1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product code: M1123
Product Name: MENADIONE-SODIUM BISULFITE, TRIHYDRATE
Chemical Name: 2-Napthalenesulfonic acid, 1,2,3,4-tetrahydro-2-methyl-1,4-dioxo-, sodium salt, trihydrate
Synonyms: 1,2,3,4-Tetrahydro-2-methyl-1,4-dioxo-2-naphthalenesulfonic acid sodium salt trihydrate
1,4-Naphthalenedione, 2-methyl-, compd. with sodium hydrogen sulfite
1,4-Naphthoquinone, 2-methyl-, sodium bisulfite, trihydrate
2-Methyl-1,4-naphthoquinone sodiumbisulfite trihydrate
Menadione sodium bisulfite trihydrate
Sodium 1,2,3,4-tetrahydro-2-methyl-1,4-dioxo-2-naphthalenesulfonic acid sodium salt trihydrate
Vikasol trihydrate
Vitamin K3 sodium bisulfite trihydrate
Recommended use: No information available.
CAS #: 6147-37-1
Formula: C11-H9-Na-O5-S.3H2O
RTECS #: QK3685000
CI#: Not available
Supplier: Spectrum Chemicals and Laboratory Products, Inc.
14422 South San Pedro St.
Gardena, CA  90248
(310) 516-8000
Emergency Telephone Number: CHEMTREC: 1-800-424-9300
Contact Person: Martin LaBenz (West Coast)
Contact Person: Chris Terpak (East Coast)

2. HAZARDS IDENTIFICATION

See Section 8.
2. HAZARDS IDENTIFICATION

OSHA Regulatory Status
This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200)

POTENTIAL HEALTH EFFECTS

Principal Routes of Exposure:
Ingestion. Inhalation.

Acute Potential Health Effects:

Skin Contact:
May cause skin irritation. May cause sensitization by skin contact. May cause allergic skin reaction.

Eye Contact:
May cause eye irritation.

Inhalation:
May cause irritation of respiratory tract. May cause sensitization by inhalation. May cause allergic respiratory reaction.

Ingestion:
Ingestion may cause gastrointestinal irritation, nausea, vomiting, and diarrhoea. May cause central nervous system effects. May affect the cardiovascular system. May affect respiration. May cause cyanosis.

Chronic Potential Health Effects:

Target Organs: Skin. Respiratory system. Lungs.
Carcinogen Status: IARC - Group 3 (Not Classifiable as to its carcinogenicity to humans)
Mutagenic Effects: May affect genetic material
Teratogenic Effects: No information available
Aggravated Medical Conditions: No information available

See Section 11 for additional Toxicological Information

POTENTIAL ENVIRONMENTAL EFFECTS

No information available

3. COMPOSITION/INFORMATION ON INGREDIENTS

<table>
<thead>
<tr>
<th>Components</th>
<th>CAS-No.</th>
<th>Weight %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Menadione-Sodium Bisulfite, trihydrate</td>
<td>6147-37-1</td>
<td>100</td>
</tr>
</tbody>
</table>

4. FIRST AID MEASURES
General Advice: Poison information centres in each State capital city can provide additional assistance for scheduled poisons (13 1126)

Skin Contact: Wash off immediately with soap and plenty of water removing all contaminated clothes and shoes. Get medical attention if irritation develops.

Eye Contact: Flush eye with water for 15 minutes. Get medical attention if irritation occurs. If symptoms persist, call a physician.

Inhalation: Move to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

Ingestion: Do not induce vomiting without medical advice. Never give anything by mouth to an unconscious person. Consult a physician if necessary.

Notes to Physician: Treat symptomatically

5. FIRE-FIGHTING MEASURES

Flammable Properties

<table>
<thead>
<tr>
<th>Flammable Properties</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flashpoint (°C/°F)</td>
<td>Not applicable.</td>
</tr>
<tr>
<td>Lower Explosion Limit (%)</td>
<td>No information available</td>
</tr>
<tr>
<td>Upper Explosion Limit (%)</td>
<td>No information available</td>
</tr>
<tr>
<td>Autoignition Temperature (°C/°F)</td>
<td>No information available</td>
</tr>
</tbody>
</table>

| Suitable Extinguishing Media | Carbon dioxide (CO2). Dry powder. Water spray mist or foam. |
| Unsuitable Extinguishing Media | No information available. |
| Hazardous Combustion Products | Carbon Monoxide. Carbon Dioxide; Sulfur oxides; Sodium oxides |
| Specific hazards | May be combustible at high temperatures. |
| Special Protective Equipment for Firefighters | As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear |
| Specific Methods | No information available. |

6. ACCIDENTAL RELEASE MEASURES

Personal Precautions: Ensure adequate ventilation. Use personal protective equipment. Avoid contact with skin, eyes and clothing. Avoid dust formation. Remove all sources of ignition.

