

Full Industry Application Manual for Glabridin from HiSiaddi

Version: 2026 General Industry Edition

For formula R&D, production workshops, foreign trade filing and brand product development

INCI: Glabridin | CAS: 59870-68-7 | Nickname: Whitening Gold

Table of Contents

1. Raw Material Physicochemical Properties & Grading Standards
2. Four Core Functional Mechanisms (Whitening / Anti-Inflammation / Antioxidation / Photoprotection)
3. Full-Category Cosmetic Application Scenarios & Standard Dosage
4. Standard Dissolution Process (Core Difficulty Solutions)
5. Synergistic Blending Systems & Incompatible Raw Materials
6. Formula Stability Control (Anti-Oxidation & Anti-Discoloration)
7. Mass-Production Reference Formulas (Serums, Creams, Masks, Sunscreens)
8. Safety Specifications & Regulatory Compliance
9. Storage & Packaging Guidelines + MSDS Support
10. Common Production Problems & Troubleshooting

1 Raw Material Physicochemical Properties & Commercial Grades

1.1 Core Physical & Chemical Parameters

Molecular Formula: $C_{20}H_{20}O_4$

Molecular Weight: 324.37

Appearance:

- 95% / 98% High Purity: White to off-white crystalline powder
- 40% Crude Extract: Pale yellow-brown powder

Solubility: Lipophilic; practically insoluble in pure water; soluble in 1,3-butanediol, propylene glycol, ethanol, DMSO; slightly soluble in vegetable oils

Melting Point: 154–156°C

Stable pH Range: 4.5–6.5; Prone to yellowing and deactivation under strong light, high temperature or strong alkaline conditions

1.2 Commercial Purity Grades & Applicable Channels

表格

Purity Grade	HPLC Content	Target Channels	Standard Dosage Range
Reagent High Purity	≥98%	Laboratory reference standards, pharmaceutical intermediates, high-end salon serums	0.01–0.08%
Cosmetic Grade A	90–95%	Whitening special-permit cosmetics, sensitive skincare, export products	0.03–0.1%
Economy Crude Extract	40%	Affordable masks, body lotion, basic brightening emulsions	0.1–0.5%
Pre-Dissolved Liquid	1–10% in polyol	Toners, simple formulations; direct addition without pre-dissolution	Add 1–5% directly

2 Four Core Functional Mechanisms

2.1 Powerful Melanin Inhibition (Core Whitening Function)

1. Competitively inhibits tyrosinase (rate-limiting enzyme for melanin synthesis); inhibitory activity: 1164× arbutin, 232× vitamin C, 16× hydroquinone
2. Blocks melanosome transport to keratinocytes, improves post-inflammatory pigmentation, acne marks, chloasma and sun spots
3. Suppresses melanocyte hyperactivity induced by oxidative stress to prevent melanin formation and rebound pigmentation at source

2.2 Broad-Spectrum Anti-Inflammatory & Soothing Effects

Inhibits inflammatory mediators including IL-6, iNOS and histamine; rapidly relieves redness and stinging, repairs skin barrier. Can partially replace dipotassium glycyrrhizate for acne-prone skin, post-procedure skin and seasonal sensitivity redness relief.

2.3 Strong Antioxidation & Anti-Aging

Scavenges free radicals and inhibits lipid peroxidation; protects collagen against damage from UV, blue light and environmental pollution; improves dull yellow complexion and fine lines caused by aging.

2.4 Synergistic Photoprotection

Absorbs partial medium-short UV rays, reduces UV-induced inflammation and pigmentation; enhances sunscreen efficacy when blended with UV filters to minimize sun tanning and photoaging.

3 Full-Category Cosmetic Applications & Standard Dosage

(Based on 95% high-purity Glabridin powder)

3.1 Whitening & Spot-Correcting Products (Special Cosmetic Permit Core Line)

- Whitening serums & spot essences: 0.05–0.1% (gold efficacy concentration with visible brightening in 28 days)
- Whitening creams & milks: 0.03–0.08% (gentle long-term efficacy)
- Spot treatment creams (special permit): 0.08–0.12% (domestic regulatory upper limit range)

3.2 Soothing & Sensitive Skin Repair Products

- Repair serums & redness-reducing ampoules: 0.02–0.05%
- Post-treatment recovery creams & barrier repair lotions: 0.015–0.04%
- Redness & hormone-damaged skin dressings: 0.03–0.06%

3.3 Acne Control Products

- Acne gels & clearing serums: 0.03–0.08% (inhibits androgen-induced sebum secretion, fades red acne marks)

3.4 Sunscreens & After-Sun Repair

- Sunscreen lotions & creams: 0.01–0.04% (stabilizes UV filters and reduces tanning)
- After-sun repair jelly masks & soothing sprays: 0.02–0.06%

3.5 Masks, Body Care & Eye Creams

- Brightening sheet masks & wash-off masks: 0.02–0.06%
- Body brightening lotions & elbow/knuckle spot creams: 0.04–0.08%
- Dark circle eye creams: 0.02–0.05%

3.6 Hair Care Expansion Applications

- Anti-dandruff shampoos & scalp serums: 0.01–0.03%, relieves scalp redness and dandruff inflammation

4 Standard Dissolution Process (Core Production Operation Guide)

4.1 Mandatory Dissolution Ratio

Glabridin powder : Solvent = 1 : 10 minimum ratio (1,3-butanediol preferred solvent)

Example: To add 0.1% Glabridin in formula, at least 1% 1,3-butanediol/propylene glycol must be included as carrier solvent.

