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Enzymes for Textile Industry: Desizing, Bioscouring, Bleaching Support and Fabric Finishing

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Enzymes for textile industry applications are targeted processing aids used to modify specific substrates on fibers and fabrics: starch size, pectin-rich cotton impurities, cuticular waxy layers, surface cellulose fibrils, residual oxidants, proteins, oils, and selected dye or color bodies. In wet processing, they are valued because they act more selectively than broad chemical treatments and can support milder preparation, finishing, and wastewater-treatment workflows when the enzyme's substrate is actually present and accessible [1].

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Textile enzymes as precision tools in wet processing

Textile wet processing is a sequence of surface and impurity-removal operations. Before dyeing or finishing, a fabric may need starch size removed, cotton cuticle impurities loosened, absorbency improved, bleaching supported, residual oxidant controlled, surface fuzz reduced, or dye-containing wastewater treated. Enzymes fit these operations because each enzyme class has a preferred chemical target: amylases attack starch, pectinases attack pectin, cutinases attack ester-linked cuticle components, cellulases act on accessible cellulose, oxidoreductases transform selected color bodies, and proteases act on proteins [2].

That specificity is the main reason enzymes are different from caustic soda, strong oxidants, or broad reducing agents. A conventional chemical bath often changes several fiber and impurity components at once; an enzyme bath is designed to accelerate a narrower reaction. In cotton preparation, for example, one-step enzymatic desizing and bioscouring has been investigated because starch size and surface impurities can be addressed through compatible biocatalytic reactions instead of treating every impurity through a highly alkaline route [1].

In practical textile language, enzymes are not “general cleaners.” They are substrate-directed catalysts. If the problem is starch size, amylase is relevant; if the problem is pectin-associated cotton impurity, pectinase or related bioscouring enzymes are relevant; if the problem is surface fuzz on cellulosic fabric, cellulase is relevant; if the objective is enzymatic bleaching support, oxidative systems such as glucose oxidase have been studied on cotton fabrics [3].

Where enzymes fit in the textile process chain

Enzymes are most often discussed in the preparation and finishing stages because these stages involve controlled removal or modification of material on the fiber surface. In cotton, desizing removes weaving size; scouring removes non-cellulosic impurities; bleaching improves whiteness and prepares for dyeing; finishing changes handle, surface appearance, or absorbency. Research on cotton fabric has examined combined enzymatic desizing, bioscouring, and enzymatic bleaching with glucose oxidase, showing how enzyme steps can be arranged as part of a fabric-preparation sequence rather than treated as isolated laboratory curiosities [2].

The same logic extends beyond cotton. Enzymatic scouring and low-temperature bleaching have been studied on fabrics constructed from cotton, regenerated bamboo, poly(lactic acid), and soy protein fibers, which is important because modern textile processing often involves regenerated or bio-based fibers rather than only conventional cotton [4]. These mixed and nontraditional substrates make selectivity more valuable, because aggressive chemistry that is acceptable for one fiber can damage or distort another.

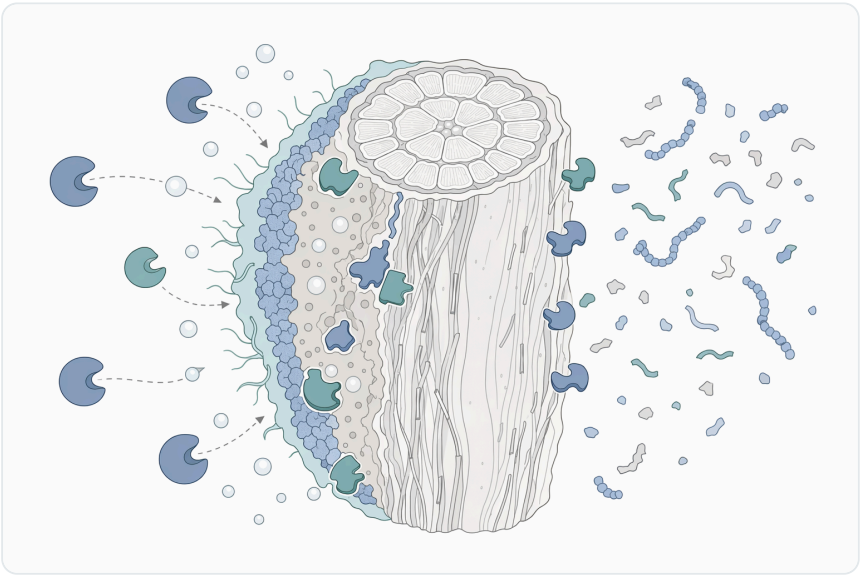


Figure 1. Textile enzyme blends hydrolyze sizing agents and surface impurities while modifying fiber surfaces under mild aqueous processing conditions.

