

## Technical Data Sheet (TDS)

### 1. Product Overview

- **Product Name:** Copper Peptide (GHK-Cu / Copper Tripeptide-1) (铜肽)
- **CAS Number:** 49557-75-7
- **Formula:** C<sub>14</sub>H<sub>24</sub>CUN<sub>6</sub> O<sub>4</sub>
- **Formula Weight:** 404.92 g/mol
- **Molecular Form:** Glycyl-L-histidyl-L-lysine copper tripeptide complex
- **Product Characteristics:** High-purity cosmetic/industrial grade Copper Peptide is a synthetic peptide-copper complex with potent skin repair and anti-aging activity. Pale blue odorless lyophilized powder, soluble in water, stable under refrigerated storage. Promotes collagen synthesis, accelerates skin cell regeneration, and has mild antioxidant/anti-inflammatory effects; low toxicity, high biocompatibility, FDA compliant for cosmetic use, widely used in skincare, biomedical research and industrial biocatalysis.

### 2. Technical Specifications (Cosmetic/Industrial Standard Compliant)

| Item                              | Specification (Cosmetic Grade)                            |
|-----------------------------------|---|
| Appearance                        | White to pale blue lyophilized powder                     |
| Assay (Purity, HPLC)              | ≥ 98.0%   |
| Copper Content                    | 12.0-14.0% (ICP)  |
| pH Value (1mg/mL aqueous, 25°C)   | 5.0-7.0   |
| Water Content (Karl Fischer)      | ≤ 3.0%  |
| Heavy Metals (Pb)                 | ≤ 5 ppm (AAS)   |
| Heavy Metals (As)                 | ≤ 1 ppm (AFS)   |
| Total Aerobic Count               | ≤ 100 CFU/g   |
| Pathogens (E. coli/Staph. aureus) | Negative  |
| Solubility                        | Soluble in water, dilute phosphate buffer                 |
| Particle Size                     | 200-300 mesh  |
| Hygroscopy                        | Slight (stable at RH ≤60%)                                |
| Storage Stability                 | 24 months (2-8°C, unopened); 1 month (4°C, after opening) |

### 3. Product Advantages

1. **Multi-functional Skin Activity:** Promotes collagen/elastin synthesis, accelerates wound healing, reduces fine lines and wrinkles; mild antioxidant and anti-inflammatory effects.
2. **High Biocompatibility:** Synthetic peptide-copper complex, low immunogenicity, no skin irritation (non-copper allergic population); suitable for all skin types including sensitive skin.
3. **Stable Physical Properties:** Lyophilized powder with slight hygroscopy; stable under refrigerated storage, easy for cosmetic formulation and storage.
4. **High Purity & Uniformity:** ≥98.0% HPLC purity, precise copper content (12-14%); standardized synthesis process, low batch-to-batch variation.
5. **Versatile Application:** Compatible with various cosmetic excipients (creams, serums, masks); suitable for biomedical research and industrial biocatalysis.
6. **Environmentally Friendly:** Fully biodegradable; copper ions are essential biogenic micronutrients, no environmental pollution risk.

### 4. Application Fields

- **Cosmetic & Skincare:** Anti-aging serums, anti-wrinkle creams, skin repair masks, scar removal products, hair care formulations (hair growth promotion).
- **Biomedical Research:** Skin tissue engineering, wound healing research, cell culture supplement (promotes fibroblast proliferation).
- **Industrial Use:** Biocatalyst for organic synthesis; metal ion chelation research; antibacterial coating additive (mild biocidal activity).
- **Veterinary Care:** Animal skin wound repair products; pet skincare formulations (low-concentration).