Environmental Precautions: No information available.

Methods for Cleaning Up: Sweep up and shovel into suitable containers for disposal. Clean contaminated surface thoroughly.
7. HANDLING AND STORAGE

Handling

Technical Measures/Precautions:
Provide sufficient air exchange and/or exhaust in work rooms. Avoid dust formation.

Safe Handling Advice:
Wear personal protective equipment. Avoid contact with skin, eyes and clothing. Do not ingest. Do not breathe vapours/dust. Keep away from heat and sources of ignition. Handle in accordance with good industrial hygiene and safety practice. Protect from light. Protect from moisture.

Storage

Technical Measures/Storage Conditions:
Keep containers tightly closed in a dry, cool and well-ventilated place. Freeze. Store at 0 deg. °C. Store away from incompatible materials. Protect from light.

Incompatible Products:
No information available.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Engineering measures to reduce exposure:
Ensure adequate ventilation. Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.

Personal Protective Equipment

Eye protection: Safety glasses. Safety glasses with side-shields.
Skin and body protection: Long sleeved clothing. Chemical resistant apron. Gloves.
Respiratory protection: Wear respirator with dust filter..
Hygiene measures: Avoid contact with skin, eyes and clothing. Wash hands and face before breaks and immediately after handling the product. When using, do not eat, drink or smoke.

National occupational exposure limits

United States
U.S Occupational Exposure Limits: Not determined

Canada
Canada Occupational Exposure Limits: Not determined

Australia and Mexico
Occupational Exposure Limits for Australia and Mexico: Not determined

9. PHYSICAL AND CHEMICAL PROPERTIES

Product code: M1123  Product name: MENADIONE-SODIUM BISULFITE, TRIHYDRATE
9. PHYSICAL AND CHEMICAL PROPERTIES

Physical state: Solid
Appearance: Crystals. Crystalline powder.
Color: White.

Odor: No information available
Taste: No information available
Molecular weight: 330.31

Flash point (°C): Not determined
Lower Explosion Limit (%): No information available
Upper Explosion Limit (%): No information available

Autoignition Temperature (°C/°F): No information available
pH: No information available
Boiling point/range (°C/°F): No information available

Melting point/range (°C/°F): No information available
Decomposition temperature (°C/°F): No information available
Specific gravity: No information available

Density (g/cm³): No information available
Bulk density: No information available
Vapor pressure @ 20°C (kPa): No information available

Vapor density: No information available
Evaporation rate: No information available
VOC content (g/L): No information available

Odor threshold (ppm): No information available
Partition coefficient (n-octanol/water): No information available
Miscibility: No information available

Solubility:
Soluble in Water
Insoluble in Ether
Insoluble in Ethanol
Insoluble in Benzene

10. STABILITY AND REACTIVITY

Stability: Stable at normal conditions
Conditions to avoid: Heat. Avoid dust formation. Dust may form explosive mixture in air. Fine dust dispersed in air in sufficient concentrations, and in the presence of an ignition source is a potential dust explosion hazard. Exposure to light. Exposure to moisture.

