1 Identification

- Product identifier
- **Trade name**: (-)-Warfarin
- **Synonym**: 4-hydroxy-3-[(1S)-3-oxo-1-phenylbutyl]-2H-1-benzopyran-2-one
- **Article number**: 13531, 006406
- **CAS Number**: 5543-57-7
- **EC number**: 226-907-3
- **Index number**: 607-056-00-0
- **Application of the substance / the mixture**: For research use only, not for human or veterinary use.

2 Hazard(s) identification

- **Classification of the substance or mixture**

  ![GHS06 Skull and crossbones]

  Acute Tox. 2  H300  Fatal if swallowed.
  Acute Tox. 1  H310  Fatal in contact with skin.
  Acute Tox. 1  H330  Fatal if inhaled.

  ![GHS08 Health hazard]

  Repr. 1A  H360  May damage fertility or the unborn child.
  STOT RE 1  H372  Causes damage to the blood through prolonged or repeated exposure.

  ![GHS09 Environment]

  Aquatic Chronic 2  H411  Toxic to aquatic life with long lasting effects.

(Contd. on page 2)
Trade name: (-)-Warfarin

· **Label elements**
  · **GHS label elements**
    The substance is classified and labeled according to the Globally Harmonized System (GHS).
  · **Hazard pictograms**
    GHS06  GHS08  GHS09

· **Signal word** Danger

· **Hazard-determining components of labeling:**
  (S)-4-Hydroxy-3-(3-oxo-1-phenylbutyl)-2-benzopyrone

· **Hazard statements**
  H300+H310+H330 Fatal if swallowed, in contact with skin or if inhaled.
  H360 May damage fertility or the unborn child.
  H372 Causes damage to the blood through prolonged or repeated exposure.
  H411 Toxic to aquatic life with long lasting effects.

· **Precautionary statements**
  Obtain special instructions before use.
  Do not handle until all safety precautions have been read and understood.
  Do not breathe dust/fume/gas/mist/vapors/spray.
  Do not get in eyes, on skin, or on clothing.
  Wash thoroughly after handling.
  Do not eat, drink or smoke when using this product.
  Use only outdoors or in a well-ventilated area.
  Avoid release to the environment.
  Wear protective gloves/protective clothing/eye protection/face protection.
  [In case of inadequate ventilation] wear respiratory protection.
  If swallowed: Immediately call a poison center/doctor.
  Rinse mouth.
  If on skin: Wash with plenty of water.
  IF INHALED: Remove person to fresh air and keep comfortable for breathing.
  IF exposed or concerned: Get medical advice/attention.
  Get medical advice/attention if you feel unwell.
  Specific treatment is urgent (see on this label).
  Take off immediately all contaminated clothing and wash it before reuse.
  Collect spillage.
  Store in a well-ventilated place. Keep container tightly closed.
  Store locked up.
  Dispose of contents/container in accordance with local/regional/national/international regulations.

· **Classification system:**
  · **NFPA ratings (scale 0 - 4)**
    Health = 4
    Fire = 0
    Reactivity = 0
  · **HMIS-ratings (scale 0 - 4)**
    Health = *4
    Fire = 0
    Reactivity = 0

(Contd. from page 1)
Trade name: (-)-Warfarin

- Other hazards
- Results of PBT and vPvB assessment
  PBT: Not applicable.
  vPvB: Not applicable.

3 Composition/information on ingredients

- Chemical characterization: Substances
- CAS No. Description
  5543-57-7 (S)-4-Hydroxy-3-(3-oxo-1-phenylbutyl)-2-benzopyrone
- Identification number(s)
  EC number: 226-907-3
  Index number: 607-056-00-0

4 First-aid measures

- Description of first aid measures
- General information:
  Immediately remove any clothing soiled by the product.
  Symptoms of poisoning may even occur after several hours; therefore medical observation for at least
  48 hours after the accident.
  Remove breathing apparatus only after contaminated clothing have been completely removed.
  In case of irregular breathing or respiratory arrest provide artificial respiration.
- After inhalation:
  Supply fresh air or oxygen; call for doctor.
- After skin contact:
  Immediately wash with water and soap and rinse thoroughly.
- After eye contact:
  Rinse opened eye for several minutes under running water. Then consult a doctor.
- After swallowing:
  Do not induce vomiting; immediately call for medical help.
- Information for doctor:
  Most important symptoms and effects, both acute and delayed
  May cause anemia, cough, CNS depression, drowsiness, headache, heart damage, lassitude
  (weakness, exhaustion), liver damage, narcosis, reproductive effects, teratogenic effects.
  No further relevant information available.

