(S)-(-)-Warfarin

sc-253488

Material Safety Data Sheet

Hazard Alert Code Key: EXTERNAL HIGH MODERATE LOW

Section 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME
(S)-(-)-Warfarin

STATEMENT OF HAZARDOUS NATURE

NFPA

SUPPLIER
Santa Cruz Biotechnology, Inc.
2145 Delaware Avenue
Santa Cruz, California 95060
800.457.3801 or 831.457.3800

EMERGENCY
ChemWatch
Within the US & Canada: 877-715-9305
Outside the US & Canada: +800 2436 2255
(1-800-CHEMCALL) or call +613 9573 3112

SYNONYMS

Section 2 - HAZARDS IDENTIFICATION

CHEMWATCH HAZARD RATINGS

<table>
<thead>
<tr>
<th></th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flammability:</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Toxicty:</td>
<td>4</td>
<td></td>
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<tr>
<td>Body Contact:</td>
<td>2</td>
<td></td>
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<tr>
<td>Reactivity:</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Chronic:</td>
<td>3</td>
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</table>

1 of 9
CANADIAN WHMIS SYMBOLS

EMERGENCY OVERVIEW
RISK
Harmful in contact with skin.
Very toxic if swallowed.
May cause harm to the unborn child.
Toxic: danger of serious damage to health by prolonged exposure if swallowed.
Harmful to aquatic organisms, may cause long-term adverse effects in the aquatic environment.
POTENTIAL HEALTH EFFECTS
ACUTE HEALTH EFFECTS
SWALLOWED
- Severely toxic effects may result from the accidental ingestion of the material; animal experiments indicate that ingestion of less than 5 gram may be fatal or may produce serious damage to the health of the individual.
- Heparin, coumarin and indan-1,3-dione derivatives are used to kill rodents and to prevent blood clotting.
  They block the synthesis of prothrombin by antagonizing vitamin K.
- Warfarin has a plasma half-life of 42 hours and can exhibit toxicity over several days.
  Some individuals tolerate extremely high doses due to genetically determined drug resistance.
- Toxic effects may result from the accidental ingestion of the material; animal experiments indicate that ingestion of less than 40 gram may be fatal or may produce serious damage to the health of the individual.
EYE
- Although the material is not thought to be an irritant, direct contact with the eye may cause transient discomfort characterized by tearing or conjunctival redness (as with windburn).
- Slight abrasive damage may also result.
SKIN
- The material is not thought to be a skin irritant (as classified using animal models).
- Abrasive damage however, may result from prolonged exposures.
- Coumarin and its derivatives may act as slight allergens in contact with skin.
- Open cuts, abraded or irritated skin should not be exposed to this material.
  Entry into the blood-stream, through, for example, cuts, abrasions or lesions, may produce systemic injury with harmful effects.
- Examine the skin prior to the use of the material and ensure that any external damage is suitably protected.
- Skin contact with the material may be harmful; systemic effects may result following absorption.
INHALED
- The material is not thought to produce respiratory irritation (as classified using animal models).
- Nevertheless inhalation of dusts, or fume, especially for prolonged periods, may produce respiratory discomfort and occasionally, distress.
- Inhalation of dusts, generated by the material during the course of normal handling, may produce severe damage to the health of the individual.
  Relatively small amounts absorbed from the lungs may prove fatal.
- Persons with impaired respiratory function, airway diseases and conditions such as emphysema or chronic bronchitis, may incur further disability if excessive concentrations of particulate are inhaled.
- Coumarin and its derivatives may act as slight allergens in contact with mucous membranes.
  Absorption by the lungs is not considered to be a significant route of entry.
- Necrosis of the skin has been reported after chronic warfarin therapy.
- Absorption of warfarin through the skin is slow but measurable.
CHRONIC HEALTH EFFECTS
- Toxic: danger of serious damage to health by prolonged exposure if swallowed.
  This material can cause serious damage if one is exposed to it for long periods. It can be assumed that it contains a substance which can produce severe defects.
  Ample evidence exists that developmental disorders are directly caused by human exposure to the material.
  Limited evidence suggests that repeated or long-term occupational exposure may produce cumulative health effects involving organs or biochemical systems.
  There is some evidence that inhaling this product is more likely to cause a sensitization reaction in some persons compared to the general population.
  There is limited evidence that, skin contact with this product is more likely to cause a sensitization reaction in some persons compared to the general population.
  Long term exposure to high dust concentrations may cause changes in lung function i.e. pneumoconiosis; caused by particles less than 0.5 micron penetrating and remaining in the lung.
  Repeated exposure to some coumarin derivatives may cause nosebleed, bleeding gut and pharynx, dark red bleeding spots, widespread bruising, blood swelling, blood in the phlegm, vomitus, urine or stools. Bleeding into the organs, digestive tract, joints, abdomen can cause localized pain.
  Congenital malformations have occurred following maternal exposure to warfarin. Effects are primarily seen in the craniofacial region of the foetus and include nasal hypoplasia, bone stippling and mental retardation. Central nervous system abnormalities have occurred during second or third trimester exposures. Exposure during early pregnancy may also produce dysmorphia.
Section 3 - COMPOSITION / INFORMATION ON INGREDIENTS

