# Safety Data Sheet (MSDS)

(According to GB/T 16483 and GB/T 17519; Adapts to GHS, IMDG, IATA Standards)

**Pure Nisin (Food Grade, Powder)**

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

### 1.1 Product Identifiers

- Product Name: Pure Nisin (Food Grade, Powder)
- Product Number: NIS-20260228
- Brand: SIGALD
- CAS-No.: 1414-45-5
- Synonyms: Nisin; Lantibiotic Nisin; 尼辛（食品级）; Nisin Powder
- EC-No.: 215-807-5

### 1.2 Details of the supplier of the safety data sheet

- Company: NEWAY SINOPHC TECH. LIMITED
- 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 Phone #: +86-021-50350029 (CHEMTREC)

### 1.4 Relevant Identified Uses of the Substance or Mixture and Uses Advised Against

- Identified Uses: Food additive (natural antimicrobial preservative) for dairy, meat, beverage, canned food, bakery and snack food; food processing auxiliary for microbial contamination control.
- Uses Advised Against: Not for pharmaceutical/medical injection; not for use in infant food (0-6 months); avoid excessive use beyond national food standard limits.

## SECTION 2: Hazards Identification

|Summary of Emergency Measures|White to off-white free-flowing powder. Non-hazardous (mild irritant for sensitive individuals). After inhalation: Move to fresh air if dust irritation occurs, cough gently to expel dust. In case of skin contact: Rinse skin with plenty of running water for 5 minutes, no special treatment needed. After eye contact: Rinse with plenty of water for 5-10 minutes; consult a doctor if irritation persists. After swallowing: Rinse mouth with water, drink a small amount of warm water; no induced vomiting, no special treatment for food-grade dosage ingestion. Non-combustible. No explosion risk.| |---|

### 2.1 GHS Classification

- Skin irritation (Category 2)
- Serious eye damage/eye irritation (Category 2)
- Specific target organ toxicity - single exposure (Respiratory tract, Category 3)

### 2.2 GHS Label Elements

- Hazard Pictogram: (Irritant)

- Signal Word: **Warning**
- Hazard Statements:
  - H315: Causes skin irritation
  - H319: Causes serious eye irritation
  - H335: May cause respiratory irritation
- Precautionary Statements:
  - P261: Avoid breathing dust/fumes
  - P264: Wash skin thoroughly after handling
  - P280: Wear protective gloves/eye protection
  - P302+P352: If on skin: Wash with plenty of water/soap
  - P304+P340: If inhaled: Remove person to fresh air and keep comfortable for breathing
  - P305+P351+P338: If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
  - P332+P313: If skin irritation occurs: Get medical advice/attention
  - P337+P313: If eye irritation persists: Get medical advice/attention

**2.3 Physical and Chemical Hazards**

Non-combustible, no explosion risk; decomposes at ≥121℃ (high temperature sterilization) with loss of antimicrobial activity, no hazardous decomposition products; stable in acidic conditions, inactivated in strong alkaline conditions.

**2.4 Health Hazards**

- Inhalation of dust may cause mild respiratory tract irritation (cough, sore throat) in sensitive individuals, no systemic toxicity.
- Direct skin contact may cause mild redness/itching in sensitive individuals, no corrosion or permanent damage.
- Direct eye contact causes mild irritation (redness, tearing), reversible after flushing, no permanent eye damage.
- Accidental swallowing of food-grade dosage has no acute toxicity; large amount ingestion may cause mild gastrointestinal discomfort (nausea), no severe adverse effects.

**2.5 Environmental Hazards**

Environmentally friendly; fully biodegradable in water/soil by microbial degradation; no adverse effects on aquatic/terrestrial organisms at normal food use concentration; no bioaccumulation potential; no impact on soil microbial community.

**2.6 Other Hazards**

No additional hazards identified; nisin is a natural polypeptide, degradable in natural environment and human/animal digestive tract.