5 Fire-fighting measures

- Extinguishing media
- Suitable extinguishing agents:
  Use fire fighting measures that suit the environment.
  A solid water stream may be inefficient.
- Special hazards arising from the substance or mixture
  67-56-1 During heating or in case of fire poisonous gases are produced.
- Advice for firefighters
- Protective equipment: Mouth respiratory protective device.
6 Accidental release measures

- Personal precautions, protective equipment and emergency procedures
  Mount respiratory protective device.
- Environmental precautions:
  Do not allow product to reach sewage system or any water course.
  Inform respective authorities in case of seepage into water course or sewage system.
  Do not allow to enter sewers/surface or ground water.
- Methods and material for containment and cleaning up:
  Dispose contaminated material as waste according to item 13.
  Ensure adequate ventilation.
- Reference to other sections
  See Section 7 for information on safe handling.
  See Section 8 for information on personal protection equipment.
  See Section 13 for disposal information.
- Protective Action Criteria for Chemicals
  - PAC-1:
    Substance is not listed.
  - PAC-2:
    Substance is not listed.
  - PAC-3:
    Substance is not listed.

7 Handling and storage

- Handling:
  - Precautions for safe handling
    Thorough dedusting.
    Ensure good ventilation/exhaustion at the workplace.
    Open and handle receptacle with care.
  - Information about protection against explosions and fires:
    Keep respiratory protective device available.
- Conditions for safe storage, including any incompatibilities
- Storage:
  - Requirements to be met by storerooms and receptacles: No special requirements.
  - Information about storage in one common storage facility: Not required.
  - Further information about storage conditions: Keep receptacle tightly sealed.
  - Specific end use(s) No further relevant information available.

8 Exposure controls/personal protection

- Additional information about design of technical systems: No further data; see item 7.
- Control parameters
  - Components with limit values that require monitoring at the workplace: Not required.
  - Additional information: The lists that were valid during the creation were used as basis.
- Exposure controls
  - Personal protective equipment:
  - General protective and hygienic measures:
    Keep away from foodstuffs, beverages and feed.
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Immediately remove all soiled and contaminated clothing. Wash hands before breaks and at the end of work. Store protective clothing separately. Avoid contact with the eyes and skin.

- **Breathing equipment:**
  In case of brief exposure or low pollution use respiratory filter device. In case of intensive or longer exposure use respiratory protective device that is independent of circulating air.

- **Protection of hands:**

  ![Protective gloves](image)

  The glove material has to be impermeable and resistant to the product/ the substance/ the preparation. Due to missing tests no recommendation to the glove material can be given for the product/ the preparation/ the chemical mixture.

  Selection of the glove material on consideration of the penetration times, rates of diffusion and the degradation

- **Material of gloves**
  The selection of the suitable gloves does not only depend on the material, but also on further marks of quality and varies from manufacturer to manufacturer.

- **Penetration time of glove material**
  The exact break through time has to be found out by the manufacturer of the protective gloves and has to be observed.

- **Eye protection:**

  ![Tightly sealed goggles](image)

9 Physical and chemical properties

- **Information on basic physical and chemical properties**
  - **General Information**
    - **Appearance:**
      - **Form:** Solid
      - **Color:** White
    - **Odor:** Characteristic
    - **Molecular Weight:** 308.3 g/mol
    - **Odor threshold:** Not determined.
    - **pH-value:** Not applicable.
  - **Change in condition**
    - **Melting point/Melting range:** Undetermined.
    - **Boiling point/Boiling range:** Undetermined.
  - **Flash point:** Not applicable.
  - **Flammability (solid, gaseous):** Product is not flammable.
  - **Decomposition temperature:** Not determined.
  - **Auto igniting:** Not determined.
Trade name: (-)-Warfarin

- **Danger of explosion:** Product does not present an explosion hazard.
  - **Explosion limits:**
    - Lower: Not determined.
    - Upper: Not determined.
  - **Vapor pressure:** Not applicable.
- **Density:** Not determined.
  - **Relative density:** Not determined.
  - **Vapor density:** Not applicable.
  - **Evaporation rate:** Not applicable.
- **Solubility in / Miscibility with Water:** Soluble.
- **Partition coefficient (n-octanol/water):** Not determined.
- **Viscosity:**
  - Dynamic: Not applicable.
  - Kinematic: Not applicable.
  - VOC content: 0.00 %
  - Solids content: 100.0 %
- **Other information**
  - No further relevant information available.

### 10 Stability and reactivity

- **Reactivity**
  - No further relevant information available.
- **Chemical stability**
- **Thermal decomposition / conditions to be avoided:**
  - No decomposition if used according to specifications.
- **Possibility of hazardous reactions**
  - No dangerous reactions known.
- **Conditions to avoid**
  - No further relevant information available.
- **Incompatible materials:**
  - No further relevant information available.
- **Hazardous decomposition products:**
  - No dangerous decomposition products known.

