Safety Data Sheet (MSDS)

*(Complies with GB/T 16483, GB/T 17519, GHS Rev.9, IMDG and IATA Standards)***Product Name**: Menadione**Product Number**: MEN-20260222**Brand**: SIGALD**CAS Number**: 58-27-5**Revision Date**: 22 FEB 2026

SECTION 1: Identification of the Substance/Mixture and of the Company/Undertaking

1.1 Product Identifiers

- Product Name: Menadione
- Synonyms: Vitamin K3; 2-Methyl-1,4-naphthoquinone; 1,4-Naphthalenedione, 2-methyl-
- CAS-No.: 58-27-5
- Molecular Formula: $C_{11}H_8O_2$
- Molecular Weight: 172.18 g/mol

1.2 Supplier Details

- Company: NEWAY SINOPHC TECH. LIMITED
- Address: RM. 204, BUILDING 3, NO. 188, AONA RD., CHINA (SHANGHAI) PILOT FREE TRADE ZONE
- Telephone: +86-021-50350029
- Fax: +86-021-50350029

1.3 Emergency Telephone

- Emergency Contact: +86-021-50350029 (24h CHEMTREC)

1.4 Identified Uses & Uses Advised Against

- **Identified Uses**: Pharmaceutical raw material (vitamin K3 supplement, hemostatic drug); feed additive (vitamin K nutritional fortifier); fine chemical intermediate.
- **Uses Advised Against**: Not for direct skin contact for a long time; not for use in light-exposed formulations without stabilizer; not for excessive use in feed and pharmaceutical preparations; not for mixing with strong reducing agents.

SECTION 2: Hazards Identification

2.1 GHS Classification

- Acute toxicity (oral, rat): Category 4 (LD_{50} = 400 mg/kg)
- Skin irritation: Category 2
- Eye irritation: Category 2
- Specific target organ toxicity (single exposure): Category 3 (Liver)
- Hazard to the aquatic environment (long-term): Category 3

2.2 GHS Label Elements

- Hazard Pictograms: GHS07 (Exclamation mark), GHS09 (Environment)
- Signal Word: Warning
- Hazard Statements:
  - H302: Harmful if swallowed
  - H315: Causes skin irritation
  - H319: Causes serious eye irritation

- H373: May cause damage to organs (Liver) through prolonged or repeated exposure
- H412: Harmful to aquatic life with long lasting effects
- Precautionary Statements:
- P264: Wash skin thoroughly after handling
- P270: Do not eat, drink or smoke when using this product
- P273: Avoid release to the environment
- P280: Wear protective gloves/eye protection
- P301+P312: If swallowed: Call a POISON CENTER/doctor if you feel unwell
- P302+P352: If on skin: Wash with plenty of soap and water
- P305+P351+P338: If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses if present and easy to do. Continue rinsing.
- P312: Call a POISON CENTER/doctor if you feel unwell
- P391: Collect spillage
- P501: Dispose of contents/container to an approved waste disposal plant

2.3 **Physical & Chemical Hazards**: Non-combustible; photosensitive, easy to decompose under direct sunlight; no explosion, corrosion or other physical and chemical hazards under normal use and storage conditions.2.4 **Health Hazards**: Harmful if swallowed; causes skin and serious eye irritation; prolonged or repeated exposure may cause liver damage; no inhalation hazard for routine handling, but dust inhalation may cause mild respiratory tract irritation.2.5 **Environmental Hazards**: Harmful to aquatic life with long-lasting effects; low biodegradability, certain bioaccumulation potential in aquatic organisms, may cause damage to aquatic biological liver and blood coagulation system.2.6 **Other Hazards**: No additional hazards identified.

SECTION 3: Composition/Information on Ingredients

- **Substance Type**: Pure Substance
- **Active Ingredient**: Menadione (100%, CAS:58-27-5)
- **Key Properties**: Vitamin K3 activity, promotes blood coagulation
- **Impurities**: No hazardous impurities present above specified limit values; related substances and heavy metals are controlled within industrial standard limits.

SECTION 4: First Aid Measures

4.1 **First-Aid Procedures**

- **Inhalation**: Move the victim to fresh air immediately, keep the respiratory tract unobstructed; if coughing or respiratory tract irritation occurs, give oxygen and call a POISON CENTER/doctor if necessary.
- **Skin Contact**: Immediately remove contaminated clothing and rinse the affected area with plenty of soap and running water for at least 5 minutes; if irritation or redness occurs, seek medical advice.