**SECTION 3: Composition/Information on Ingredients**

- Substance / Mixture: Pure substance (natural polypeptide antimicrobial)

**3.1 Main Components**

| | |
|---|---|
| Formula | $C_{143}H_{228}N_{42}O_{39}S_7$ (Nisin A, main active component) |
| Molecular Weight | 3348.0 g/mol |
| CAS-No.: | 1414-45-5 |
| EC-No.: | 215-807-5 |
| Concentration (w/w) | ≥95.0% (Food Grade, powder) |
| Other Component | Food-grade maltodextrin (carrier, ≤5.0%) |

**Hazardous Ingredients**

| Component | Classification | Concentration (w/w) |
|---|---|---|
| Pure Nisin | Skin Irrit. 2, Eye Irrit. 2, Resp. Irrit. 3 | 95.0-98.0% |
| Food-grade Maltodextrin | Non-hazardous | 2.0-5.0% |
| **Total Hazardous Ingredients** | **100%** | **95.0-98.0%** |

## SECTION 4: First Aid Measures

### 4.1 Description of First-Aid Measures

- If Inhaled: Move victim to fresh air and rest in a comfortable breathing position. Loosen tight clothing. If cough or sore throat persists, drink warm water and consult a doctor if needed.
- In Case of Skin Contact: Immediately rinse skin with plenty of running water and mild soap for 5 minutes. Remove contaminated clothing/shoes; wash clothing before reuse. No neutralizer needed.
- In Case of Eye Contact: Hold eyes open and rinse thoroughly with plenty of running water (from inner to outer corner) for 5-10 minutes. Do not rub eyes. Remove contact lenses if present (after initial rinsing). Consult an ophthalmologist only if irritation persists for more than 1 hour.
- If Swallowed: Rinse mouth with clean water. Drink 200-300 mL warm water to dilute. Do not induce vomiting (no choking risk for powder). Consult a doctor only if mild gastrointestinal discomfort (nausea, abdominal pain) occurs.

### 4.2 Most Important Symptoms and Effects, Both Acute and Delayed

- Acute Effects: Mild respiratory irritation from dust inhalation, mild skin/eye irritation in sensitive individuals, mild gastrointestinal discomfort from large amount ingestion.
- Delayed Effects: No known delayed toxic effects based on long-term human/animal use data; no cumulative toxicity.

### 4.3 Indication of Any Immediate Medical Attention and Special Treatment Needed

No specific antidote; treat symptomatically (e.g., anti-irritant cream for skin, eye drops for mild eye irritation). No special medical treatment required for normal exposure/ingestion.

### 4.4 Notes to Physician

Inform the physician of the product composition (natural polypeptide) and exposure/ingestion dosage; no specific treatment protocol needed, supportive care is sufficient.

## SECTION 5: Firefighting Measures

### 5.1 Extinguishing Media

- Suitable Extinguishing Media: Water spray, carbon dioxide ($CO_2$), dry chemical powder, foam.
- Unsuitable Extinguishing Media: No limitations of extinguishing agents.

**5.2 Special Hazards Arising from the Substance or Mixture**

- Non-combustible; no flame or smoke during combustion (if involved in fire); decomposes at high temperature (≥121℃) with loss of antimicrobial activity, no toxic/hazardous combustion products.
- Dust cloud may cause mild respiratory irritation to firefighters; no dust explosion risk (no combustible components).

**5.3 Advice for Firefighters**

- Wear standard fire-fighting gear (gloves, goggles, respirator) to avoid inhalation of dust and skin/eye contact with hot powder.
- Cool containers with water spray to prevent overheating and caking; keep a safe distance from spilled powder.
- Ensure good ventilation at fire scene to disperse dust.

**SECTION 6: Accidental Release Measures**

**6.1 Personal Precautions, Protective Equipment and Emergency Procedures**

- Wear nitrile rubber gloves, chemical protective goggles and FFP1 respirator (for dust) when cleaning up spills.
- Evacuate non-essential personnel from the spill area; ensure good ventilation to disperse dust.
- Do not touch or walk through the spilled powder directly; avoid breathing dust cloud.

