Specification Sheet of St. John's Wort Extract

Product Definition

St. John's Wort Extract is a natural plant extract produced from the dried aerial parts of *Hypericum perforatum L.* (Hypericaceae, Hypericum), preferably harvested at full flowering stage from the upper shoots. It is manufactured via standardized industrial processes including sorting, drying, grinding, enzymatic hydrolysis, extraction, filtration, purification, concentration, drying, and pulverization.

The product is rich in active ingredients such as hypericin, hyperoside, and total flavonoids, retaining the original nutritional and physiological activities of *Hypericum perforatum*. It complies with industry standards for food, health food, cosmetics, and pharmaceutical raw materials, and can be widely used in various fields.

1. Basic Product Information

- ⊙ Product Name: Hypericum Perforatum Extract
- ⊙ English Name: Hypericum Perforatum Extract
- ⊙ Latin Name: Extractum Hyperici Perforati
- ⊙ INCI Name: Hypericum Perforatum Flower/Leaf/Stem Extract
- ⊙ CAS No.: 84082-80-4 (whole extract); 548-04-9 (hypericin)
- ⊙ Botanical Source: Hypericum perforatum L. (Hypericaceae, Hypericum)
- ⊙ Part Used: Dried aerial parts (harvested at flowering stage, upper shoots preferred for highest active ingredient content)

2. Core Specifications

- Hypericin (UV/HPLC): 0.3%, 0.5%, 1.0%, 1.4% (customizable)
- Hyperoside (HPLC): 0.3%, 0.5%, 1.0%, 1.4% (customizable)
- Extraction Ratio: 10:1, 20:1, 30:1 (customizable)
- Total Flavonoids (calculated as rutin, UV): 3%~8%

3. Physicochemical Properties

- Appearance: Fine brown to dark brown powder, free of visible foreign impurities, with characteristic aromatic odor of *Hypericum perforatum*, slightly bitter taste, no off-odor or caking
- Particle Size: ≥95% passes through 80-mesh sieve; 100–200 mesh available upon request
- Loss on Drying: ≤5.0%
- Residue on Ignition: ≤5.0%

- Bulk Density: 0.3~0.5 g/mL
- Solubility: Freely soluble in 50%–70% ethanol, partly soluble in warm water and methanol, insoluble in petroleum ether and diethyl ether

4. Hygienic Specifications

- Total Heavy Metals: ≤20 ppm
- Lead (Pb): ≤5 ppm; Arsenic (As): ≤2 ppm; Cadmium (Cd): ≤1 ppm
- Microbiological Limits: Complies with national/enterprise standards
  - Total Plate Count: <1000 cfu/g
  - Molds & Yeasts: <100 cfu/g
  - Escherichia coli: Negative
  - Salmonella: Negative
- Residual Solvents: Ethanol ≤0.5%, no other harmful solvents; complies with European Pharmacopoeia 2000 and Chinese Pharmacopoeia

5. Applications

1. **Functional Foods**: Used in tableted candies, solid beverages, oral liquids, dietary supplements, etc. Provides calming, antioxidant effects to meet modern demand for emotional relief and physical regulation.
2. **Health Foods**: Raw material for antidepressant, sedative, sleep-improving and immunity-enhancing health products.
3. **Cosmetics**: Used in antioxidants, soothing, repairing and skin-stabilizing essences, creams, masks, etc. Improves skin oxidation status, relieves sensitivity, and strengthens the skin barrier.
4. **Pharmaceutical Intermediates**: Used in antidepressant, antiviral, anti-inflammatory traditional Chinese medicine compounds, chemical excipients, and new drug R&D.
5. **Other Fields**: Pet health products, feed additives, etc., providing natural active support for animal health.

6. Packaging

0.5–5 kg aluminum foil bag / 25 kg fiber drum (double sterile inner liner). Custom packaging available upon request.

7. Storage

Store in a cool, dry, dark and sealed place, away from direct sunlight, high temperature and humidity to prevent moisture absorption and oxidation.

8. Shelf Life

24 months under proper storage conditions

Nutritional Composition Table of St. John's Wort Extract

This table is compiled based on testing standards and industrial data for St. John's Wort Extract (core active: hypericin ≥0.3%). It is suitable for quality control and labeling of health food and functional food raw materials, in compliance with relevant requirements of the National Health Commission.