- **Eye Contact**: Immediately rinse eyes thoroughly with plenty of running water for 10-15 minutes, lifting the upper and lower eyelids occasionally; remove contact lenses if worn; consult a doctor immediately, even if no irritation is felt.
- **Ingestion**: Do not induce vomiting; rinse the mouth with water immediately; call a POISON CENTER/doctor at once and provide the product information for medical treatment.

4.2 **Key Symptoms & Effects**

- **Acute Effects**: Nausea, vomiting, abdominal pain after accidental ingestion; skin redness, itching, irritation after skin contact; eye redness, tearing, pain, blurred vision after eye contact.
- **Delayed Effects**: Prolonged or repeated exposure may cause liver function damage, abnormal blood coagulation indicators; long-term dust inhalation may cause chronic respiratory tract irritation.

4.3 **Medical Attention Indication**: Immediate medical attention is required for accidental ingestion, eye contact, severe skin irritation and prolonged exposure; provide a copy of this MSDS to the attending physician.

SECTION 5: Firefighting Measures

5.1 **Extinguishing Media**

- **Suitable**: Water spray, dry powder, foam, carbon dioxide (CO_2); any common extinguishing agent can be used.
- **Unsuitable**: No limitations on extinguishing media.

5.2 **Special Hazards from Combustion/Decomposition**

- The product is non-combustible; no hazardous combustion gases are generated when heated to high temperature.
- Decomposes at >200℃ to produce carbon dioxide, water vapor and a small amount of naphthalene series organic compounds, no toxic gas release; no explosion risk under fire conditions.

5.3 **Advice for Firefighters**

- Wear self-contained breathing apparatus (SCBA) and full fire-fighting protective gear when fighting fires; avoid inhalation of decomposition fumes.
- Fight the fire from a safe distance; prevent the fire runoff from entering sewers, rivers and other water bodies to avoid environmental contamination.
- After fire, treat the fire residue as hazardous waste for proper disposal.

SECTION 6: Accidental Release Measures

6.1 **Personal Precautions & Emergency Procedures**

- Wear nitrile rubber gloves, chemical splash goggles and N95 dust mask when handling the spillage; ensure good ventilation in the spill area.
- Evacuate non-essential personnel from the spill site to a safe area; only trained professional personnel can handle the spillage.
- Avoid dust formation and inhalation; do not touch the spilled powder with bare hands.

6.2 **Environmental Precautions**

- Strictly prevent the spillage from entering soil, sewers, rivers, lakes and other natural water bodies; the product is harmful to aquatic life and may cause long-term environmental damage.
- Do not discharge the spilled material directly into the environment; collect all spilled powder and contaminated materials for proper disposal.

6.3 **Containment & Cleaning Methods**

- **Small Spill**: Sweep up the spilled powder with a dry and clean brush/spatula, collect it in a sealed brown glass hazardous waste container for proper disposal; do not use water to clean to avoid dissolution and spread.
- **Large Spill**: Contain the spillage with dry sand to prevent spread, transfer the collected powder to a sealed dark container by vacuum with HEPA filter for disposal; clean the spill area with a small amount of ethanol and wipe dry, collect the cleaning waste as hazardous waste.

6.4 **Reference to Other Sections**: For the disposal of spilled waste, see Section 13.

SECTION 7: Handling and Storage

7.1 **Handling Precautions**

- Handle the product in a well-ventilated fume hood with dust extraction equipment and dark operation conditions to avoid direct sunlight and dust formation; only trained professional personnel can perform the handling operations.
- Wear the specified personal protective equipment (PPE) during all handling operations; operate quickly to reduce exposure time.
- Do not eat, drink, smoke or apply cosmetics when handling the product; wash hands and face thoroughly with soap and water after handling, and take a shower if necessary.
- Avoid mixing the product with strong oxidizing agents, strong acids, strong alkalis and reducing agents; avoid contact with water for a long time and high temperature processing (>80℃).

7.2 **Storage Conditions & Incompatibilities**

- **Storage Conditions**: Store in a cool, dry, dark warehouse, temperature ≤25℃, relative humidity ≤60%; use brown glass or dark HDPE packaging with tight seal and aluminum foil inner bag to prevent light and moisture.
- **Incompatibilities**: Strong oxidizing agents, concentrated mineral acids, strong alkalis, reducing agents, direct sunlight, high temperature (>80℃), heavy metal ions.
- **Storage Classification**: Dedicated locked storage area for pharmaceutical/feed raw materials, separate from other chemicals and food/feed raw materials; mark the storage area with obvious warning signs for photosensitive and irritating substances.
- **Shelf Life**: 24 months (unopened, room temperature, dark); 36 months (unopened, 2-8℃, dark); 3 months after opening (sealed, dark storage at room temperature).
- Store locked up and keep away from children and unauthorized personnel; the storage area should be equipped with light-shielding facilities and emergency cleaning equipment.

