Antiseptic & Antibacterial Efficacy Test Data Manual for Litsea Cubeba Oil from HiSiaddi

Special Version for Buyers (Washing Care / Pet Washing Care / Fruit & Vegetable Preservation)

Manual Positioning: Downloadable materials for B-end buyers, formula engineers' basis for selecting natural substitutes for chemical preservatives. Full set includes authoritative in vitro bacteriostatic test raw data, antiseptic replacement schemes, application formulas and safety compliance, shelf life verification.

Core Raw Material Standards: Rectified litsea cubeba oil (citral ≥75%, dual compliant for daily chemical & food use); high-purity citral (≥97.5%, high-end bacteriostatic enhancement grade)

Part 1 Basic Physicochemical & Compliance Indicators (Must-Read for Buyers)

1.1 Physicochemical Parameters of Litsea Cubeba Oil (Test Standards GB 28300, QB/T 1789)

表格

Test Item	Indicator Limit	Test Method
Appearance	Pale yellow transparent oily liquid	Visual Inspection
Odor	Fresh lemon fruity aroma, no burnt oxidized odor	Sensory Evaluation
Citral Content	Crude Oil 60%～80%; Rectified Refined Oil ≥75%; High-Purity Citral ≥97.5%	GC Gas Chromatography Normalization Method
Relative Density (20℃)	0.888～0.894	Pycnometer Method
Refractive Index (20℃)	1.4860～1.4900	Abbe Refractometer
Acid Value	≤1.0 mgKOH/g	Titration Method
Moisture Content	≤0.1%	Karl Fischer Method
Heavy Metals (Pb/As)	Pb≤2mg/kg; As≤1mg/kg	Atomic Absorption Spectrometry
Blank Microorganisms	Free of bacteria, molds, yeasts	Plate Counting Method

1.2 Compliance Qualification List (Attachable with COA Documents)

1. Food Grade: GB 1886.191 Food Additive Citral; Allowed for use per GB2760
2. Daily Chemical Washing Care: 《Cosmetic Safety Technical Specifications 2015》natural fragrance raw material, non-restricted preservative, suitable for "no parabens, no MIT, no CMIT" natural labeling
3. Export Compliance: REACH Registration, FCC Food Standard, IFRA Fragrance Specification
4. Pet Washing Care: Free of high-irritation chemical bacteriostatic agents, applicable for cat and dog skin antibacterial and itch relief
5. Fruit & Vegetable Preservation: Natural plant fumigation preservative, substitute chemical imazalil and prochloraz

Part 2 Complete In Vitro Broad-Spectrum Bacteriostatic Test Data (Third-Party Laboratory Tested)

Test Description

Test Methods: Disk Diffusion Method (Inhibition Zone Diameter) + Double Dilution Method (MIC Minimum Inhibitory Concentration, MBC Minimum Bactericidal Concentration)

Test Strains: Pathogens covering all scenarios of washing care / pet care / fruit & vegetable preservation (Gram-negative bacteria, Gram-positive bacteria, molds, yeasts, fruit & vegetable spoilage fungi)

2.1 Bacteriostatic Data for Bacteria (Mainly Escherichia Coli, Staphylococcus Aureus)

Table 2-1 Inhibition Zone Diameter (1% Litsea Cubeba Oil Ethanol Solution, Unit mm; ＞15mm = Highly Sensitive)

表格

Test Strain	**Litsea Cubeba Oil (76% Citral)**	**High-Purity Citral (97.8%)**	**CG Preservative Control (0.1%)**
Escherichia Coli (Water Pollution Bacteria in Washing Products)	19.1±0.4	23.5±0.3	20.2±0.5
Staphylococcus Aureus (Pet Skin Acne Bacteria)	16.8±0.3	20.7±0.4	18.5±0.3
Pseudomonas Aeruginosa (Lotion Spoilage Bacteria in Washing Products)	15.6±0.2	19.3±0.2	17.1±0.4

Test Strain	Litsea Cubeba Oil (76% Citral)	High-Purity Citral (97.8%)	CG Preservative Control (0.1%)
Listeria Monocytogenes (Fruit & Vegetable Pathogen)	17.5±0.3	21.2±0.3	18.8±0.2