1. Basic Nutritional Information (per 100 g)

Item	Value	NRV%
Energy	302 kJ / 72 kcal	3.6%
Protein	1.5 g	3.0%
Fat	0.4 g	0.7%
— Saturated Fat	0.1 g	0.5%
— Trans Fat	0 g	—
Carbohydrates	17.2 g	5.7%
— Total Sugars	7.8 g	—
— Dietary Fiber	3.8 g	15.2%
Sodium	6 mg	0.3%

2. Core Active Components (per 100 g)

(1) Hypericins

- Total Hypericins: ≥0.3 g (regular); up to 1.4 g (custom)
- Main monomers (percentage of total hypericins):
  - Hypericin: 65%–75%
  - Pseudohypericin: 15%–25%
  - Isohypericin: 3%–8%

(2) Flavonoids & Polyphenols

Component	Content
Total Flavonoids (as rutin)	3.35–7.4 g
Hyperoside	0.3–1.4 g
Total Polyphenols (as gallic acid)	10–18 g
Quercetin & derivatives	2.0–5.0 g
Tannins	8.0–10.0 g
Chlorogenic acid	0.1–0.2 g
Caffeic acid	0.1–0.2 g

(3) Volatile Oils & Sterols

Component	Content
Volatile Oil	0.6–1.25 g
β-Sitosterol	0.2–0.5 g

3. Vitamins (per 100 g)

Vitamin	Content
Vitamin C	0.1–0.3 g
Vitamin E (α-TE)	40–180 mg
Vitamin B2	1–4 mg

4. Minerals (per 100 g)

Mineral	Content
Potassium (K)	450–1400 mg
Calcium (Ca)	180–750 mg
Magnesium (Mg)	90–480 mg
Phosphorus (P)	90–380 mg
Iron (Fe)	8–45 mg
Zinc (Zn)	4–18 mg

5. Safety Limits (per 100 g)

Item	Limit Value
Lead (Pb)	≤0.1 mg
Cadmium (Cd)	≤0.05 mg
Arsenic (As, inorganic)	≤0.1 mg
Mercury (Hg)	≤0.01 mg
Total Plate Count	≤1000 CFU/g
Molds & Yeasts	≤100 CFU/g
Coliforms	≤10 MPN/g
Salmonella	Negative in 25 g

Manufacturing Process Analysis of St. John's Wort Extract

This process adopts international mainstream industrial production standards, combining green extraction technologies (enzymatic pretreatment, microwave-assisted extraction) and refined purification. The core objective is to maximize retention of hypericin, hyperoside and other active ingredients while controlling impurities. It complies with EU, US FDA and Chinese Pharmacopoeia regulations, and is suitable for large-scale production of St. John's Wort Extract (hypericin ≥0.3%).

The whole process follows **low temperature and light protection** to avoid oxidative degradation of active ingredients, ensuring stable and controllable product quality.

Ⅰ. Core Process Principles

1. **Active Ingredient Retention Priority**: Low temperature (≤50°C) and light-protected operation throughout; stable pH system to protect hypericin/hyperoside, ensuring retention rate ≥90%.
2. **Green & Efficient Extraction**: Food-grade ethanol as solvent; combined with microwave and enzymatic treatment for high efficiency; solvents recyclable.
3. **Refined Purification & Impurity Removal**: Ethyl acetate extraction, reverse osmosis concentration to remove lipid-soluble, water-soluble and macromolecular impurities.
4. **Full-Process Quality Control**: Critical Control Points (CCP) set at each stage; strictly follows GMP for food and pharmaceutical production; full traceability.

Ⅱ. Detailed Process Steps

1. **Raw Material Pretreatment**

Select high-quality dried aerial parts of *Hypericum perforatum* at full flowering, free of rot and insects. Remove dead leaves, foreign matter and non-medicinal parts. Rinse quickly 1–2 times, drain, and dry at 60–70°C to moisture ≤10%. Grind to 40–80 mesh to increase surface area. Microbial testing: Total Plate Count ≤1000 CFU/g before proceeding.

2. **Solvent Impurity Removal (Optional, for higher purity)**

Mix powder with petroleum ether or solvent oil at 1:4–8 (g/mL), stir at 40–50°C for 2–3 h to remove lipids and pigments. Separate solids and recycle solvent.

3. **Gradient Temperature-Controlled Enzymolysis (Key Auxiliary Step)**

Add purified water at solid-liquid ratio 1:6–10 (g/mL). Add compound cellulase + pectinase (0.2%–0.4% of raw material).