For bast fibers such as linen and jute, enzymatic scouring aims to improve wettability, dyeability, and surface cleanliness by acting on non-cellulosic binding materials and surface impurities. Studies on linen have evaluated enzymatic and ultrasonic bioscouring using experimental design approaches,

while jute studies have connected enzymatic bioscouring with dyeability and mechanical properties [5]. These examples show that enzymes for textile industry use are not restricted to one fiber type, although the relevant enzyme mechanism changes with the substrate.

Main enzyme classes used in textile applications

Enzyme class	Primary textile substrate or reaction	What changes on the fabric or in the bath	Typical textile purpose
Amylase / glucoamylase	Starch-based size	Long starch chains are hydrolyzed into smaller, more washable fragments	Desizing cotton and other sized fabrics
Pectinase and related bioscouring enzymes	Pectin-rich cotton impurities	Pectin networks that bind waxes and cuticle materials are loosened	Cotton bioscouring and absorbency improvement
Cutinase	Cuticle esters and wax-associated surface structures	Ester bonds in cuticular materials are cleaved, helping open the cotton surface	Enzymatic scouring of cotton fiber cuticle
Cellulase	Accessible surface cellulose fibrils	Protruding microfibrils are partially hydrolyzed and released	Biopolishing, surface smoothing, denim effects
Glucose oxidase systems	Glucose-to-peroxide chemistry used in bleaching support	Hydrogen peroxide can be generated in situ under controlled bleaching conditions	Enzymatic bleaching support for cotton
Laccase / peroxidase systems	Oxidizable color bodies and some dye structures	Aromatic or chromophoric structures are oxidized or transformed	Dye decolorization support and selected bleaching concepts
Protease	Proteinaceous materials	Peptide bonds are hydrolyzed, modifying or removing protein components	Silk, wool, and protein-fiber support applications
Lipase	Fats, oils, and triglyceride-type impurities	Ester bonds in oils are hydrolyzed, improving removal	Selected cleaning or preparation support

The table is conceptual rather than a product specification. The key point is that each enzyme's practical usefulness comes from the chemistry of the substrate it can reach. Cutinase, for example, has been studied for cotton-fiber cuticle scouring because the cotton surface contains cuticular materials that can limit wetting and processing uniformity [6].

Enzymatic desizing: removing starch without attacking the fabric backbone

Desizing is one of the clearest and most established enzyme applications in textile processing. During weaving, yarns are often coated with starch-based size to improve abrasion resistance and reduce breakage. After weaving, that starch becomes a processing obstacle: it blocks wetting, interferes with scouring and bleaching, and can lead to uneven dyeing or printing if not removed thoroughly [7].

Amylases solve the desizing problem by hydrolyzing starch. Starch is made of glucose units linked into amylose and amylopectin chains; amylase cuts these chains into shorter, more soluble fragments. The fabric does not become clean because the enzyme "dissolves everything"; it becomes easier to wash because the large, film-forming starch molecules lose chain length, viscosity, and adhesion to the yarn surface [8].

Research has examined enzymatic desizing under a range of chemo-physical conditions, including optimization studies using statistical approaches such as Taguchi design. These studies are valuable because desizing performance depends not only on the enzyme but also on how well water, heat, mechanical movement, and bath chemistry allow starch to swell, expose its glycosidic bonds, and leave the yarn once hydrolyzed [7].

Some work has focused on acidic desizing systems, including a calcium-independent α-amylase with an acidic pH profile. This matters industrially because it can allow desizing to be aligned with other acidic or mildly acidic fabric-preparation steps, reducing the need for large pH swings between operations [8]. Other studies have evaluated combinations of acid demineralization with acid-stable glucoamylases and α-amylases, showing how mineral removal and starch breakdown can be paired in a single preparation concept [9].