SECTION 8: Exposure Controls/Personal Protection

8.1 **Exposure Limits**: Occupational Exposure Limit (OEL): TWA 0.5 mg/m³ (airborne dust); STEL 1.0 mg/m³ (short-term exposure).

8.2 **Exposure Controls & PPE**

- **Engineering Controls**: Install local exhaust ventilation (LEV) and high-efficiency dust extraction equipment in the handling area; use dark operation facilities to avoid direct sunlight; conduct regular air quality monitoring in the workplace (quarterly).
- **Personal Protective Equipment**:
  - Eye/Face: Chemical splash goggles and full face shield for all handling operations to avoid powder splashing into eyes and light exposure.
  - Skin: Nitrile rubber gloves (thickness ≥0.5 mm), impermeable protective clothing and disposable shoe covers; replace protective equipment immediately if contaminated.
  - Respiratory: N95 dust mask for routine handling; powered air-purifying respirator (PAPR) for large spills or heavy dust operations.
  - Hand: Replace gloves immediately if they are torn, punctured or contaminated; wash hands with soap and water after glove removal, and disinfect with alcohol if necessary.

SECTION 9: Physical and Chemical Properties

- Physical State: Crystalline powder
- Color: Yellow to orange
- Odor: Odorless or slight characteristic odor
- Melting Point: 105-107℃
- Boiling Point: Decomposes at >200℃ (no obvious boiling point)
- Flammability: Non-combustible
- Flash Point: >150℃ (Closed Cup)
- Autoignition Temperature: Not applicable
- Solubility: Soluble in ethanol, ether, chloroform, acetone, benzene; slightly soluble in water (0.04 g/100 mL, 25℃); insoluble in petroleum ether
- Density (20℃): 1.29 g/cm³ (powder)
- Vapor Pressure (25℃): <0.0001 hPa (negligible volatility)
- Particle Size: 90% passing 100 mesh (pharmaceutical grade); 90% passing 80 mesh (feed grade)
- Photosensitivity: Highly photosensitive, decomposes under direct sunlight and strong light
- Hygroscopy: Non-hygroscopic
- pH Value: Not applicable (slightly soluble in water)

SECTION 10: Stability and Reactivity

10.1 **Chemical Stability**: Stable under the recommended sealed, dark and low-temperature storage conditions; photosensitive, easy to decompose and discolor under direct sunlight and strong light; no easy oxidation and decomposition in the dark.10.2 **Hazardous Reactions**: No hazardous reactions occur under normal use and handling conditions; no violent reaction with

common organic solvents and pharmaceutical/feed excipients.10.3 **Conditions to Avoid**: Direct sunlight, strong light, high temperature (>80℃), contact with strong oxidizing agents/strong acids/strong alkalis/reducing agents, long-term exposure to open air.10.4 **Incompatible Materials**: Hydrogen peroxide, potassium permanganate, concentrated sulfuric acid, sodium hydroxide, sodium sulfite and other strong reducing agents, heavy metal salts.10.5 **Hazardous Decomposition Products**: No toxic decomposition products; decomposes into carbon dioxide, water vapor and a small amount of naphthoquinone derivatives and naphthalene compounds at >200℃; no toxic gas release.

SECTION 11: Toxicological Information

11.1 **Toxicological Effects**

- **Acute Toxicity**: Oral (rat) LD_{50} = 400 mg/kg (harmful); Dermal (rabbit) LD_{50} >2000 mg/kg (low toxic); Inhalation (rat) LC_{50} >5 mg/m³ (4h, low toxic).
- **Skin Irritation**: Causes mild to moderate skin irritation (rabbit 24h closed patch test); redness, itching and erythema may occur in human skin contact.
- **Eye Irritation**: Causes serious eye irritation (rabbit test); eye redness, tearing, pain and conjunctivitis may occur, and severe cases may cause temporary blurred vision.
- **Mutagenicity**: No mutagenic effects observed in standard in vitro and in vivo tests (Ames test, chromosome aberration test).
- **Carcinogenicity**: Not classified as a carcinogen by IARC, EPA or NTP; no carcinogenic effect in long-term animal tests.
- **Reproductive Toxicity**: No reproductive toxicity observed in animal tests; no adverse effects on fertility and fetal development at normal dosage.
- **Target Organ Toxicity**: Prolonged or repeated exposure may cause liver function damage; animal tests show abnormal liver enzyme indicators after high-dose and long-term exposure.
- **Immunotoxicity**: No obvious immunotoxic effects observed in animal tests.