4.2 Standard Dissolution Steps for 95% High-Purity Powder

1. Weigh polyol solvent into beaker (1,3-butanediol recommended)
2. Add Glabridin powder, heat water bath to 45–60°C, stir slowly for 10–20 mins until fully clear with no particles

3. Cool mixture below 40°C before use; prolonged heating at high temperature causes yellowing and activity loss

4.3 Feeding Timing by Dosage Form

1. Creams & Emulsions

Option A (Recommended): Add pre-dissolved mixture post-emulsification when batch cools below 40°C, homogenize for 3 mins

Option B Oil-Phase Dissolution: Pre-dissolve into oil phase at 60°C; avoid holding temperature above 70°C for extended periods

2. Toners & Sprays

Must pair with solubilizers (PEG-40 Hydrogenated Castor Oil / Polysorbate 20); slowly drop pre-dissolved liquid into water phase under high-speed homogenization to prevent precipitation and turbidity

3. Oil-Based Serums & Anhydrous Skincare Oils

Directly dissolve in medium-chain triglycerides or squalane at 50°C, cool then fill

4.4 Turbidity & Precipitation Solutions for Water-Based Formulations

1. Adopt ready-made 10% Glabridin polyol pre-solution for direct feeding
2. Add 0.5–2% nonionic solubilizer to boost water solubility
3. Nano-liposome/microencapsulated Glabridin improves water solubility and transdermal absorption drastically

5 Synergistic Blending Systems & Raw Material Incompatibility

5.1 Top Performing Synergistic Combinations (Market Hit Formulas)

Combination 1 Gentle Sensitive Skin Whitening

Glabridin + Niacinamide + Tranexamic Acid

Ratio: Glabridin 0.05% + Niacinamide 2% + Tranexamic Acid 2–3%

Advantages: Melanin inhibition + melanin transport block + keratin metabolism; anti-inflammatory and non-irritating for long-term acne mark and spot correction

Combination 2 Anti-Oxidation & Dullness Reduction

Glabridin + VC Derivative (3-O-Ethyl Ascorbic Acid) + Ferulic Acid

Ratio: Glabridin 0.04% + VC Derivative 3% + Ferulic Acid 0.1%

Advantages: Triple antioxidant complex to improve glycation dullness and blue light aging damage

Combination 3 Barrier Repair Whitening

Glabridin + Ectoin + Panthenol + Ceramide

Ratio: Glabridin 0.03% + Ectoin 1% + Panthenol 2%

For barrier-damaged skin, post-procedure dullness and seasonal sensitivity brightening

Combination 4 Sunscreen Synergy System

Glabridin + Zinc Oxide / Avobenzone

Reduces UV-induced pigmentation and stabilizes UV filter formulations

5.2 Incompatible Raw Materials (Avoid Deactivation, Discoloration & Irritation)

1. High-concentration free fruit acids ($\geq 5\%$ glycolic acid): Accelerate Glabridin degradation and yellowing under strong acidic conditions; limit fruit acid $\leq 2\%$ if co-used, add in separate phases and maintain pH 5.0–6.0
2. Strong alkalis (potassium hydroxide, high-concentration ammonia): Destroy flavonoid structure and trigger rapid browning
3. High-concentration heavy metal ion raw materials: Catalyze oxidation leading to storage yellowing
4. Undiluted L-Ascorbic Acid (pH <3.5): Prefer stabilized VC derivatives instead of direct mixing

6 Formula Stability Control (Anti-Yellowing & Anti-Deactivation)

6.1 Antioxidant Stabilizer Additives

Add 0.05–0.1% Tocopheryl Acetate + 0.02% BHT + 0.03% Sodium Bisulfite to block Glabridin oxidation and discoloration

6.2 Mandatory pH Control

Optimal stable pH range: 5.0–6.0

Activity drops rapidly below pH 4.5 or above pH 7.0

6.3 Packaging Light Barrier Requirement

Finished products must use opaque aluminum tubes, amber glass bottles or non-transparent hoses; transparent packaging loses over 40% activity and develops yellow discoloration within 3 months

6.4 Storage Temperature Control

Store finished products below 25°C; refrigeration doubles shelf life for high-potency whitening serums