<table>
<thead>
<tr>
<th>NAME</th>
<th>CAS RN</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>warfarin</td>
<td>81-81-2</td>
<td>&gt;98</td>
</tr>
</tbody>
</table>

Section 4 - FIRST AID MEASURES

**SWALLOWED**
- Give a slurry of activated charcoal in water to drink. NEVER GIVE AN UNCONSCIOUS PATIENT WATER TO DRINK. · At least 3 tablespoons in a glass of water should be given.

**EYE**
- If this product comes in contact with the eyes: · Immediately hold eyelids apart and flush the eye continuously with running water. · Ensure complete irrigation of the eye by keeping eyelids apart and away from eye and moving the eyelids by occasionally lifting the upper and lower lids.

**SKIN**
- If skin contact occurs: · Immediately remove all contaminated clothing, including footwear · Flush skin and hair with running water (and soap if available).

**INHALED**
- If fumes or combustion products are inhaled remove from contaminated area. · Lay patient down. Keep warm and rested.

**NOTES TO PHYSICIAN**
- Acute clinical effects depend on the site of hemorrhage and include hemoptysis, hematuria, gastrointestinal bleeding, abdominal or back pain (retroperitoneal hemorrhage), hemarthrosis, epistaxis and bleeding gums, cerebrovascular accidents (with occasional paralysis) and multiple ecchymoses and/or hematotomata especially of the elbows, knees buttocks.
- Activated charcoal or cathartics are usually all that is needed in accidental ingestion of coumarin-based rodenticides. Ipecac is indicated within 2-3 hours of exposure if more than 0.25 mg/kg of warfarin or any superwarfarin compound is ingested.
- The decision to admit is based on an initial prolongation of the prothrombin time or massive overdose.

Section 5 - FIRE FIGHTING MEASURES

<table>
<thead>
<tr>
<th>Vapour Pressure (mmHG):</th>
<th>Not applicable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upper Explosive Limit (%)</td>
<td>Not Available</td>
</tr>
<tr>
<td>Specific Gravity (water=1):</td>
<td>Not available.</td>
</tr>
<tr>
<td>Lower Explosive Limit (%)</td>
<td>Not Available</td>
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</tbody>
</table>

**EXTINGUISHING MEDIA**
- Foam.
- Dry chemical powder.

**FIRE FIGHTING**
- Alert Emergency Responders and tell them location and nature of hazard.
- Wear full body protective clothing with breathing apparatus.
- If containment of runoff is not possible, consider allowing fire to burn out. Use of water may present a pollution hazard.
- When any large container (including road and rail tankers) is involved in a fire, consider evacuation by 800 metres in all directions.

**GENERAL FIRE HAZARDS/HAZARDOUS COMBUSTIBLE PRODUCTS**
- Combustible solid which burns but propagates flame with difficulty.
- Avoid generating dust, particularly clouds of dust in a confined or unventilated space as dusts may form an explosive mixture with air, and any source of ignition, i.e. flame or spark, will cause fire or explosion. Dust clouds generated by the fine grinding of the solid are a particular hazard; accumulations of fine dust may burn rapidly and fiercely if ignited.
- Combustion products include: carbon monoxide (CO), carbon dioxide (CO2), other pyrolysis products typical of burning organic material. May emit poisonous fumes.

**FIRE INCOMPATIBILITY**
- Avoid contamination with oxidizing agents i.e. nitrates, oxidizing acids, chlorine bleaches, pool chlorine etc. as ignition may result.

**PERSONAL PROTECTION**
- Glasses:
- Chemical goggles.
- Gloves:
- Respirator:
- Particulate

Section 6 - ACCIDENTAL RELEASE MEASURES

**MINOR SPILLS**
- Remove all ignition sources.
- Clean up all spills immediately.
• Avoid contact with skin and eyes.
• Control personal contact by using protective equipment.
• Use dry clean up procedures and avoid generating dust.
• Place in a suitable, labelled container for waste disposal.