**6.2 Environmental Precautions**

- Prevent spilled powder from entering sewers, rivers, lakes or other water bodies (biodegradable, no severe pollution; avoid excessive accumulation).
- Sweep up spilled powder on soil and transfer to sealed containers; no special environmental treatment needed.

**6.3 Methods and Materials for Containment and Cleaning Up**

- Small Spill: Sweep up with a clean dry brush, transfer to a sealed HDPE plastic bag/container for reuse or disposal; wipe the area with a dry cloth to remove residual dust.
- Large Spill: Contain with plastic barriers; sweep up the powder with a dust pan, transfer to sealed HDPE drums for recycling or disposal; rinse the area with a small amount of water (avoid excessive water to prevent clumping).

**6.4 Reference to Other Sections**

For disposal, see Section 13.

**SECTION 7: Handling and Storage**

**7.1 Precautions for Safe Handling**

- Operate in a well-ventilated area with local exhaust ventilation (to capture dust); use dry powder handling equipment (avoid moisture) to prevent caking.

- Wear personal protective equipment (PPE) as specified in Section 8; wash hands/face thoroughly with soap and water after handling; do not eat, drink or smoke in the workplace.
- Avoid contact with strong bases (pH > 8.0) and high temperature (≥121℃) to prevent loss of antimicrobial activity; dissolve in acidic water (pH 3.0-5.0) for food application.
- Use dry, clean stainless steel/HDPE equipment for handling; avoid iron/copper equipment (no reaction, just to prevent contamination).

**7.2 Conditions for Safe Storage, Including Any Incompatibilities**

- **Storage Conditions**: Store in a **cool, dry, dark, well-ventilated** food-grade warehouse. Keep container tightly sealed to prevent moisture absorption, caking and loss of activity. Storage temperature **2-8℃ (refrigerated)** for long-term storage, ≤25℃ for short-term storage (≤3 months); avoid direct sunlight and high humidity (RH ≤60%).
- **Incompatibilities**: Strong bases (NaOH, KOH), alkaline food additives (sodium bicarbonate, ammonium bicarbonate), high-temperature sterilization (≥121℃ for long time), proteolytic enzymes (e.g., papain, trypsin).
- **Storage Class (TRGS 510)**: 13 (Non-Hazardous Solids)
- **Shelf Life**: 24 months (unopened, refrigerated at 2-8℃); 6 months (unopened, stored at ≤25℃); 1 month (after opening, sealed and refrigerated).
- **Packaging Requirements**: Store in food-grade sealed aluminum foil bags/HDPE plastic drums (airtight, moisture-proof); vacuum packaging is recommended for long-term storage.

**SECTION 8: Exposure Controls/Personal Protection**

**8.1 Control Parameters**

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| Component | CAS-No. | TLV-TWA (8h) | TLV-STEL (15min) | Basis |
|---|---|---|---|---|
| Pure Nisin | 1414-45-5 | 10 mg/m³ | 20 mg/m³ | ACGIH (polypeptide dust) |

**8.2 Exposure Controls**

- **Engineering Controls**: Install local exhaust ventilation at the operation station (capture efficiency ≥90%) to reduce dust concentration; use closed-loop powder transfer systems for bulk handling.
- **Personal Protective Equipment (PPE)**:
  - Eye/Face Protection: Chemical protective goggles (mandatory for all handling) to prevent dust from entering eyes.
  - Skin Protection: Nitrile rubber gloves (thickness ≥0.15mm), clean cotton work clothes; avoid direct skin contact with large amounts of powder.
  - Respiratory Protection: FFP1 respirator for normal handling; FFP2 respirator for bulk handling/dust generation.
  - Hand Protection: Replace gloves if damaged/contaminated; wash gloves before removal.
- **Control of Environmental Exposure**: Do not discharge powder into the environment; collect and reuse/dispose of spilled powder.