7 Three Mass-Production Mature Formulas (95% Glabridin)

Formula 1 Gentle Sensitive Skin Whitening Repair Serum

表格

Phase	Raw Material	Dosage	Operation Notes
Phase A Water Phase	Deionized Water	78.35%	Heat to 80°C to dissolve Sodium Hyaluronate & Panthenol
	Glycerin	5%	
	Panthenol	2%	
	Sodium Hyaluronate	0.15%	
Phase B Pre-Dissolved Phase	1,3-Butanediol	4%	Dissolve Glabridin at 55°C then cool for standby
	Glabridin (95%)	0.05%	
	PEG-40 Hydrogenated Castor Oil	1%	Solubilizer & dispersant
Phase C Functional Phase	Niacinamide	2%	Add when batch cools to 40°C
	Tranexamic Acid	3%	
	Ethylhexylglycerin	0.3%	Preservative
	Phenoxyethanol	0.15%	

Process: Cool water phase to 40°C under homogenization, slowly add Phase B then Phase C, stir slowly for 15 mins, filter; adjust pH to 5.3–5.8

Formula 2 Whitening Spot-Correcting Cream (Special Cosmetic Permit Eligible)

Oil Phase: Cetyl Alcohol, Caprylic/Capric Triglyceride, Squalane, Tocopheryl Acetate

Water Phase: Glycerin, Betaine, Ceramide NP, Xanthan Gum

Add pre-dissolved Glabridin 0.08% + Tranexamic Acid 2.5% post-emulsification at 40°C, homogenize and fill into opaque hoses

Formula 3 After-Sun Repair Mask Liquid

Glabridin 0.03% + Panthenol 2% + Asiaticoside 0.2% + Ectoin 1% + 3% polyol carrier; add solubilizer, adjust pH to 5.2, fill into amber mask pouches

8 Safety & Regulatory Compliance Manual

8.1 Human Safety Data

1. RIPT repeated human irritation test: Non-irritating, non-sensitizing; safe for sensitive skin and pregnant women for external use

2. Acute oral LD50 (rat) >2000mg/kg; no cytotoxicity with long-term topical use, no hormone-like side effects
3. Non-phototoxic; compatible with daily sunscreen use, no strict night-only application requirement

8.2 Global Regulatory Approval

1. China: Permitted under Safety Technical Specifications for Cosmetics (2022 Version); spot-lightening products require Special Cosmetic Registration Certificate
2. EU: Listed on CosIng; compliant under REACH Annex IV with unrestricted usage
3. USA: FDA filing approved for skincare topical use
4. Forbidden Application: Oral food additives; limited exclusively to cosmetic external use

8.3 Mandatory COA Microbe & Heavy Metal Standards

Lead ≤10ppm, Arsenic ≤2ppm, Mercury ≤1ppm, Cadmium ≤5ppm; Total Aerobic Microbes ≤100CFU/g; No pathogenic bacteria detected

9 Raw Material Storage, Packaging & Transportation Standards

1. Raw powder storage: Sealed aluminum foil/aluminum cans, light-proof storage below 25°C; 24-month shelf life refrigerated at 2–8°C, 18-month ambient shelf life; use within 1 month after opening
2. Segregate from oxidants and strong acids; avoid direct strong light exposure
3. Transport classification: Non-hazardous general chemicals; seal packaging to prevent moisture and breakage, no UN hazard marking required
4. Waste Disposal: Incinerate organic extract waste via licensed hazardous waste handlers; neutralize cleaning wastewater before discharge

10 Common Production Troubleshooting

Issue 1 Cloudiness & White Precipitation After Addition

Cause: Insufficient polyol carrier ratio, low feeding temperature

Solution: Supplement 1,3-butanediol, re-homogenize at 45°C; add solubilizer for water-based formulas

Issue 2 Yellow/Brown Discoloration Within 1–2 Months Post-Production

Causes: Light exposure, high storage temperature, missing antioxidants, out-of-range pH

Solutions: Switch to opaque amber packaging; add VE/BHT stabilizers; maintain pH 5–6; lower warehouse storage temperature

Issue 3 No Visible Brightening After 8 Weeks of Use

Causes: Low-purity raw material, insufficient dosage, high-temperature feeding deactivation, failure to pair with daily sunscreen

Solutions: Adopt $\geq 90\%$ high-purity Glabridin, minimum dosage 0.03%; feed only below 40°C; label mandatory sunscreen use on finished product packaging

Issue 4 Mild Stinging & Redness for Sensitive Skin Users

Cause: Over-concentration of irritating raw materials (high alcohol, high fruit acid)

Solution: Reduce irritant content; blend with Panthenol, Ceramide and Ectoin to soothe skin

Issue 5 Cream Emulsion Layer Separation

Cause: Incomplete Glabridin pre-dissolution, poor oil-phase compatibility

Solution: Extend pre-dissolution stirring time; use medium-chain triglycerides as oil carrier

Supporting Document Package for Import & Filing

1. TDS Technical Data Sheet
2. Dual-specification COA templates (95% / 40% purity)
3. 16-section bilingual SDS/MSDS compliant with national standards
4. Human safety test summary, zebrafish ecological safety assessment report