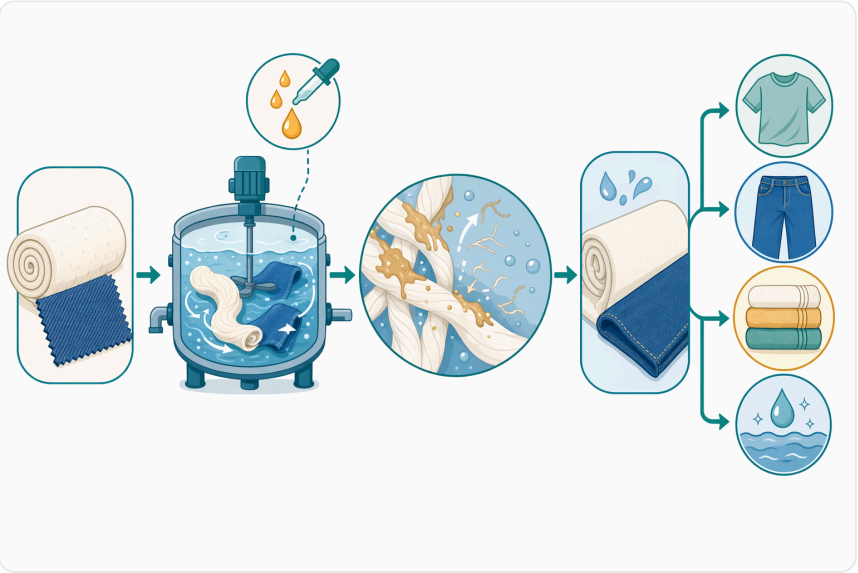


Figure 2. Industrial textile enzyming converts prepared fabric into cleaner, softer, and more uniformly finished material with reduced harsh chemical input.

Not all textile size is starch. Polyvinyl alcohol has also been studied as a desizing target, and enzymatic removal of polyvinyl alcohol from cotton fabrics has been reported [10]. Mechanistically, this is a different problem from starch hydrolysis; it reinforces the broader rule that desizing enzymes must match the chemistry of the size film rather than the word “size” alone.

Bioscouring: opening the cotton surface and improving absorbency

Raw cotton is mostly cellulose, but its surface is not pure cellulose. It contains pectins, waxes, proteins, mineral matter, seed-coat fragments, and other non-cellulosic materials that reduce wetting and limit uniform dye uptake. Conventional scouring removes much of this material with strong alkali, but alkali is broad in its action and can contribute to fiber damage, wastewater load, and higher neutralization demand [11].

Bioscouring uses enzymes to loosen the surface barrier more selectively. Pectinases break down pectin structures that act like a cementing matrix for other hydrophobic impurities; as this network is disrupted, waxy and cuticular materials become easier to remove in the bath. The practical change is visible as improved wettability: water penetrates the fabric faster because the surface is less blocked by hydrophobic non-cellulosic layers [11].

Cutinase offers another route into cotton scouring because the cotton cuticle contains ester-linked components. By hydrolyzing ester bonds in cuticular material, cutinase can help open the fiber surface and improve access for washing and subsequent processing. Studies on cutinase in cotton scouring have specifically investigated its ability to act on the cotton-fiber cuticle, making it relevant when surface wetting and cuticle modification are central goals [6].

Later work on cutinase production and application in cotton scouring further supports the practical relevance of this enzyme class. The important mechanism is not that cutinase “bleaches” cotton or removes all impurities; it changes the surface barrier by cleaving susceptible ester structures, which can help preparation baths remove materials that otherwise resist wetting [12].

Bioscouring has also been connected with post-treatment strategies. Research on sustainable enzymatic scouring of cotton textiles evaluated different post-treatments to improve fabric wettability, which reflects a realistic processing point: an enzyme may loosen or transform the impurity layer, while subsequent washing or finishing steps determine how completely that loosened material leaves the fabric [11].



Figure 3. Textile enzymes are used in desizing, bioscouring, biopolishing, denim finishing, bleach cleanup, dye preparation, and effluent improvement.