**SECTION 9: Physical and Chemical Properties**

**9.1 Information on Basic Physical and Chemical Properties**

a) Physical State: Solid (powder)b) Color: White to off-whitec) Odor: Odorless (faint malt odor from carrier)d) Melting Point/Freezing Point: Decomposes (≥121℃, no melting)e) Initial Boiling Point and Boiling Range: Not applicable (solid, decomposes on heating)f) Flammability (Solid/Gas): Non-combustibleg) Upper/Lower Flammability or Explosive Limits: Not applicableh) Flash Point: Not applicablei) Autoignition Temperature: Not applicablej) Decomposition Temperature: ≥121℃ (loss of antimicrobial activity, no hazardous decomposition)k) pH Value (25℃): 3.0-5.0 (1% aqueous solution)l) Viscosity (25℃): Not applicable (powder); 5-10 mPa·s (1% aqueous solution)m) Water Solubility: Soluble in acidic water (pH 3.0-5.0), slightly soluble in neutral water, insoluble in organic solvents (ethanol, ether)n) Partition Coefficient (n-octanol/water): -6.2 (25℃, acidic condition)o) Vapor Pressure (25℃): Negligible (<0.001 hPa)p) Density (25℃): 1.15-1.25 g/cm³ (bulk density)q) Bulk Density: 0.4-0.6 g/cm³r) Particle Characteristics: 80-120 mesh (uniform fine powder)s) Explosive Properties: Not explosive (no dust explosion risk)t) Oxidizing Properties: None (mild reducing property)

**9.2 Other Safety Information**

Hygroscopic (easily absorbs moisture and cakes); stable in acidic conditions (pH 2.0-6.0), rapidly inactivated in alkaline conditions (pH >8.0); sensitive to proteolytic enzymes and high temperature; compatible with most food additives (acidulants, antioxidants, thickeners).

**SECTION 10: Stability and Reactivity**

**10.1 Chemical Stability**

Stable under recommended storage conditions (2-8℃, dry, sealed, acidic); stable in food processing under low-temperature pasteurization (≤85℃); no spontaneous reaction with air/water at room temperature.

**10.2 Possibility of Hazardous Reactions**

- No hazardous reactions under normal use/handling conditions; inactivated in strong alkaline conditions (no toxic products) and high temperature (only loss of activity).
- Reacts with proteolytic enzymes (e.g., trypsin) to hydrolyze into amino acids (natural degradation, no hazardous products).
- No polymerization, no decomposition into toxic substances under any normal conditions.

**10.3 Conditions to Avoid**

High temperature (≥121℃), strong alkaline conditions (pH >8.0), high humidity (RH >60%), contact with proteolytic enzymes, direct sunlight, moisture absorption.

**10.4 Incompatible Materials**

- Strong bases: Sodium hydroxide, potassium hydroxide, calcium hydroxide.
- Alkaline food additives: Sodium bicarbonate, ammonium bicarbonate, sodium carbonate.
- Proteolytic enzymes: Papain, trypsin, pepsin (food grade).
- High-temperature sterilization equipment (prolonged exposure to ≥121℃).

**10.5 Hazardous Decomposition Products**

No hazardous decomposition products; decomposes at high temperature into amino acids, carbon dioxide and water; hydrolyzes into amino acids in alkaline conditions or by enzymes (all non-toxic).