Table 2-2 MIC/MBC Bacteriostatic & Bactericidal Concentration (μL/mL, Lower Value = Stronger Activity)

表格

Strain	Litsea Cubeba Oil MIC	Litsea Cubeba Oil MBC	High-Purity Citral MIC	High-Purity Citral MBC
Escherichia Coli	0.23	0.47	0.125	0.25
Staphylococcus Aureus	0.47	0.94	0.25	0.50
Pseudomonas Aeruginosa	0.62	1.25	0.31	0.62

2.2 Mold & Yeast Bacteriostatic Data (Core Targets for Washing Product Mold Growth & Fruit & Vegetable Rot)

Litsea cubeba oil has dominant inhibitory effect on molds, significantly better than traditional chemical preservatives

Table 2-3 Mold Inhibition Zone & MIC Data

表格

Fungal Strain (High Incidence in Washing / Fruit & Vegetable Products)	Inhibition Zone Diameter /mm	MIC μL/mL	MBC μL/mL
Aspergillus Niger (Cream & Lotion Mold Growth in Washing Products)	24.6±0.5	0.11	0.23
Penicillium (Fruit & Vegetable, Mask Spoilage)	22.8±0.4	0.18	0.37
Botrytis Cinerea (Strawberry, Tomato Gray Mold)	21.5±0.3	0.25	0.50
Rhizopus (Aqueous Washing Product Mildew)	20.1±0.3	0.31	0.62
Candida Albicans (Pet Ear Canal Fungi)	18.7±0.2	0.40	0.80

Key Conclusions (Focus for Buyers)

1. Mold inhibitory activity ＞ bacteria, perfectly solves the pain point of mold growth during shelf life of washing products
2. Extremely low concentration of 0.11μL/mL can completely inhibit Aspergillus niger growth, controllable antiseptic addition cost
3. Strong inhibition of Candida albicans in pet ear canals, suitable for cat and dog medicated bath and ear wash formulas

2.3 Fruit & Vegetable Specific Pathogenic Fungi Inhibition Data (Dual Modes: Fumigation & Soaking)

Table 2-4 Inhibition Rate of 500μg/mL Litsea Cubeba Oil on Fruit & Vegetable Pathogens (72h)

表格

Fruit & Vegetable Pathogen	Inhibition Rate	Application Scenario
Pythium aphanidermatum (Melon Root Rot)	86.31%	Fresh Fruit & Vegetable Soaking Preservation Liquid
Apple Black Rot Pathogen	82.52%	Fresh Fruit Coating Preservation
Strawberry Anthracnose Pathogen	89.75%	Cold Chain Fumigation Preservation
Chestnut Aspergillus / Penicillium	92.40%	Dried Fruit Storage Bacteriostasis

Part 3 Bacteriostatic Mechanism (Technical Support for Formulators)

1. Destroy Microbial Cell Membrane: Citral aldehyde group binds with membrane lipids and membrane proteins to increase permeability, leakage of intracellular nucleic acids and proteins leading to bacterial lysis and death
2. Inhibit Mycelium Spore Germination: Block mold spore reproduction to fundamentally eliminate mildew
3. Interfere with Metabolic Enzyme Activity: Reduce bacterial antioxidant enzymes and respiratory enzyme activity to inhibit microbial proliferation
4. Dual Antioxidant Function: Simultaneously delay oil rancidity in washing products and browning of fruits & vegetables, integrating preservation and anti-mildew

Part 4 Three Major Industries: Complete Schemes to Replace Chemical Preservatives (Core Download Module for Buyers)

Module A: Human Washing Care (Body Wash / Cream / Mask / Shampoo) Replacement Scheme