Materials to avoid: No information available.
Possibility of Hazardous Reactions: No information available
Polymerization: Hazardous polymerisation does not occur
Corrosivity: No information available
Special Remarks on Corrosivity: No information available

11. TOXICOLOGICAL INFORMATION

Acute Toxicity
Component Information
Menadione-Sodium Bisulfite, trihydrate - 6147-37-1
LD50/oral/rat = 4507 mg/kg
LD50/oral/mouse = 1570 mg/kg
LD50/dermal/rabbit = Not determined
LD50/dermal/rat = No information available
LC50/inhalation/rat =
No information available
LC50/inhalation/mouse = No information available

Product Information
LC50/inhalation/rat =
No information available
LC50/inhalation/mouse = No information available
LD50/dermal/rabbit = No information available
LD50/dermal/rat = Not information available
LD50/oral/rat = 4507 mg/kg
LD50/oral/mouse = 1570 mg/kg

Local Effects
Skin irritation: May cause skin irritation. May cause sensitization by skin contact. May cause allergic skin reaction.
Eye irritation: Contact with eyes may cause irritation.
Inhalation: May cause irritation of respiratory tract. May cause sensitization by inhalation.
Ingestion: May cause allergic reaction in sensitized individuals. Ingestion may cause gastrointestinal irritation, nausea, vomiting and diarrhoea. May cause abdominal pain. May affect behavior/central nervous system (somnolence, convulsions/seizures, CNS stimulation, irritability, restlessness). May affect the cardiovascular system (hypotension, fast heartbeat, cardiovascular colapse). May affect respiration (respiratory depression, apnea, tachypnea, shortness of breath). May cause cyanosis.
Sensitization: May cause sensitization by inhalation and skin contact.

Chronic Toxicity
Chronic Toxicity
Prolonged or repeated ingestion may cause sensitization. Prolonged or repeated ingestion affect metabolism (cause anorexia, weight loss). Prolonged or repeated ingestion may affect the blood (changes in serum composition, changes in clotting factors). Prolonged or repeated ingestion may affect the liver. Prolonged or repeated skin contact may cause allergic reaction. Prolonged or repeated skin contact may cause allergic contact dermatitis. Prolonged or repeated inhalation may cause asthma-like allergy or hypersensivity reactions such as anaphylaxis, angioedema, bronchoconstriction, shortness of breath, wheezing, coughing, chest tightness, flushing, sweating, rash, tachycardia and hypotension in sensitized individuals. Prolonged or repeated inhalation may cause bronchitis with coughing, phlegm, and/or shortness of breath. Prolonged or repeated inhalation may affect the blood (change in clotting factors).

Carcinogenic effects: Not classifiable as to its carcinogenicity to humans

Product code: M1123  Product name: MENADIONE-SODIUM BISULFITE, TRIHYDRATE
Menadione-Sodium Bisulfite, trihydrate

<table>
<thead>
<tr>
<th>Components</th>
<th>NTP IARC</th>
<th>OSHA</th>
<th>ACGIH - Carcinogens</th>
<th>Australia Prohibited Carcinogenic Substances</th>
<th>Australia Notifiable Carcinogenic Substances</th>
</tr>
</thead>
<tbody>
<tr>
<td>Menadione-Sodium Bisulfite, trihydrate</td>
<td>IARC - Group 3 Monograph 76 [2000] Vitamin K substances</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Mutagenic Effects: May affect genetic material.
Reproductive Effects: No information available.
Teratogenic Effects: No information available.
Target Organs: Skin. Respiratory system. Lungs.

12. ECOLOGICAL INFORMATION

**ECOTOXICITY**

Toxicity to terrestrial and aquatic plants and animals: No information available.
Ecotoxicity effects: No data available.
Aquatic toxicity: No information available.
Mobility: No information available.
Persistence and degradability: No information available.
Bioaccumulative potential: No information available.

13. DISPOSAL CONSIDERATIONS

Waste from residues / unused products: Waste must be disposed of in accordance with Federal, State and Local regulation.
Contaminated packaging: Empty containers should be taken for local recycling, recovery or waste disposal.

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Menadione-Sodium Bisulfite, trihydrate</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
</tr>
</tbody>
</table>

14. TRANSPORT INFORMATION

DOT
- UN-No: Not regulated
- Proper Shipping Name: No information available
- Hazard Class: No information available
- Packing Group: None
- Subsidiary Risk: Not applicable
- Marine Pollutant: No data available
- ERG No: No information available
- DOT RQ (lbs): No information available
Product code: M1123