**SECTION 11: Toxicological Information**

**11.1 Information on Toxicological Effects**

- **Acute Toxicity**:
  - Oral (Rat, $LD_{50}$): > 20000 mg/kg
  - Dermal (Rabbit, $LD_{50}$): > 10000 mg/kg
  - Inhalation (Rat, $LC_{50}$): > 5000 mg/m³ (4-hour exposure, dust)
- **Skin Corrosion/Irritation**: Mild irritation (Rabbit test, 4-hour exposure); slight redness, no corrosion/blistering, reversible within 24 hours.
- **Serious Eye Damage/Eye Irritation**: Mild irritation (Rabbit test, 24-hour exposure); redness/tearing, reversible within 48 hours, no corneal damage.
- **Respiratory or Skin Sensitization**: No skin/respiratory sensitization (long-term human/animal use data; patch test negative).
- **Germ Cell Mutagenicity**: No mutagenic effects (Ames test, chromosome aberration test); negative results for all genetic toxicity tests.
- **Carcinogenicity**: Not classified as carcinogenic by IARC, EPA, or NTP; FDA/CFDA GRAS certified (food grade).
- **Reproductive Toxicity**: No adverse reproductive/developmental effects in animal tests (rat/mouse) at high dosage (1000 mg/kg/day); no teratogenic, embryotoxic or fetotoxic effects.
- **Specific Target Organ Toxicity (Single/Repeated Exposure)**: No target organ toxicity for single/repeated exposure; no cumulative toxicity in long-term animal tests.
- **Aspiration Hazard**: Low (powder, low bulk density; no aspiration risk for normal handling, avoid inhaling large amounts of dust).

**11.2 Additional Information**

Approved by FAO/WHO Codex Alimentarius, **ADI: 0-3300 IU/kg body weight**; nisin is a natural polypeptide produced by *Lactococcus lactis*, degradable into amino acids in human/animal digestive tract, no accumulation, safe for long-term human consumption in compliance with GB 2760-2021 dosage standards.

**SECTION 12: Ecological Information**

**12.1 Toxicity**

- Fish (Zebrafish, $LC_{50}$): > 5000 mg/L (96-hour exposure, 1% acidic solution)
- Daphnia ($EC_{50}$): > 3000 mg/L (48-hour exposure, 1% acidic solution)
- Algae ($EC_{50}$): > 4000 mg/L (72-hour exposure, 1% acidic solution)

- Soil Microorganisms: No inhibitory effect at normal use concentration; promotes beneficial microbial growth.No toxic effects on aquatic/terrestrial organisms at any concentration related to food use; high concentration only has mild inhibitory effect on a small number of gram-positive bacteria (no ecological impact).

**12.2 Persistence and Degradability**

**Fully biodegradable** in water/soil ($BOD_5$ /COD > 0.8); degraded by microbial proteases into amino acids within 3-7 days; no persistent organic pollutants (POPs); degradable in sewage treatment systems (activated sludge process).

**12.3 Bioaccumulative Potential**

**No bioaccumulation potential**; nisin is a polypeptide, rapidly hydrolyzed into amino acids in organisms, no accumulation in tissues/organs of aquatic/terrestrial animals.

**12.4 Mobility in Soil**

Low mobility in soil; adsorbs to soil organic matter and clay particles, slowly degraded by soil microorganisms; no leaching into groundwater (no groundwater contamination risk).

**12.5 Results of PBT and vPvB Assessment**

Not classified as PBT/vPvB (no persistence, no bioaccumulation, low toxicity); environmentally friendly natural food additive.

**12.6 Other Adverse Effects**

No known adverse ecological impacts; no effect on water quality, soil fertility or biodiversity; nisin-producing bacteria are natural lactic acid bacteria, non-pathogenic.

**SECTION 13: Disposal Considerations**

**13.1 Waste Treatment Methods**

- **Product Waste**: Uncontaminated powder can be reused for food processing (if within shelf life); expired powder can be mixed with animal feed (low dosage) or disposed of by licensed solid waste treatment facilities; dilute aqueous solution can be discharged to municipal sewage treatment plants (biodegradable).
- **Packaging Waste**: Rinse packaging thoroughly with acidic water (pH 3.0-5.0) to remove residual powder; dispose of as non-hazardous food-grade packaging waste or recycle (HDPE/aluminum foil).
- **Dust Waste**: Collect all dust waste, transfer to sealed containers, and dispose of as non-hazardous solid waste.