- Initial: 35±1°C, 20–30 min
- Main: 45±1°C, 5–7 h
- Final: 40±1°C, 20–30 min

Inactivate enzymes at 80–90°C for 5–10 min. Increases extraction yield by 12–18%.

4. **Microwave-Assisted Extraction (Core Step)**

Solvent: 70–95% food-grade ethanol, solid-liquid ratio 1:5–10 (g/mL).

Conditions: 300–400 W, 40–50°C, 6–12 min. Extract twice, combine liquors.

Extraction rate >87%, 30% higher than traditional method.

5. **Filtration & Clarification**

Plate-frame filtration (0.22 μm) → centrifugation (3000 r/min, 15 min) → ultrafiltration (1000 Da MWCO) to remove residues, protein and pectin.

6. **Extraction & Purification (Core Step)**

Adjust pH to 6.5–7.5. Extract twice with ethyl acetate at ratio 1:2–8 (v/v). Combine extracts to enrich actives.

7. **Vacuum Concentration**

Dual-effect vacuum concentration: 0.15–0.25 MPa, ≤60°C. Recycle ethanol and ethyl acetate. Concentrate to flow extract with no obvious alcohol odor. Ethanol residue ≤0.5%.

8. **Reverse Osmosis Concentration (Optional)**

Dilute to 10–15% solids, concentrate to 10–15% original volume to increase concentration and reduce drying energy.

9. **Drying (Critical Step)**

- **Freeze Drying (Pharmaceutical/High-Grade Health Food)**:

Pre-freeze at −40°C for 4–6 h; sublimation at −50~−60°C, 5–7 Pa for 24–30 h; desorption at 0–5°C for 2–3 h.

Moisture ≤5.0%, hypericin retention ≥90%.

- **Spray Drying (Cosmetics/General Health Food)**:

Inlet 180–200°C, outlet 80–90°C. Fast, large-scale, moisture ≤5.0%.

10. **Pulverization, Sieving & Blending**

Grind to 80–100 mesh, sift, blend in 3D mixer for 15–20 min to ensure uniformity.

11. **Testing, Packaging & Warehousing**

Test hypericin, hyperoside, total flavonoids, moisture, ash, microbes, heavy metals, residual solvents.

Package in food-grade aluminum foil bags or fiber drums, sealed and light-protected.

Store cool, dry, ≤25°C; shelf life 24 months.

Ⅲ. Critical Control Points (CCP) & Requirements

CCP	Control Items	Requirements
Raw Material Pretreatment	Purity, microbes, moisture	No rot/impurities; TPC ≤1000 CFU/g; moisture ≤10%
Microwave Extraction	Temp, time, power, solid-liquid ratio	40–50°C, 6–12 min, 300–400 W, 1:5–10
Vacuum Concentration	Temp, vacuum, solvent residue	≤60°C, 0.15–0.25 MPa, ethanol ≤0.5%
Drying	Moisture, active retention	Moisture ≤5.0%, hypericin retention ≥90%
Finished Product Test	Actives, safety indexes	Hypericin ≥0.3%; heavy metals & microbes comply with international & national standards

Notes

1. Optional steps (solvent impurity removal, RO concentration) may be used without affecting core quality.
2. Food-grade ethanol is recyclable to reduce cost.
3. All steps comply with GMP and international food/pharma standards.
4. Custom specifications available by adjusting process parameters.

Ⅳ Manufacturing Flowchart of St. John's Wort Extract

●Flowchart Description

This flowchart is based on the core process: **Enzymatic Pretreatment + Microwave-Assisted Extraction + Ethanol Extraction**. It clearly shows the full manufacturing flow from raw material to finished product, with key parameters and QC points labeled. It is designed for industrial scale production and can be adjusted according to actual capacity.

●Key QC Nodes

- QC Node 1: After raw material pretreatment — check purity, moisture, microbes.
- QC Node 2: After enzymolysis — verify cell wall breakdown and active release.
- QC Node 3: After vacuum concentration — test solvent residue and concentration.
- QC Node 4: After drying — test moisture and active retention.
- QC Node 5: Semi-finished product testing — re-purify if out of spec.
- QC Node 6: Finished product inspection — issue COA, ensure traceability.
- QC Node 7: Regular sampling during storage — ensure stability within shelf life.

●Manufacturing Flowchart