Pain Points of Traditional Chemical Preservatives (Replacement Reasons)
Parabens, MIT, CMIT: High irritation, sensitization, EU restriction, inconsistent with natural organic labeling, long-term use damages skin barrier.
Scheme 1 Single Litsea Cubeba Oil Antiseptic System (No Chemical Preservatives)
Applicable for Rinse-Off Products (Body Wash, Shampoo, Hand Sanitizer)
Addition Amount: 0.8%～1.2% refined litsea cubeba oil (citral ≥75%)
Compound Auxiliaries: 0.3%～0.5% Caprylyl Glycol / Hexanediol (solubilization, synergistic enhancement, low irritation)
Feeding Process: Cool system to 40～50℃ before adding, match PEG-40 Hydrogenated Castor Oil for solubilization
Microbial Challenge Test Data (28-day Accelerated Shelf Life)
Initial Inoculation: Bacteria 10^6 CFU/mL, Mold 10^5 CFU/mL
7 Days: Bacteria ＜10 CFU/mL, No Mold Colonies; No Rebound after 28 Days, No Stratification & Mold Growth
Scheme 2 Compound Mild Antiseptic System (Leave-On Products Cream, Essence, Mask)
Formula: 0.5% Litsea Cubeba Oil + 0.5% Pentanediol + 0.2% Plant Polyol Bacteriostatic Agent
Advantages: Reduce essential oil addition, weaken lemon fruit aroma, fresh skin feel, long-term antiseptic effect
Challenge Test: No bacteria or mold contamination and stable acid value without increase after 6 months at room temperature
Scheme 3 High-Purity Citral Enhanced Antiseptic (High-End Organic, Mother & Baby Washing Care)
Addition Amount 0.3%～0.6% high-purity citral (97.5%), bacteriostatic efficiency increased by 40%, lower addition dosage and lighter odor
Compliant Selling Points: 0 Parabens, 0 MIT, 0 CMIT, 0 Formaldehyde Releasers, natural plant antiseptic labeling
Module B: Special Antibacterial & Preservative Scheme for Pet Washing Care (Cat & Dog Shampoo, Medicated Bath, Ear Mite Wash)
Industry Pain Points
Ordinary chemical preservatives irritate fragile cat and dog skin, easily induce itching, hair loss and repeated ear canal fungi; pet products require low irritation, dual functions of natural insect repellent and bacteriostasis.
Standard Formula Scheme

1. Daily Pet Shampoo: 0.6% Litsea Cubeba Oil + 0.4% Hexanediol

Efficacy: Inhibits Staphylococcus Aureus and Candida Albicans, relieves skin itching and inhibits body surface mites

2. Fungal Medicated Bath Wash: 1.2% Litsea Cubeba Oil, substitute chemical bacteriostatic agents chlorhexidine and ketoconazole
   Animal Skin Irritation Test: No redness or sensitization after 48h rabbit skin application at 5% concentration, 70% lower irritation than ketoconazole
3. Pet Ear Canal Cleaning Liquid: 0.4% high-purity citral solubilized aqueous solution
   Function: Kill ear canal Candida, eliminate dark brown earwax odor, long-term anti-recurrence

Accelerated Storage Verification

No mildew, peculiar odor or attenuation of bacteriostatic activity after 90 days constant temperature storage at 45℃

Module C: Fruit & Vegetable Preservation Antiseptic Scheme (Substitute Chemical Imazalil, Prochloraz)

Two commercial schemes: Soaking Coating & Closed Fumigation, suitable for fruit & vegetable processing plants and cold chain storage buyers

Scheme 1 Edible Coating Preservation Liquid (Strawberry, Cherry Tomato, Apple, Fresh-Cut Fruits & Vegetables)

Formula: 0.15% Litsea Cubeba Oil + 1.0% Chitosan + 0.5% Citric Acid

Usage: Soak fruits & vegetables for 30s and air-dry coating, room temperature shelf life extended 2~3 times

Measured Data: Blank group rot rate 82% after 3 days at room temperature; Coated group rot rate ＜12% after 7 days, completely inhibits gray mold and penicillium growth

Scheme 2 Storage Fumigation Bacteriostasis (Citrus, Chestnut, Kiwi Long-Term Storage)

Usage: Adsorb litsea cubeba oil with non-woven fabric, place in fresh-keeping box / cold storage, fumigation concentration 50μL/L space

Efficacy: Mold incidence reduced by 90% after 60 days storage at 0～5℃ cold storage; free of chemical pesticide residues, compliant with high-end fresh food export standards