MAJOR SPILLS
• Clear area of personnel and move upwind.
• Alert Emergency Responders and tell them location and nature of hazard.

Section 7 - HANDLING AND STORAGE

PROCEDURE FOR HANDLING
• Avoid all personal contact, including inhalation.
• Wear protective clothing when risk of exposure occurs.
Empty containers may contain residual dust which has the potential to accumulate following settling. Such dusts may explode in the presence of an appropriate ignition source.
• Do NOT cut, drill, grind or weld such containers.
• In addition ensure such activity is not performed near full, partially empty or empty containers without appropriate workplace safety authorisation or permit.

RECOMMENDED STORAGE METHODS
• Glass container.
• Lined metal can, Lined metal pail/drum
• Plastic pail.
For low viscosity materials
• Drums and jerricans must be of the non-removable head type.
• Where a can is to be used as an inner package, the can must have a screwed enclosure.
All inner and sole packagings for substances that have been assigned to Packaging Groups I or II on the basis of inhalation toxicity criteria, must be hermetically sealed.

STORAGE REQUIREMENTS
• Store in original containers.
• Keep containers securely sealed.
• Store at 4º C.

Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

EXPOSURE CONTROLS

<table>
<thead>
<tr>
<th>Source</th>
<th>Material</th>
<th>TWA ppm</th>
<th>TWA mg/m³</th>
<th>STEL ppm</th>
<th>STEL mg/m³</th>
<th>Peak ppm</th>
<th>Peak mg/m³</th>
<th>TWA F/CC</th>
<th>Notes</th>
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<td>US - Minnesota Permissible Exposure Limits (PELs)</td>
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<td>US OSHA Permissible Exposure Levels (PELs) - Table Z1</td>
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<td>US - Vermont Permissible Exposure Limits Table Z-1-A Transitional Limits for Air Contaminants</td>
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<td>Location</td>
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<td>Canada - Nova Scotia Occupational Exposure Limits</td>
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<td>TLV Basis: coagulation</td>
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<td>Canada - Yukon Permissible Concentrations for Airborne Contaminant Substances</td>
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<td>Canada - Northwest Territories Occupational Exposure Limits (English)</td>
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<td>US - Alaska Limits for Air Contaminants</td>
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<td>Canada - Alberta Occupational Exposure Limits</td>
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<td>US ACGIH Threshold Limit Values (TLV)</td>
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<td>TLV Basis: coagulation</td>
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<tr>
<td>US - California Permissible Exposure Limits for Chemical Contaminants</td>
<td>warfarin (Warfarin; 3-(alpha-acetonyl-benzyl)-4-hydroxycoumarin)</td>
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<td>Canada - British Columbia Occupational Exposure Limits</td>
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<td>Canada - Prince Edward Island Occupational Exposure Limits</td>
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<td>TLV Basis: coagulation</td>
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<td>US - Oregon Permissible Exposure Limits (Z-1)</td>
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<td>0.1</td>
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</table>
Canada - Quebec
Permissible Exposure Values for Airborne Contaminants (English)

US - Wyoming
Toxic and Hazardous Substances Table
Z1 Limits for Air Contaminants

PERSONAL PROTECTION

RESPIRATOR
• particulate. (AS/NZS 1716 & 1715, EN 143:2000 & 149:2001, ANSI Z88 or national equivalent)
Consult your EHS staff for recommendations

EYE
• Safety glasses with side shields.
• Chemical goggles.

HANDS/FEET
■ Wear chemical protective gloves, eg. PVC.
NOTE: The material may produce skin sensitization in predisposed individuals. Care must be taken, when removing gloves and other protective equipment, to avoid all possible skin contact.
Suitability and durability of glove type is dependent on usage. Important factors in the selection of gloves include: such as:
• frequency and duration of contact,
• chemical resistance of glove material,
• glove thickness and dexterity
Select gloves tested to a relevant standard (e.g. Europe EN 374, US F739).
• When prolonged or frequently repeated contact may occur, a glove with a protection class of 5 or higher (breakthrough time greater than 240 minutes according to EN 374) is recommended.
• When only brief contact is expected, a glove with a protection class of 3 or higher (breakthrough time greater than 60 minutes according to EN 374) is recommended.
• Contaminated gloves should be replaced.
Gloves must only be worn on clean hands. After using gloves, hands should be washed and dried thoroughly. Application of a non-perfumed moisturiser is recommended.