Enzymatic scouring beyond cotton: linen, jute, and blended fibers

Bast fibers such as linen and jute contain cellulose bound within a matrix of hemicellulose, pectin, lignin-like materials, waxes, and other non-cellulosic components. Their preparation challenges are therefore related to cotton scouring but not identical. Enzymatic bioscouring of linen has been optimized alongside ultrasound, indicating that mechanical energy can improve mass transfer and help enzymes access substrates within the surface structure [5].

For jute, enzymatic bioscouring has been studied for its effect on dyeability, physicochemical properties, and mechanical properties. This is especially relevant because jute's natural color and impurity profile can make uniform dyeing difficult; targeted removal or modification of surface materials can improve dye access without necessarily relying on the harshest chemical treatments [13].

Ultrasound-assisted enzymatic scouring of jute has also been investigated with response surface methodology and connected to natural dyeing. Ultrasound can create cavitation and micro-agitation in the bath, which may improve enzyme penetration and removal of loosened surface materials, while the enzyme provides the chemical selectivity needed to attack specific impurity structures [14].

The broader implication is that textile enzymes are not only for fine cotton goods. They can support preparation of plant-derived fibers where surface impurity removal, wetting, and dye uptake are the practical objectives. However, the enzyme mechanism still has to match the fiber chemistry: a treatment designed for cotton pectin may not behave identically on lignocellulosic jute or linen [13].

Enzymatic bleaching support: controlled oxidation rather than excessive chemical force

Bleaching aims to reduce natural color bodies and improve whiteness or brightness before dyeing, printing, or finishing. Conventional cotton bleaching commonly relies on hydrogen peroxide under alkaline conditions. Enzymatic bleaching support explores ways to generate, direct, or moderate oxidative chemistry so the fabric reaches useful whiteness with less aggressive conditions or better control [3].

Glucose oxidase has been studied in enzymatic bleaching of knitted cotton fabric and compared with conventional bleaching. The enzyme catalyzes oxidation of glucose, generating hydrogen peroxide as a reaction product; that peroxide can then participate in bleaching chemistry. The practical difference is that peroxide can be produced gradually in the bath rather than added only as a conventional chemical charge [3].

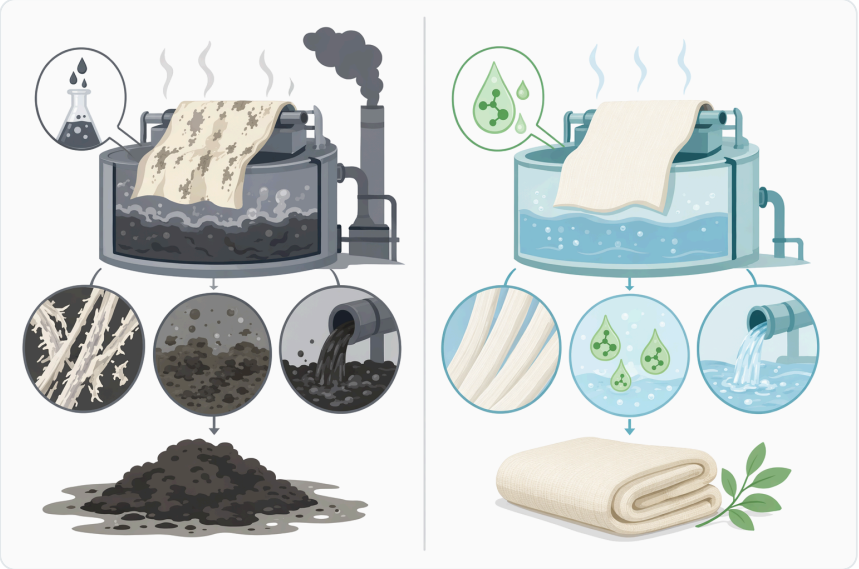


Figure 4. Compared with conventional chemical textile processing, enzyme-based treatment can lower fiber damage, effluent load, energy demand, and chemical consumption.

Work on enzymatic desizing, bioscouring, and bleaching of cotton fabric with glucose oxidase shows how bleaching support can be integrated with earlier preparation steps. In such sequences, desizing improves fabric accessibility, bioscouring improves wettability, and enzymatic bleaching chemistry can act more uniformly because the fabric surface is less blocked by size and hydrophobic impurities [2].