**13.2 Disposal Notes**

- Do not mix with alkaline waste (inactivation only, no hazardous reaction); no open burning of powder (unnecessary, non-toxic decomposition).
- Comply with local, national and international waste disposal regulations (e.g., China GB 8978, EU WFD, US EPA); food-grade waste shall be disposed of in accordance with food safety regulations.

**SECTION 14: Transport Information**

**14.1 UN Number**

ADR/RID: -; IMDG: -; IATA-DGR: -

**14.2 UN Proper Shipping Name**

ADR/RID: Not dangerous goods; IMDG: Not dangerous goods; IATA-DGR: Not dangerous goods

**14.3 Transport Hazard Class(es)**

ADR/RID: -; IMDG: -; IATA-DGR: -

**14.4 Packaging Group**

ADR/RID: -; IMDG: -; IATA-DGR: -

**14.5 Environmental Hazards**

ADR/RID: No; IMDG Marine Pollutant: No; IATA-DGR: No

**14.6 Special Precautions for User**

- Transport at **2-8℃ (refrigerated transport)** for long-distance/long-term transport; use insulated refrigerated vehicles with temperature control. For short-distance transport (≤3 days), transport at ≤25℃, avoid high temperature and direct sunlight.
- Use moisture-proof, airtight packaging (aluminum foil bags/HDPE drums); avoid collision and extrusion to prevent packaging damage and powder caking.
- Do not transport with strong bases, alkaline food additives, proteolytic enzymes and high-temperature goods (separate loading); no mixing with other food additives is prohibited (compatible with most).
- Ensure good ventilation in the transport vehicle; no smoking/open fire in the vehicle; carry a small amount of PPE for emergency cleaning of spilled powder.

**14.7 Incompatible Materials**

Avoid transport with strong bases, alkaline food additives, proteolytic enzymes and high-temperature (≥60℃) cargoes.

**Further Information**: Not classified as dangerous goods under international transport regulations (ADR/RID, IMDG Code, IATA-DGR); transport as ordinary food additive, refrigerated transport is recommended for best quality retention.

**SECTION 15: Regulatory Information**

**15.1 Safety, Health and Environmental Regulations/Legislation Specific for the Substance or Mixture**

- **National Regulations (China)**:
  - Hazardous Chemical Safety Management Regulation (Non-hazardous classification)
  - National Food Safety Standard for Food Additives (GB 2760-2021) – approved as natural antimicrobial preservative (specified application scope and dosage)
  - National Food Safety Standard for Nisin (GB 1886.234-2016) – strict quality requirements for food grade
  - Food Safety Law of the People's Republic of China

- Water Pollution Prevention and Control Law

- **International Regulations**:
- GHS Classification (Rev. 9): Skin Irrit. 2, Eye Irrit. 2, STOT-single 3 (Resp. tract)
- REACH (EU): Registered; not in SVHC Candidate List; complies with EC 1333/2008 (food grade)
- TSCA (US): Listed on the TSCA Inventory; FDA GRAS certified (21 CFR 184.1338)
- Codex Alimentarius (FAO/WHO): Approved as food additive (ADI: 0-3300 IU/kg bw)
- FCC (Food Chemicals Codex): Grade V compliance

**15.2 Other Regulations**

Comply with local food safety, occupational health and environmental protection regulations; the workplace must meet the occupational exposure limit of polypeptide dust; food use must follow GB 2760-2021 application scope and dosage limit (no use in infant food 0-6 months).

**SECTION 16: Other Information**

- **Further Information**: This MSDS is based on current scientific knowledge and complies with GB/T 16483, GB/T 17519, and GHS standards. It is intended for safe handling, storage, transport, and disposal of food-grade Pure Nisin (powder). The supplier is not liable for damage caused by improper use, storage or non-compliance with safety precautions.
- **Revision Date**: 28 FEB 2026
- **Version**: V1.0