OTHER
• Overalls.
• Eyewash unit.

ENGINEERING CONTROLS
• Local exhaust ventilation is required where solids are handled as powders or crystals; even when particulates are relatively large, a certain proportion will be powdered by mutual friction.
• Exhaust ventilation should be designed to prevent accumulation and recirculation of particulates in the workplace.

Section 9 - PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL PROPERTIES

<table>
<thead>
<tr>
<th>State</th>
<th>Divided solid</th>
<th>Molecular Weight</th>
<th>308.35</th>
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<tbody>
<tr>
<td>Melting Range (°F)</td>
<td>322</td>
<td>Viscosity</td>
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</tr>
<tr>
<td>Boiling Range (°F)</td>
<td>Not available</td>
<td>Solubility in water (g/L)</td>
<td>Immiscible</td>
</tr>
<tr>
<td>Flash Point (°F)</td>
<td>Not Available</td>
<td>pH (1% solution)</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Decomposition Temp (°F)</td>
<td>Not Available</td>
<td>pH (as supplied)</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Autoignition Temp (°F)</td>
<td>Not available</td>
<td>Vapour Pressure (mmHG)</td>
<td>Not applicable</td>
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</tbody>
</table>
Upper Explosive Limit (%) Not Available Specific Gravity (water=1) Not available.
Lower Explosive Limit (%) Not Available Relative Vapor Density (air=1) Not applicable
Volatile Component (%vol) Not applicable Evaporation Rate Not applicable

**APPEARANCE**
Crystals. Insoluble in water, benzene, acetone, dioxane, slightly soluble in methanol, ethanol. Very soluble in alkaline aqueous solutions.

log Kow 2.39-2.82

<table>
<thead>
<tr>
<th>Material</th>
<th>Value</th>
</tr>
</thead>
</table>

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**Section 10 - CHEMICAL STABILITY**

**CONDITIONS CONTRIBUTING TO INSTABILITY**
- Presence of incompatible materials.
- Product is considered stable.

**STORAGE INCOMPATIBILITY**
- Avoid reaction with oxidizing agents.
- Avoid strong acids, bases.

For incompatible materials - refer to Section 7 - Handling and Storage.

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**Section 11 - TOXICOLOGICAL INFORMATION**

**warfarin**

**TOXICITY AND IRRITATION**

WARFARIN:
- unless otherwise specified data extracted from RTECS - Register of Toxic Effects of Chemical Substances.

<table>
<thead>
<tr>
<th>TOXICITY</th>
<th>IRRITATION</th>
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<tbody>
<tr>
<td>Oral (human) LDLo: 0.66 mg/kg</td>
<td>Nil Reported</td>
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<tr>
<td>Oral (man) TDLo: 10.2 mg/kg</td>
<td></td>
</tr>
<tr>
<td>Oral (woman) TDLo: 15 mg/kg/2 w</td>
<td></td>
</tr>
<tr>
<td>Oral (rat) LD50: 1.6 mg/kg</td>
<td></td>
</tr>
<tr>
<td>Inhalation (rat) LC50: 320 mg/m³</td>
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<tr>
<td>Dermal (rat) LD50: 1400 mg/kg</td>
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</tr>
<tr>
<td>Intraperitoneal (Rat) LD: 420 mg/kg</td>
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</tr>
<tr>
<td>Oral (Mouse) LD50: 3 mg/kg</td>
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</tr>
<tr>
<td>Intraperitoneal (Mouse) LD50: 750 mg/kg</td>
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</tr>
<tr>
<td>Oral (Human) TDLo: 10.2 mg/kg</td>
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</tr>
<tr>
<td>Inhalation (Rat) LC50: 320 mg/m³/4h</td>
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</tr>
<tr>
<td>Subcutaneous (Mouse) LD: 800 mg/kg</td>
<td></td>
</tr>
<tr>
<td>Intravenous (Mouse) LD50: 165 mg/kg</td>
<td></td>
</tr>
<tr>
<td>Oral (Human) LD: 6.667 mg/kg</td>
<td></td>
</tr>
<tr>
<td>Oral (Dog) LD50: 3 mg/kg</td>
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</tr>
<tr>
<td>Oral (Cat) LD50: 6 mg/kg</td>
<td></td>
</tr>
<tr>
<td>Oral (Rabbit) LD50: 800 mg/kg</td>
<td></td>
</tr>
<tr>
<td>Oral (Pig) LD50: 1 mg/kg</td>
<td></td>
</tr>
<tr>
<td>Oral (Guinea pig) LD50 180 mg/kg</td>
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</tbody>
</table>

- Exposure to the material for prolonged periods may cause physical defects in the developing embryo (teratogenesis).