Pilot-scale ultrasonic work on enzymatic bleaching of cotton fabrics adds another process dimension. Ultrasound can improve mixing, surface renewal, and transport of reactants to and from the fiber. In an enzymatic bleaching context, that means the enzyme-catalyzed chemistry and the

removal of oxidized color bodies may be more effectively distributed across the fabric, although the benefit depends on the reactor and process design [15].

Enzymatic scouring and bleaching of cotton terry fabrics has also been studied as an opportunity to improve physicochemical and mechanical properties. Terry fabrics are thick, looped structures, so uniform penetration is a real concern; any preparation route must address not only chemical transformation but also the movement of liquor into and out of the pile structure [16].

Single-bath enzymatic scouring and bleaching for absorbent cotton has been investigated as well. The practical attraction is process consolidation: if surface impurities can be loosened and bleaching support can occur in the same bath, mills may reduce handling between stages. The chemistry remains sequential at the substrate level, because scouring improves access while bleaching changes color bodies [17].

Cellulases for biopolishing and denim-style surface effects

Cellulases act on cellulose, which makes them powerful but also control-sensitive in cellulosic textiles. The surface of cotton, viscose, lyocell, linen, and related fabrics can develop protruding microfibrils that scatter light, trap lint, and form pills during wear. Cellulase can partially hydrolyze these accessible fibrils, weakening their attachment so mechanical action removes them from the surface.

The result is biopolishing: a smoother fabric face, cleaner appearance, softer handle, and reduced tendency for pilling. Mechanistically, the enzyme is not polishing in a mechanical sense; it is cutting cellulose chains in the most accessible protruding fibers. The main fabric body is less accessible than the loose surface fibrils, which is why carefully controlled cellulase treatment can preferentially affect fuzz rather than the whole yarn.

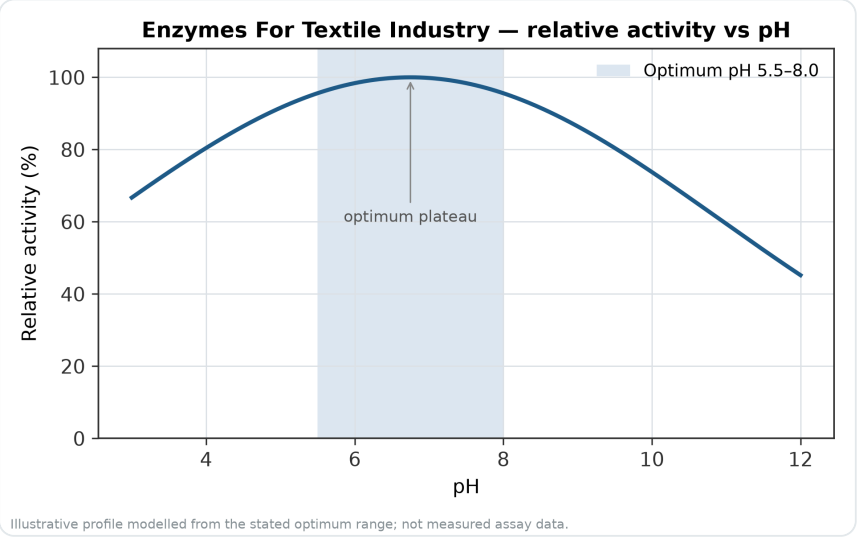


Figure 5. Relative activity of Enzymes For Textile Industry as a function of pH, showing the optimum plateau at pH 5.5–8.0.

The same cellulose-surface action is used in denim finishing. Indigo dye sits largely near the surface of denim yarns, and cellulase treatment can loosen dyed surface fibrils so mechanical movement releases color from the outer layer. This creates worn or faded effects with less dependence on heavy stone abrasion, although process control is essential because excessive cellulose hydrolysis can reduce strength or cause unwanted weight loss.

Cellulase applications illustrate both the advantage and the risk of textile enzymes. Their selectivity is based on substrate accessibility, not magic discrimination between “good” and “bad” cellulose. Loose surface fibers are attacked faster because they are exposed; if time, temperature, bath movement, or recipe severity is pushed too far, the enzyme can also affect load-bearing cellulose in the yarn.

