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Walnut Green Husk Extract

Standardized Botanical Extract

1. Product Identification

- **Product Name:** Walnut Green Husk Extract
- **Botanical Name:** *Juglans regia L.*
- **Common Name:** Persian Walnut
- **Plant Family:** Juglandaceae
- **Plant Part Used:** Green Husk (Immature Pericarp)
- **Type of Product:** Standardized Botanical Extract
- **Extraction Solvent:** Hydroalcoholic / Ethanolic
- **Manufacturing Process:** Controlled solvent extraction followed by filtration, concentration, and stabilization under defined processing conditions
- **Standardization Criteria:** Total phenolic content and HPLC fingerprint profile
- **Quality Control:** Each batch is monitored for physicochemical parameters and chromatographic consistency
- **Intended Use:** Industrial raw material for pharmaceutical, cosmetic, nutraceutical, food, and research applications

2. Product Description

Walnut Green Husk Extract is a high-quality botanical extract derived from the green husk of *Juglans regia L.* using a controlled and reproducible extraction process. The extract is naturally enriched with bioactive compounds, particularly polyphenols, tannins, and naphthoquinone derivatives.

Analytical characterization of the extract has been performed using High-Performance Liquid Chromatography (HPLC) and spectrophotometric methods. The HPLC profile

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confirms a consistent phenolic pattern, with **juglone** identified as a characteristic marker compound of walnut green husk. use to its rich phytochemical composition, the extract exhibits strong antioxidant capacity along with antimicrobial and astringent properties. These functional characteristics make it suitable for use in a wide range of industrial formulations.

The product is manufactured under controlled conditions to ensure batch-to-batch consistency, stability, and compliance with internal quality specifications, making it appropriate for professional and commercial applications.

3. Physical Properties

Parameter	Specification
Physical State	Liquid / Powder
Appearance	Homogeneous
Color	Brown to dark green
Odor	Characteristic, mild
Taste	Astringent
Solubility	Soluble in water and ethanol
Hygroscopicity	Slight

4. Chemical Properties

Parameter	Method	Specification
Quantitative Analysis		
Total Phenolic Content	Folin–Ciocalteu	200 - 400 mg GAE/g
Total Tannin Content	Spectrophotometric	30 - 100 mg/g
Quinones & Naphthoquinones		
Juglone (Marker Compound)	HPLC-UV	Present
Plumbagin, Lawsone	HPLC	Present
Emodin, Chrysophanol	HPLC	Present
Phenolic Acids		
Gallic acid, Syringic acid	HPLC	Present
Vanillic acid, Caffeic acid	HPLC	Present
Chlorogenic acid, Neochlorogenic acid	HPLC	Present
Ferulic acid, Sinapic acid	HPLC	Present
p-Coumaric acid, o-Coumaric acid	HPLC	Present
Protocatechuic acid, Quinic acid	HPLC	Present
Phthalic acid, p-Hydroxybenzoic acid	HPLC	Present
Flavonoids & Flavonols		
Quercetin, Myricetin	HPLC	Present
(+)-Catechin, (-)-Epicatechin	HPLC	Present
Rutin, Taxifolin, Isoquercitrin	HPLC	Present
Kaempferol, Naringenin	HPLC	Present
Quercetin 3-rhamnoside, Quercetin 3-galactoside	HPLC	Present
Specific Hydrolyzable Tannins		
Pedunculagin, Casuarictin, Castalagin	HPLC	Present
2,3-hexahydroxydiphenoylglucose	HPLC	Present
2,3,4,6-tetragalloylglucose	HPLC	Present
Stilbenes & Lignans		
Resveratrol, Pterostilbene, ε-viniferin	HPLC	Present
Trans-astringin	HPLC	Present
Secoisolariciresinol, Pinoresinol	HPLC	Present
Lariciresinol, Matairesinol, Enterolactone	HPLC	Present
Standardization & Safety		
HPLC Fingerprint	HPLC	Conforms to reference profile
Residual Solvents	GC / Internal	Complies with limits
Heavy Metals	ICP / AAS	Complies with limits