### 11 Toxicological information

- **Information on toxicological effects**
- **Acute toxicity:**
  - **LD/LC50 values that are relevant for classification:**
    - **ATE (Acute Toxicity Estimate):**
      - Oral LD50: 5 mg/kg
      - Dermal LD50: 5 mg/kg
      - Inhalative LC50/4 h: 0.005 mg/l
  - 5543-57-7 (S)-4-Hydroxy-3-(3-oxo-1-phenylbutyl)-2-benzopyrone
    - Oral TDLO: 2.25 ml/kg/3D intermittent (mouse)
- **Primary irritant effect:**
  - on the skin: No irritant effect.
  - on the eye: No irritating effect.
Trade name: (-)-Warfarin

- **Sensitization:** No sensitizing effects known.
- **Additional toxicological information:** Danger through skin absorption.

**Carcinogenic categories**

- **IARC (International Agency for Research on Cancer)**
  Substance is not listed.
- **NTP (National Toxicology Program)**
  Substance is not listed.
- **OSHA-Ca (Occupational Safety & Health Administration)**
  Substance is not listed.

**12 Ecological information**

- **Toxicity**
  - **Aquatic toxicity:** No further relevant information available.
  - **Persistence and degradability:** No further relevant information available.
  - **Behavior in environmental systems:**
    - **Bioaccumulative potential:** No further relevant information available.
    - **Mobility in soil:** No further relevant information available.
  - **Ecotoxicological effects:**
    - **Remark:** Toxic for fish
  - **Additional ecological information:**
    - **General notes:**
      Water hazard class 3 (Self-assessment): extremely hazardous for water
      Do not allow product to reach ground water, water course or sewage system, even in small quantities.
      Danger to drinking water if even extremely small quantities leak into the ground.
      Also poisonous for fish and plankton in water bodies.
      Toxic for aquatic organisms
  - **Results of PBT and vPvB assessment**
    - **PBT:** Not applicable.
    - **vPvB:** Not applicable.
  - **Other adverse effects** No further relevant information available.

**13 Disposal considerations**

- **Waste treatment methods**
  - **Recommendation:**
    Must not be disposed of together with household garbage. Do not allow product to reach sewage system.

- **Uncleaned packagings:**
  - **Recommendation:** Disposal must be made according to official regulations.
  - **Recommended cleansing agent:** Water, if necessary with cleansing agents.

**14 Transport information**

- **UN-Number**
  UN2811
### 15 Regulatory information

**Safety, health and environmental regulations/legislation specific for the substance or mixture**

No further relevant information available.

**Sara**

**Section 355 (extremely hazardous substances):**

Substance is not listed.
Trade name: (-)-Warfarin

· **Section 313 (Specific toxic chemical listings):**
  Substance is not listed.

· **TSCA (Toxic Substances Control Act):**
  Substance is not listed.

· **Hazardous Air Pollutants**
  Substance is not listed.

· **Proposition 65**
  · **Chemicals known to cause cancer:**
    Substance is not listed.
  · **Chemicals known to cause reproductive toxicity for females:**
    Substance is not listed.
  · **Chemicals known to cause reproductive toxicity for males:**
    Substance is not listed.
  · **Chemicals known to cause developmental toxicity:**
    Substance is not listed.

· **Carcinogenic categories**
  · **EPA (Environmental Protection Agency)**
    Substance is not listed.
  · **TLV (Threshold Limit Value established by ACGIH)**
    Substance is not listed.
  · **NIOSH-Ca (National Institute for Occupational Safety and Health)**
    Substance is not listed.

· **Chemical safety assessment:** A Chemical Safety Assessment has not been carried out.

### 16 Other information

This information is based on our present knowledge. However, this shall not constitute a guarantee for any specific product features and shall not establish a legally valid contractual relationship.

· **Department issuing SDS:** Environment protection department.
· **Contact:** -
· **Date of preparation / last revision** 02/23/2021 / -

**Abbreviations and acronyms:**
- IMDG: International Maritime Code for Dangerous Goods
- DOT: US Department of Transportation
- IATA: International Air Transport Association
- ACGIH: American Conference of Governmental Industrial Hygienists
- EINECS: European Inventory of Existing Commercial Chemical Substances
- CAS: Chemical Abstracts Service (division of the American Chemical Society)
- NFPA: National Fire Protection Association (USA)
- HMIIS: Hazardous Materials Identification System (USA)
- VOC: Volatile Organic Compounds (USA, EU)
- LC50: Lethal concentration, 50 percent
- LD50: Lethal dose, 50 percent
- PBT: Persistent, Bioaccumulative and Toxic
- vPvB: very Persistent and very Bioaccumulative
- NIOSH: National Institute for Occupational Safety
- OSHA: Occupational Safety & Health
- TLV: Threshold Limit Value
- PEL: Permissible Exposure Limit
- REL: Recommended Exposure Limit
- Acute Tox. 2: Acute toxicity – Category 2
Trade name: (-)-Warfarin

Acute Tox. 1: Acute toxicity – Category 1
Repr. 1A: Reproductive toxicity – Category 1A
STOT RE 1: Specific target organ toxicity (repeated exposure) – Category 1
Aquatic Chronic 2: Hazardous to the aquatic environment - long-term aquatic hazard – Category 2