Enzymes in dyeing support and effluent decolorization

Dyeing creates two enzyme-related challenges: preparing the fabric surface so dye uptake is uniform, and treating dye-containing wastewater after processing. Desizing and bioscouring support dyeing by improving wetting and removing barriers that block dye penetration. This is why jute bioscouring studies often measure dyeability alongside physicochemical and mechanical properties [13].

Oxidative enzymes such as laccases and peroxidases are also studied for decolorization of dye structures. Their mechanism is different from hydrolytic enzymes: they catalyze electron-transfer reactions that can change chromophores, break conjugation, or transform aromatic structures responsible for visible color. Such reactions may reduce color in wastewater or alter lignin-like color bodies in selected bleaching contexts [18].

The limitation is that dye effluent is chemically complex. Salts, surfactants, auxiliaries, metals, pH, reducing agents, oxidants, and mixed dye classes can all influence enzyme performance. Therefore, enzyme-assisted decolorization is best understood as a technically supported treatment approach for suitable streams, not as a universal single-step cure for every dyehouse effluent [19].

Ultrasound and process intensification with enzymes

Several textile studies combine enzymes with ultrasound, especially for desizing, scouring, and bleaching. Ultrasound can improve wet processing by creating micro-turbulence, enhancing mass transfer, and helping detach loosened material from the fabric surface. In enzymatic desizing of cotton fabric, ultrasonic energy has been investigated as a way to improve access to starch size and support removal once hydrolysis has occurred [20].

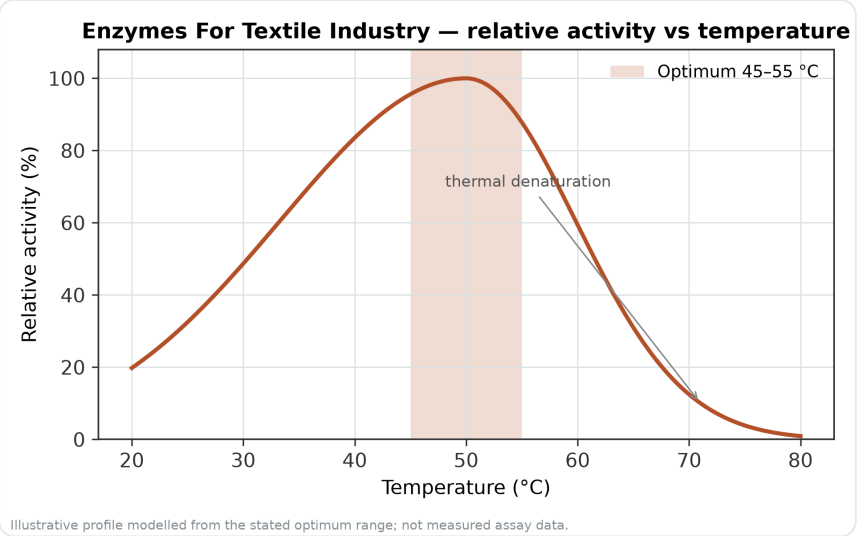


Figure 6. Relative activity of Enzymes For Textile Industry as a function of temperature, with the optimum at 45–55 °C and a characteristic thermal-denaturation fall-off above the optimum.

For scouring, ultrasound may help expose surface impurities to enzyme action and move hydrolyzed fragments away from the fiber. This is particularly relevant for dense fabrics, bast fibers, or looped structures where liquor movement through the textile is not trivial. Enzymatic and ultrasonic bioscouring of linen demonstrates this combined approach in a fiber system where surface and matrix impurities affect wetting and dyeing behavior [5].

In bleaching, ultrasonic pilot-scale reactor studies show that enzyme chemistry is not only a matter of molecular reaction; reactor design, agitation, and transport also shape performance. If the active chemistry is generated or consumed unevenly, fabric whiteness and uniformity can suffer. Better movement of the bath can help the enzyme-supported reaction occur more evenly across the textile load [15].

One-step and single-bath processes

Textile mills often look for shorter, simpler preparation sequences, and enzyme research reflects that interest. One-step enzymatic desizing and bioscouring of cotton fabrics has been studied because starch size removal and cotton-surface impurity removal are adjacent preparation needs. If both can be managed in one bath, the fabric may move to bleaching or dyeing with fewer intermediate operations [1].

