

MATERIAL SAFETY DATA SHEET

(-)-Warfarin

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Cayman Chemical Company
1180 E. Ellsworth Rd.
Ann Arbor, MI 48108

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1. Product and Company Identification

Product Code: 13531
Product Name: (-)-Warfarin
Manufacturer Information
Company Name: Cayman Chemical Company
Emergency Contact: Cayman Chemical Company (800)364-9897
Information: Cayman Chemical Company (734)971-3335
Synonyms: 4-hydroxy-3-[(1S)-3-oxo-1-phenylbutyl]-2H-1-benzopyran-2-one; (S)-Warfarin;

2. Hazards Identification

Emergency Overview: Toxic.
Avoid contact and inhalation.
Target Organ(s): blood, cardiovascular system

Route(s) of Entry: Inhalation? Yes Skin? Yes Eyes? Yes Ingestion? Yes Other: Injection

Health Hazards (Acute and Chronic): Material may be irritating to the mucous membranes and upper respiratory tract.
May be harmful by inhalation or skin absorption.
May cause eye, skin, or respiratory system irritation.
May cause congenital malformation in the fetus.
May cause harm to unborn child.
Toxic if swallowed.
The toxicological properties of this product have not been fully evaluated.

LD 50 / LC 50: Please refer to Section 11.

Signs and Symptoms Of Exposure: 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.

3. Composition/Information on Ingredients

Hazardous Components (Chemical Name)	CAS #	Concentration	EC#
1. (S)-4-Hydroxy-3-(3-oxo-1-phenylbutyl)-2-benzopyrone	5543-57-7	100.0 %	226-907-3

4. First Aid Measures

Emergency and First Aid Procedures: If inhaled, remove to fresh air. If not breathing, give artificial respiration or give oxygen by trained personnel. Get immediate medical attention.
If swallowed, 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.
In case of contact with eyes, hold eyelids apart and flush eyes with plenty of water for at least 20 minutes. Have eyes examined and tested by medical personnel.
In case of skin contact, immediately wash skin with soap and plenty of water for at least 20 minutes. Remove contaminated clothing. Get medical attention if symptoms occur. Wash clothing before reuse.

5. Fire Fighting Measures

Flash Pt: No data.

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

Special Fire Fighting Procedures: 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.

Unusual Fire and Explosion Hazards: No data available.

Hazardous Combustion Products: No data available.

Suitable Extinguishing Media: Use alcohol-resistant foam, carbon dioxide, water, or dry chemical spray.
Use water spray to cool fire-exposed containers.

Unsuitable Extinguishing Media: A solid water stream may be inefficient.

6. Accidental Release Measures

Steps To Be Taken In Case Material Is Released Or Spilled: Avoid release into the environment.
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).
Transfer to a proper chemical waste container for disposal.

7. Handling and Storage

Hazard Label Information: Avoid contact with skin and eyes. Do not reuse this container. Use with adequate ventilation.
Wash thoroughly after handling

Precautions To Be Taken in Handling: Avoid breathing (dust, vapor, mist, gas).
Avoid prolonged or repeated exposure.

Precautions To Be Taken in Storing: Keep tightly closed.
Store at correct temperature.

8. Exposure Controls/Personal Protection

Hazardous Components (Chemical Name)	CAS #	OSHA PEL	ACGIH TLV	Other Limits
1. (S)-4-Hydroxy-3-(3-oxo-1-phenylbutyl)-2-benzopyrone	5543-57-7	No data.	No data.	No data.

Protective Equipment Summary - Hazard Label Information: Compatible chemical-resistant gloves Eye wash station in work area Lab coat Safety glasses Safety shower in work area Vent Hood

Respiratory Equipment (Specify Type): NIOSH approved respirator, as conditions warrant.

Eye Protection: Safety glasses

Protective Gloves: Compatible chemical-resistant gloves

Other Protective Clothing: Lab coat

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

Work/Hygienic/Maintenance Practices: Do not take internally.
Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower.
Wash thoroughly after handling.

9. Physical and Chemical Properties

Physical States: [] Gas [] Liquid [X] Solid

Melting Point: No data.

Boiling Point: No data.

Autoignition Pt: No data.

Flash Pt: No data.

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

Specific Gravity (Water = 1): No data.

Bulk density: No data.

Vapor Pressure (vs. Air or mm Hg):	No data.
Vapor Density (vs. Air = 1):	No data.
Evaporation Rate (vs Butyl Acetate=1):	No data.
Solubility in Water:	No data.
Solubility Notes:	~5 mg/ml in EtOH; ~25 mg/ml in DMF & DMSO;
Percent Volatile:	No data.
Heat Value:	No data.
Particle Size:	No data.
Corrosion Rate:	No data.
Formula:	C ₁₉ H ₁₆ O ₄
Molecular Weight:	308.30
pH:	No data.
Appearance and Odor:	A crystalline solid

10. Stability and Reactivity

Stability:	Unstable [] Stable [X]
Conditions To Avoid - Instability:	No data available.
Incompatibility - Materials To Avoid:	strong acids strong bases strong oxidizing agents
Hazardous Decomposition Or Byproducts:	carbon dioxide carbon monoxide
Possibility of Hazardous Reactions:	Will occur [] Will not occur [X]
Conditions To Avoid - Hazardous Reactions:	No data available.

11. Toxicological Information

:	The toxicological effects of this product have not been thoroughly studied.
Chronic Toxicological Effects:	Warfarin - Toxicity Data: Oral LD50 (rat): 1.6 mg/kg; Dermal LD50 (rat): 1,400 mg/kg; Inhalation LC50 (rat): 320 mg/m ³ ; 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/Other Information:	No data available.
Carcinogenicity:	NTP? No IARC Monographs? No OSHA Regulated? No

12. Ecological Information

:	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.
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13. Disposal Considerations

Waste Disposal Method:	Dispose in accordance with local, state, and federal regulations.
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14. Transport Information

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

MATERIAL SAFETY DATA SHEET

(-)-Warfarin

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

15. Regulatory Information

European Community Hazard Symbol codes T: Toxic; Reproductive Hazard: 1

European Community Risk and Safety Phrases

- R61 - May cause harm to the unborn child.
- 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.
- S53 - Avoid exposure - obtain special instructions before use.
- S45 - In case of accident or if you feel unwell, seek medical advice immediately (show the label whenever possible.)
- S61 - Avoid release to the environment. Refer to special instructions / safety data sheets.

US EPA SARA Title III

Hazardous Components (Chemical Name)	CAS #	Sec.302 (EHS)	Sec.304 RQ	Sec.313 (TRI)	Sec.110
1. (S)-4-Hydroxy-3-(3-oxo-1-phenylbutyl)-2-benzopyrone	5543-57-7	No	No	No	No

US EPA CAA, CWA, TSCA

Hazardous Components (Chemical Name)	CAS #	EPA CAA	EPA CWA NPDES	EPA TSCA	HPV/LPV
1. (S)-4-Hydroxy-3-(3-oxo-1-phenylbutyl)-2-benzopyrone	5543-57-7	HAP, ODC ()	No	No	

16. Other Information

Company Policy or Disclaimer

For research use only, not for human or veterinary clinical use.

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.

N.A.=Not available, N.P.=Not applicable, N.D.=Not determined, N.E.=Not established, N.R.=Not required