effects of this product have not been thoroughly studied.

(-)-Warfarin - Toxicity Data: TDLO LD50 (mouse): 2.25 mg/kg/3D (intermittent);

Chronic Toxicological Effects: Only select Registry of Toxic Effects of Chemical Substances (RTECS) data is presented here.

See actual entry in RTECS for complete information.

(-)-Warfarin RTECS: DJ3100235

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.

When sold in quantities of less than or equal to 1 mL, or 1 g, with an Excepted Quantity Code of E1, E2, E4, or E5, this item meets the De Minimis Quantities exemption, per IATA 2.6.10. Therefore packaging does not have to be labeled as Dangerous Goods/Excepted Quantity.
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>5543-57-7</td>
<td>(S)-4-Hydroxy-3-(3-oxo-1-phenylbutyl)-2-benzopyrone</td>
<td>No</td>
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<tr>
<th>CAS #</th>
<th>Hazardous Components (Chemical Name)</th>
<th>Other US EPA or State Lists</th>
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<tr>
<td>5543-57-7</td>
<td>(S)-4-Hydroxy-3-(3-oxo-1-phenylbutyl)-2-benzopyrone</td>
<td>CAA HAP, ODC: No; CWA NPDES: No; TSCA: No; CA PROP.65: No</td>
</tr>
</tbody>
</table>

European Community Hazard Symbol codes:

European Community Risk and Safety Phrases:

R48/25  Toxic: danger of serious damage to health by prolonged exposure if swallowed.
R52/53  Harmful to aquatic organisms, may cause long-term adverse effects in the aquatic environment.
R61  May cause harm to the unborn child.
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.

Regulatory Information Statement: This SDS was prepared in accordance with Regulation (EC) No.1272/2008 and European Directive 67/548/EEC as amended.

Section 16. Other Information

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

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