Single-bath enzymatic scouring and bleaching for absorbent cotton takes the concept further. The objective is not merely to add enzymes to a conventional recipe, but to coordinate substrate removal, wetting improvement, and color-body oxidation in a way that produces absorbent material. This kind of integration is most realistic when the enzyme actions do not conflict with one another and the fabric structure allows uniform liquor penetration [17].

Response surface methodology and other optimization approaches appear repeatedly in textile enzyme studies because the outcome is multi-variable. Desizing, scouring, whiteness, absorbency, weight change, dyeability, and strength can move in different directions. For example, better impurity removal may improve wetting but overly severe treatment can harm mechanical properties, so the practical process window is a balance rather than a single maximum [21].

Realistic industrial benefits of textile enzymes

The first benefit is selectivity. Amylase desizing targets starch rather than cellulose; pectinase-based bioscouring targets pectin networks rather than dissolving the whole cotton surface; cutinase attacks susceptible cuticular esters; cellulase modifies accessible surface fibrils. This targeted chemistry can reduce unnecessary attack on the main fiber when the enzyme is used in the right stage and under suitable processing conditions [8].

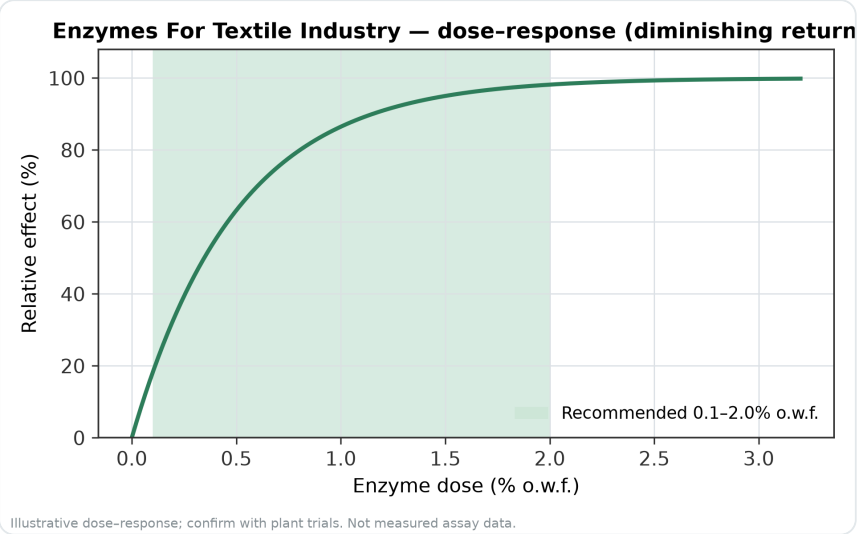


Figure 7. Illustrative dose–response for Enzymes For Textile Industry across the recommended use band (0.1–2.0% o.w.f.).

The second benefit is the potential for milder processing. Enzymatic scouring and low-temperature bleaching have been studied across cotton, regenerated bamboo, PLA, and soy protein fabrics, reflecting the need for preparation methods that are less damaging to temperature- or alkali-sensitive materials [4]. Milder conditions can be particularly valuable in blended or specialty fabrics where the most aggressive chemistry tolerated by cotton may not be acceptable for the companion fiber.

The third benefit is fabric quality. Proper desizing improves downstream wetting and dye uniformity; bioscouring improves absorbency; biopolishing improves surface smoothness; controlled bleaching improves whiteness while aiming to preserve mechanical properties. Studies

on cotton terry fabrics specifically connect enzymatic scouring and bleaching with physicochemical and mechanical property outcomes, which is the right way to evaluate textile enzymes: by the fabric result, not only by the reaction in the bath [16].

The fourth benefit is process integration. Enzyme-compatible sequences such as desizing plus bioscouring, or scouring plus bleaching, can reduce handling and help streamline preparation. One-step process studies demonstrate this direction, even though the best arrangement depends on the fabric construction and the specific operation being performed [1].

Practical boundaries and responsible expectations

Enzymes are catalysts, not universal replacements for all textile chemicals. Their action depends on substrate accessibility, bath compatibility, temperature, pH, time, fabric construction, and mechanical movement. If starch is absent, amylase has no useful desizing target; if cotton pectin is already removed, pectinase has little scouring role; if surface fibrils are not the issue, cellulase may not improve the fabric in a meaningful way [7].