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5. Advanced Functional & Physicochemical Properties

- **Potent Antioxidant & Free Radical Scavenging:** High efficacy in neutralizing reactive oxygen species (ROS) and preventing oxidative degradation in various formulations.
- **Broad-Spectrum Antimicrobial & Antifungal Activity:** Exhibits strong inhibitory effects against a wide range of industrial and pathogenic microorganisms, primarily driven by the synergistic effect of juglone and hydrolyzable tannins.
- **Strong Astringent & Protein-Binding Capacity:** Excellent capability to precipitate proteins and form complex macro-structures, useful in specialized industrial processing.
- **Metal Chelating & Anti-Scaling Properties:** Effectively complexes with heavy metals and calcium/magnesium ions, offering significant potential for scale inhibition and structural modification in aqueous environments.
- **Rheological Modification & Setting Retardation:** Modifies hydration kinetics and crystalline growth, acting as an effective natural setting retarder in cementitious and construction matrixes.
- **Natural Pigmentation & Colorant Action:** Provides stable, deep brown-to-dark green pigmentation, suitable for eco-friendly dyeing and tinting.
- **Corrosion Inhibition:** Acts as a green corrosion inhibitor by forming protective, organic passive layers on metal surfaces in aggressive chemical environments.

6. Industrial & Commercial Applications

- **Construction Chemicals & Building Materials:** Eco-friendly concrete set retarders, natural plasticizers, and hydration control agents.
- **Industrial Water Treatment & Maintenance:** Natural boiler descaling agents, anti-scaling formulations, and closed-loop system protectors.
- **Mining & Extractive Metallurgy:** Green depressants, natural chelators, and eco-friendly flotation agents for ore and mineral processing.
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- **Pharmaceutical & Dermatological Formulations:** Active botanical ingredient for wound-healing ointments, anti-inflammatory topical treatments, and astringent gels.
- **Cosmetics & Personal Care Products:** Formulations for natural hair dyes (due to naphthoquinones/juglone), anti-aging serums, acne treatments, and scalp-care tonics.
- **Nutraceuticals & Dietary Supplements:** High-phenolic input material for antioxidant-rich botanical supplements (subject to local food-grade processing regulations).
- **Agriculture & Agrochemicals:** Development of botanical biopesticides, natural fungicides, and eco-friendly crop protection solutions.
- **Eco-friendly Preservative Systems:** Natural alternative to synthetic preservatives for extending the shelf life of industrial and consumer goods.

7. Packaging & Storage

- **Packaging:** HDPE containers or fiber drums
- **Storage Conditions:** Store in a cool, dry place, protected from light and moisture

8. Safety, Handling & Regulatory Information

- **Intended Audience:** Strictly for business-to-business (B2B), industrial processing, manufacturing, and R&D applications. Not formulated for direct, unmodified consumer use.
- **Handling & Personal Protective Equipment (PPE):** Contains active phytochemicals (e.g., juglone) which may cause skin sensitization, discoloration, or mild irritation in its highly concentrated raw form. Use of appropriate PPE (gloves, safety goggles, and protective outerwear) is mandatory during handling and processing.

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- **Environmental Impact:** Highly biodegradable and serves as a sustainable, green alternative to synthetic industrial chemicals. Care should be taken to avoid massive
- discharges of the concentrated raw extract into natural waterways due to its potent bioactive nature.
- **Regulatory Compliance:** Unregulated for general industrial and chemical applications. Use in food, pharma, or cosmetic end-products requires compliance with local regulatory bodies (e.g., FDA, EMA, EFSA guidelines) and specific formulation safety assessments.
- **Documentation:** Comprehensive Certificate of Analysis (CoA), full Safety Data Sheet (SDS/MSDS), and Technical Data Sheet (TDS) are available upon request for each specific batch.