SECTION 12: Ecological Information

12.1 **Ecotoxicity**: Harmful to aquatic life; Zebrafish LC_{50} (96h) = 3.5 mg/L; Daphnia EC_{50} (48h) = 2.8 mg/L; Green Algae EC_{50} (72h) = 3.2 mg/L; may cause blood coagulation dysfunction of aquatic organisms.12.2 **Persistence & Degradability**: Low biodegradability (BOD_5/COD <0.3); difficult to be decomposed by microorganisms in water and soil, persists in the environment for more than 6 months.12.3 **Bioaccumulative Potential**: Moderate bioaccumulation potential (BCF = 500-1000) in aquatic organisms, easy to accumulate in fatty tissues of fish and aquatic invertebrates.12.4 **Soil Mobility**: Low mobility; easy to adsorb on soil organic matter and particles, not easy to leach with soil water, no groundwater pollution risk.12.5 **PBT/vPvB Assessment**: Classified as PBT (persistent, bioaccumulative, toxic) to aquatic organisms; meets the PBT classification criteria of GHS and EU REACH.12.6 **Other Ecological Effects**: May cause damage to the liver and blood coagulation system of aquatic organisms;

long-term exposure may affect the population survival rate of sensitive aquatic species; no obvious toxic effect on soil microorganisms and plants.

SECTION 13: Disposal Considerations

13.1 **Waste Disposal Methods**

- **Product Waste**: Do not discharge to the environment. Dispose of the unused product and expired product to a licensed professional hazardous waste treatment facility in accordance with local, national and international regulations; incineration is the recommended disposal method.
- **Packaging Waste**: Rinse the empty brown glass packaging with a small amount of ethanol, collect the rinse liquid as hazardous waste; dispose of the empty packaging as hazardous waste after drying, do not recycle directly.
- **Spillage Residue**: Collect all contaminated materials and cleaning waste as hazardous waste, do not mix with non-hazardous waste; the waste containing menadione must be treated as toxic and harmful hazardous waste.

13.2 **Disposal Notes**: Incineration must be carried out in a special hazardous waste incinerator with flue gas treatment system to remove organic fumes; do not landfill the untreated waste; the disposal must comply with the local hazardous waste management regulations.

SECTION 14: Transport Information

14.1 **UN Number**: UN 3077 (Environmentally hazardous substance, solid, n.o.s.)14.2 **UN Proper Shipping Name**: Environmentally hazardous substance, solid, n.o.s. (Menadione, Vitamin K3)14.3 **Transport Hazard Class**: 9 (Miscellaneous dangerous goods)14.4 **Packaging Group**: III14.5 **Environmental Hazards**: Marine Pollutant (Yes); ADR/RID/IMDG/IATA: Class 9, environmentally hazardous.14.6 **Special Precautions for User**

- Transport the product in sealed dark packaging (brown glass or dark HDPE), use ordinary dry transport means, avoid direct sunlight and high temperature during transport.
- The transport temperature must not exceed 30℃ for a long time; avoid collision, rough handling and rain during transport to prevent packaging damage and powder leakage.
- Do not transport with food, beverages, feed, medical supplies, non-hazardous goods and strong oxidizing agents/reducing agents.
- Accompany with complete transport documents indicating the UN number, hazard class, dark transport requirements and emergency contact information.

14.7 **IATA Restrictions**: Permitted for air transport (cargo only), limited quantity per package (≤5 kg); no transport on passenger aircraft; the packaging must be light-shielding and sealed.

SECTION 15: Regulatory Information

15.1 **National Regulations (China)**: Complies with Chinese Pharmacopoeia, Feed Additive Hygiene Standards, Hazardous Chemical Safety Management Regulation; classified as Class 9 hazardous chemical and environmentally hazardous substance.15.2 **International Regulations**: Complies with USP, EP, BP pharmaceutical standards; REACH (EU) registered, listed in Annex

XVII (environmentally hazardous substances); TSCA (US) listed; IMDG Code Class 9, UN 3077, Marine Pollutant; meets GHS Rev.9 classification requirements.

SECTION 16: Other Information

- This MSDS is compiled based on current scientific research and industrial application data, complying with GB/T 16483, GB/T 17