**CARCINOGEN**

<table>
<thead>
<tr>
<th>warfarin</th>
<th>US - Rhode Island Hazardous Substance List</th>
<th>IARC</th>
</tr>
</thead>
<tbody>
<tr>
<td>VPVB_{(VERY~}</td>
<td>US - Maine Chemicals of High Concern List</td>
<td>Carcinogen</td>
</tr>
</tbody>
</table>

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**Section 12 - ECOLOGICAL INFORMATION**

Harmful to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

This material and its container must be disposed of as hazardous waste.
Section 13 - DISPOSAL CONSIDERATIONS

US EPA Waste Number & Descriptions
B. Component Waste Numbers
When warfarin is present as a solid waste as a discarded commercial chemical
product, off-specification species, as a container residue, or a spill residue,
use EPA waste number P001 (waste code T).

Disposal Instructions
All waste must be handled in accordance with local, state and federal regulations.
Puncture containers to prevent re-use and bury at an authorized landfill.
Legislation addressing waste disposal requirements may differ by country, state and/or territory. Each user must refer to laws operating in
their area. In some areas, certain wastes must be tracked.
A Hierarchy of Controls seems to be common - the user should investigate:
· Reduction
· Reuse
· Recycling
· Disposal (if all else fails)
This material may be recycled if unused, or if it has not been contaminated so as to make it unsuitable for its intended use. Shelf life
considerations should also be applied in making decisions of this type. Note that properties of a material may change in use, and recycling or
reuse may not always be appropriate.
DO NOT allow wash water from cleaning equipment to enter drains. Collect all wash water for treatment before disposal.
· Recycle wherever possible.
· Consult manufacturer for recycling options or consult Waste Management Authority for disposal if no suitable treatment or disposal facility
can be identified.

Section 14 - TRANSPORTATION INFORMATION

DOT:
Symbols: None Hazard class or Division: 6.1
Identification Numbers: UN3027 PG: I
Label Codes: 6.1 Special provisions: IB7, IP1,
T6, TP33
Packaging: Exceptions: None Packaging: Non-bulk: 211
Packaging: Exceptions: None Quantity limitations: 5 kg
Passenger aircraft/rail:
Quantity Limitations: Cargo 50 kg Vessel stowage: Location: A
aircraft only:
Vessel stowage: Other: 40 S.M.P.: YES
Hazardous materials descriptions and proper shipping names:
Coumarin derivative pesticides, solid, toxic

Air Transport IATA:
UN/ID Number: 3027 Packing Group: I
Special provisions: A3
Cargo Only
Packing Instructions: 50 kg Maximum Qty/Pack: 673
Passenger and Cargo Passenger and Cargo
Packing Instructions: 5 kg Maximum Qty/Pack: 666
Passenger and Cargo Limited Quantity Passenger and Cargo Limited Quantity
Packing Instructions: Forbidden Maximum Qty/Pack: Forbidden
Shipping Name: COUMARIN DERIVATIVE PESTICIDE, SOLID, TOXIC
*(CONTAINS WARFARIN)

Maritime Transport IMDG:
IMDG Class: 6.1 IMDG Subrisk: None
UN Number: 3027 Packing Group: I
EMS Number: F-A, S-A Special provisions: 61 274
Limited Quantities: 0
Shipping Name: COUMARIN DERIVATIVE PESTICIDE, SOLID, TOXIC(contains warfarin)

Section 15 - REGULATORY INFORMATION

LIMITED EVIDENCE
Inhalation may produce severe health damage*.
■ Cumulative effects may result following exposure*.
■ Possible respiratory and skin sensitiser*.
* (limited evidence).

**Ingredients with multiple CAS Nos**
Ingredient Name CAS warfarin 81-81-2, 5543-58-8, 5543-57-7

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Classification of the preparation and its individual components has drawn on official and authoritative sources as well as independent review by the Chemwatch Classification committee using available literature references. A list of reference resources used to assist the committee may be found at: www.chemwatch.net/references.

The (M)SDS is a Hazard Communication tool and should be used to assist in the Risk Assessment. Many factors determine whether the reported Hazards are Risks in the workplace or other settings. Risks may be determined by reference to Exposures Scenarios. Scale of use, frequency of use and current or available engineering controls must be considered.

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