Scheme 3 Fresh Food Cleaning Bacteriostatic Water (Supermarket Ready-to-Cook Vegetables)

Add 0.03% litsea cubeba oil solubilized liquid, soak for 5min to kill surface Escherichia Coli and Salmonella, no residue after clean water rinsing

Part 5 Full Summary of Microbial Challenge Test Report (Available for Tender Bidding of Buyers)

5.1 Washing Product Antiseptic Challenge Test (GB/T 26396 Cosmetic Antiseptic Challenge Standard)

Test Sample: Amino Acid Body Wash (0.9% Litsea Cubeba Oil Antiseptic System)

Inoculated Flora: Escherichia Coli, Staphylococcus Aureus, Pseudomonas Aeruginosa, Candida Albicans, Aspergillus Niger

- 24h: Total bacteria decreased by ＞99.99%
- 7d: All bacteria, molds and yeasts reduced below detection limit
- No microbial rebound after repeated inoculation at 28d, long-term stable antiseptic system

5.2 90-Day High-Temperature Accelerated Test of Pet Shampoo

Constant temperature storage at 45℃ for 90 days, monthly sampling test: Total aerobic bacteria ＜10 CFU/g; molds and yeasts not detected; no stratification, rancidity or peculiar odor

5.3 Strawberry Preservation Shelf Life Comparison Test

Blank Group: Large-area mold growth and soft rot after 3 days at room temperature

Litsea Cubeba Oil Coating Group: Only slight water loss on individual fruits after 7 days at room temperature, no mildew or peculiar odor

Chemical Imazalil Group: No mildew after 7 days but pesticide residues exist, not suitable for high-end fresh food supermarkets

Part 6 Comparison Table: Comprehensive Contrast Between Litsea Cubeba Oil Natural Antiseptic & Traditional Chemical Preservatives

表格

Comparison Dimension	**Litsea Cubeba Oil Natural Antiseptic**	**CG / Methylisothiazolinone**	**Parabens**	**Imazalil (Fruit & Vegetable Chemical Preservative)**
Mold Inhibition Capacity	Extremely Strong (Ultra-Low MIC)	Medium	Weak	Strong
Skin / Animal Irritation	Extremely Low	High (Easy Sensitization)	Medium-High	Strictly Forbidden for Skin Contact

Comparison Dimension	Litsea Cubeba Oil Natural Antiseptic	CG / Methylisothiazolinone	Parabens	Imazalil (Fruit & Vegetable Chemical Preservative)
Compliance Labeling	Natural, Organic, No Restricted Additives	EU Restricted Use	Restricted in Multiple Countries	Strict Control of Food Residues
Odor	Natural Lemon Fresh Scent (Dual Fragrance Blending)	Pungent Chemical Odor	Odorless	Pesticide Peculiar Odor
Multiple Functions	Antiseptic + Antioxidant + Itch & Insect Repellent	Single Bacteriostasis Only	Single Antiseptic Only	Single Sterilization Only
Applicable Scenarios	Washing Care, Mother & Baby, Pet Care, Fruit & Vegetables supermarket washing supplies	Low-End		
Long-Term Safety	Biodegradable, no body accumulation risk	Skin accumulation, sensitization risk	Potential endocrine disruption risk	Human toxic hazard risk

Part 7 Operation & Storage Guidelines for Users

7.1 General Feeding Key Points

1. Oil-soluble raw material; for aqueous formulas, solubilize with PEG-40 hydrogenated castor oil or propylene glycol
2. Feed at temperature ≤50℃; high temperature accelerates citral oxidation and weakens bacteriostatic efficacy
3. Adaptable pH range of system: 4.0~8.5, compatible with all washing and fruit & vegetable formulas

4. Compound with pentanediol, caprylyl glycol can cut litsea cubeba oil dosage by 30% and reduce raw material cost

7.2 Storage Specifications

1. Light-proof sealed stainless steel drums filled with nitrogen
2. Storage temperature 10~25℃, avoid direct sunlight and high temperature
3. Unopened shelf life 12 months; finish use within 6 months after opening
4. Forbid long-term contact with iron and copper to prevent discoloration and oxidation