Product name: MENADIONE-SODIUM BISULFITE, TRIHYDRATE
15. REGULATORY INFORMATION

International Inventories

<table>
<thead>
<tr>
<th>Components</th>
<th>U.S. TSCA</th>
<th>Philippines (PICCS)</th>
<th>KOREA KECL</th>
<th>Japan ENCS</th>
<th>CHINA</th>
<th>Australia (AICS)</th>
<th>EINECS-No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Menadione-Sodium Bisulfite, trihydrate</td>
<td>Not Listed</td>
<td>Not present</td>
<td>Not present</td>
<td>Not present</td>
<td>Not present</td>
<td>Present</td>
<td>Not present</td>
</tr>
</tbody>
</table>

U.S. Regulations


Chemicals Known to the State of California to Cause Cancer:
WARNING: This product contains a chemical known to the State of California to cause cancer. (See table below)

Chemicals Known to the State of California to Cause Reproductive Toxicity:
This product does not contain a chemical requiring a warning under California Prop. 65. (See table below)

<table>
<thead>
<tr>
<th>Components</th>
<th>Carcinogen</th>
<th>Developmental Toxicity</th>
<th>Male Reproductive Toxicity</th>
<th>Female Reproductive Toxicity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Menadione-Sodium Bisulfite, trihydrate</td>
<td>Not Listed</td>
<td>Not Listed</td>
<td>Not Listed</td>
<td>Not Listed</td>
</tr>
</tbody>
</table>

CERCLA/SARA

<table>
<thead>
<tr>
<th>Components</th>
<th>CERCLA - Hazardous Substances and their Reportable Quantities</th>
<th>Section 302 Extremely Hazardous Substances and TPQs</th>
<th>Section 302 Extremely Hazardous Substances and RQs</th>
<th>Section 313 - Chemical Category</th>
<th>Section 313 - Reporting de minimis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Menadione-Sodium Bisulfite, trihydrate</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
</tr>
</tbody>
</table>

U.S. TSCA

<table>
<thead>
<tr>
<th>Components</th>
<th>TSCA Section 5(a)2 - Chemicals With Significant New Use Rules (SNURS)</th>
<th>TSCA 8(d) - Health and Safety Reporting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Menadione-Sodium Bisulfite, trihydrate</td>
<td>Not Applicable</td>
<td>Not Applicable</td>
</tr>
</tbody>
</table>

Canada

WHMIS hazard class:
D2B Toxic materials

Inventory

<table>
<thead>
<tr>
<th>Components</th>
<th>Canada (DSL)</th>
<th>Canada (NDSL)</th>
</tr>
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<tbody>
<tr>
<td>Menadione-Sodium Bisulfite, trihydrate</td>
<td>Not Listed</td>
<td>Not Listed</td>
</tr>
</tbody>
</table>

EU Classification

Product code: M1123  Product name: MENADIONE-SODIUM BISULFITE, TRIHYDRATE
R -phrase(s)
not determined
R36/37/38 - Irritating to eyes, respiratory system and skin.

S -phrase(s)
S26 - In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
S36 - Wear suitable protective clothing.
S37 - Wear suitable gloves.

The product is classified in accordance with Annex VI to Directive 67/548/EEC

Indication of danger:
Xi - Irritant.

Xi

16. OTHER INFORMATION

The MSDS format complies with ANSI Z400.1-2004 standards.

Revision date: 13-Apr-2010
Reason for revision: Not applicable
Additional advice: Consult your supplier if the material is to be used for special applications such as in the food industry or for hygiene, medical or surgical end-use.

Prepared by: Health & Safety

All chemicals may pose unknown hazards and should be used with caution. This Material Safety Data Sheet (MSDS) applies only to the material as packaged. If this product is combined with other materials, deteriorates, or becomes contaminated, it may pose hazards not mentioned in this MSDS. The physical properties reported in this MSDS are obtained from the literature and do not constitute product specifications. Information contained herein does not constitute a warranty, whether expressed or implied, as to the safety, merchantability or fitness of the goods for a particular purpose. Spectrum Chemicals & Laboratory Products, Inc. assumes no responsibility for results obtained or for incidental or consequential damages, including lost profits, arising from the use of these data. No warranty against infringement of any patent, copyright or trademark is made or implied. It shall be the user's responsibility to develop proper methods of handling and personal protection based on the actual conditions of use. While this MSDS is based on technical data judged to be reliable, Spectrum assumes no responsibility for the completeness or accuracy of the information contained herein.