The same specificity that makes enzymes useful also defines their limits. A glucose oxidase bleaching-support system works through glucose oxidation and peroxide generation; it should not be confused with amylase desizing or cutinase scouring. A cutinase that helps open a cotton cuticle is not a direct substitute for cellulase biopolishing, because the bond types and fabric changes are different [12].

Mechanical effects also matter. Enzymes change the chemistry of the substrate, but wet processing removes material through washing, agitation, squeezing, rinsing, and liquor exchange. This is why ultrasound-assisted studies are important: they show that enzyme action and physical transport are linked. A hydrolyzed starch fragment or loosened cuticle material still has to leave the fabric surface to deliver the desired result [20].

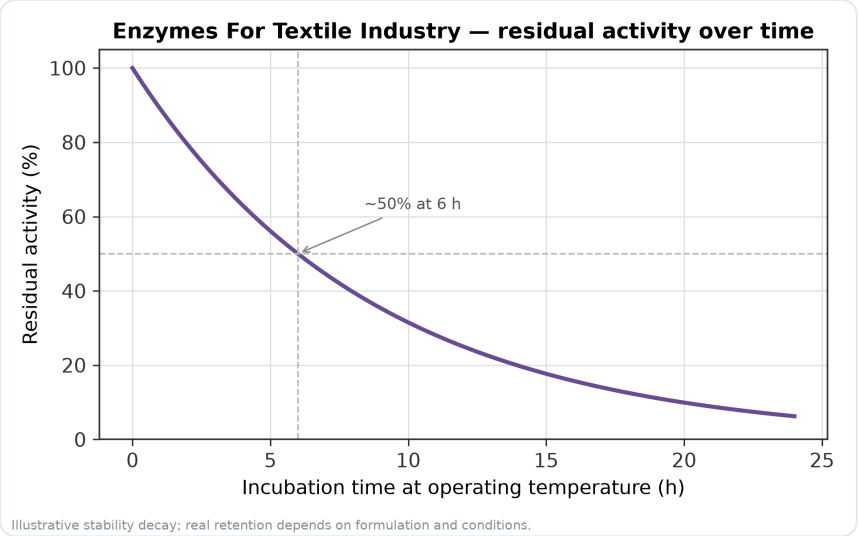


Figure 8. Illustrative thermal-stability decay of Enzymes For Textile Industry — residual activity falling over time at the operating temperature.

Quality control at the fabric level is essential because useful enzyme action can become excessive action if the process is pushed beyond its intended scope. Cellulase can reduce fuzz but also reduce strength if cellulose hydrolysis continues too far. Bioscouring can improve wetting, but excessive removal or poor washing can affect handle, shade, or downstream uniformity. Enzyme processing is best viewed as controlled substrate modification, not simple addition of a "green chemical" [21].

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This sales model is designed for straightforward purchasing rather than a custom development project. The educational information above explains how enzymes for textile industry applications work and where they are commonly used, while the order documentation provides the standard product and safety information supplied with the shipment.

Conclusion

Enzymes for textile industry applications are best understood as selective biocatalysts for defined wet-processing tasks. Amylases hydrolyze starch size for desizing; pectinases and cutinases help open cotton and plant-fiber surfaces for bioscouring; glucose oxidase systems have been studied for enzymatic bleaching support; cellulases modify exposed cellulose fibrils for biopolishing and denim-style effects; and oxidative enzymes are investigated for color-body transformation and dye-effluent decolorization [2].

Their value comes from doing specific chemistry on specific substrates. When the fabric surface, bath conditions, and processing objective align, enzymes can support cleaner preparation, improved wetting, better dyeing readiness, controlled surface finishing, and reduced reliance on harsh broad-spectrum treatments. They are not a universal replacement for every textile chemical, but they are a well-supported and practical toolset for modern wet processing [11].

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References

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1. Aly, A. S., Sayed, S. M., & Zahran, M. (2010). One-Step Process for Enzymatic Desizing and Bioscouring of Cotton Fabrics. *Journal of Natural Fibers*, 7, 71 - 92.
2. Mojsov, K. (2018). Enzymatic desizing, bioscouring and enzymatic bleaching of cotton fabric with glucose oxidase. *Journal of the Textile Institute*, 110, 1032 - 1041.
3. