

Silk Protein Fiber Morphology & Care Blueprint

Biochemistry of Fibroin Degradation, Protease Enzymes & Neutral Cleansing

Domain: Textile Chemistry & Natural Biopolymers
Fiber: 100% Bombyx Mori Mulberry Silk

Structure: Fibroin Protein Core & Sericin Coating
Vulnerability: Protease Enzymes & Alkaline Hydrolysis

Executive Textile Science Summary

- **Animal Protein vs. Plant Cellulose:** Silk is an animal protein biopolymer composed of crystalline fibroin. Unlike plant cotton, it is biologically digested by the same digestive enzymes used to break down biological stains.
- **The Protease Enzyme Danger:** Standard laundry detergents (Tide, Persil) formulate protease enzymes to attack protein stains (blood, eggs, sweat). Washing silk with biological detergents literally dissolves the silk fiber diameter.
- **Alkaline Hydrolysis (pH > 8):** Normal laundry soaps possess high pH (9–11). Alkaline water swells silk fibers and breaks disulfide cross-links, causing permanent chalkiness, stiffening, and brittle fiber shatter.

Detergent Chemistry Impact on Silk Protein Fibers

Detergent Type	pH Range	Enzyme Profile	Structural Effect on Silk Fibers
Standard Biological Powder/Liquid	pH 9.0 - 10.5	Contains Active Protease & Amylase	Protease digests fibroin protein; fibers fray & thin rapidly
Oxygen Bleach / Color-Safe Bleach	pH 10.0 - 11.5	High Sodium Percarbonate Oxidizers	Oxidizes peptide bonds; catastrophic fiber yellowing & tears
Regular Castile Soap / Dish Soap	pH 8.5 - 9.5	Enzyme-free but strongly alkaline	Strips natural sericin; leaves dull, chalky, stiff surface
Specialized pH-Neutral Silk Wash	pH 6.5 - 7.5	100% Enzyme-Free, Gentle Surfactants	Maintains crystalline triangular fibroin prism; silky luster intact

Step-by-Step Heirloom Silk Hand-Washing Protocol

- [] **Select Dedicated pH-Neutral Silk Wash:** Use exclusively enzyme-free, pH-neutral delicate detergents (such as Heritage Park Silk & Wool or Eucalan). Never use baby shampoo or hair conditioner.
- [] **Cool Water Immersion (Max 80°F / 27°C):** Fill a clean basin with cold to tepid water. Submerge the turned-inside-out silk pillowcase or blouse.
- [] **Gentle Agitation (Never Rub or Scrub):** Gently swirl the silk in the water for 2 to 3 minutes. Never rub fabric against fabric, scrub stains, or twist threads.
- [] **White Vinegar pH Balancing Rinse:** Add 1 tablespoon of distilled white vinegar to the final clean rinse water. The mild acetic acid neutralizes residual alkali and restores silk's natural luster.
- [] **The Terrycloth Towel Roll Drying:** Press excess water between clean white towels. Lay flat to air dry on a breathable drying rack away from radiators and direct sun. Never machine tumble dry.

Textile Chemist Rule: The Triangular Prism Light Reflection

Silk's legendary shimmer is not an optical illusion; mulberry silk fibers have a natural triangular prism cross-section that refracts incoming light at different angles. Maintaining an acidic-to-neutral pH (6.5–7.0) keeps these microscopic protein prisms smooth and parallel. Alkaline detergents pit the prisms, scattering light chaotically and rendering the silk permanently dull.