### 5. Usage Methods

- **Cosmetic Formulation:** Dissolve in water/propylene glycol (0.5-2.0% concentration) and blend with cosmetic excipients; adjust pH to 5.0-7.0 for optimal stability; add in the final stage of formulation (temperature  $\leq 40^{\circ}\text{C}$ ).
- **Research Use:** 0.01-0.1 mg/mL concentration for in vitro cell experiments; dissolve in sterile phosphate-buffered saline (PBS, pH 6.5) to prepare stock solution (store at  $4^{\circ}\text{C}$  for 1 month).
- **Industrial Biocatalysis:** 0.1-1.0 g/L concentration in reaction system; use in neutral pH (6.0-7.0) aqueous environment; avoid chelating agents/strong acids/bases.
- **Critical Notes:**
  1. Avoid use in copper-allergic individuals; perform skin patch test before cosmetic use.
  2. Do not mix with chelating agents (EDTA), strong acids/bases or oxidizing agents; avoid high-temperature formulation ( $>40^{\circ}\text{C}$ ).
  3. Strict refrigerated storage; avoid high temperature/moisture to prevent peptide degradation.

## 6. Packaging & Storage

### Packaging Specifications (Sealed/Refrigerated/Moisture-Proof)

- 1 g/vial (cosmetic grade, sealed glass vial with rubber stopper + aluminum crimp seal)
- 10 g/bottle (industrial grade, HDPE plastic bottle with moisture-proof cap)
- 100 g/bag (bulk grade, aluminum foil vacuum bag)
- 1 kg/drum (large-scale industrial use, HDPE plastic drum with inner aluminum foil bag)
- Custom packaging (0.1g/5g) for research/small-batch orders available on request.

### Storage Conditions (Refrigerated Mandatory)

- **Long-term Storage:**  $2-8^{\circ}\text{C}$  (refrigerated), dry, dark, **sealed**; store in original packaging; avoid temperature fluctuation ( $>10^{\circ}\text{C}$ ).
- **Short-term Storage:**  $4^{\circ}\text{C}$  (refrigerated), up to 1 month after opening; keep sealed and dry (RH  $\leq 60\%$ ).
- **Avoid:** High temperature ( $>40^{\circ}\text{C}$ ), direct sunlight, high humidity (RH  $>60\%$ ), strong acids/bases, oxidizing agents, chelating agents.
- **Segregation:** Store separately from food/feed, cosmetics (other raw materials), strong acids/bases; store in dedicated peptide refrigerated storage area ( $2-8^{\circ}\text{C}$ ).

### Shelf Life

- 24 months (unopened,  $2-8^{\circ}\text{C}$  refrigerated storage, cosmetic/industrial grade)
- 18 months (unopened,  $2-8^{\circ}\text{C}$  refrigerated storage, research grade)
- 1 month ( $4^{\circ}\text{C}$  refrigerated, after opening, all grades)
- 7 days (room temperature, low humidity, after opening; emergency use only)

### Transportation

- **Refrigerated transport ( $2-8^{\circ}\text{C}$ );** sealed packaging with moisture-proof liner; insulated styrofoam cooler with ice packs.
- Non-hazardous goods transport; mark "**Keep Refrigerated**"; no transport with food/feed/strong acids/bases/chelating agents.
- Temperature monitor for long-distance transport; replenish ice packs for transport time  $>24\text{h}$ ; avoid collision/moisture/direct sunlight.

## 7. Safety & Protection

- The product may cause **allergic skin reactions** in copper-sensitive individuals and **serious eye irritation**; no acute systemic toxicity.
- **Mandatory PPE** for handling: chemical safety goggles, N95/P95 dust mask, powder-free nitrile gloves ( $\geq 0.18\text{mm}$ ), disposable lab coat.
- Operate in well-ventilated area; avoid dust generation/inhalation and skin/eye contact; wash hands thoroughly after handling.

## 8. Quality Assurance

- Manufactured in accordance with **ISO 9001 (Quality)** and **ISO 14001 (Environment)** standards; cosmetic grade complies with global skincare raw material regulations.
- Each batch is tested by an independent third-party laboratory and accompanied by a **Certificate of Analysis (COA)** with full purity/copper content test data.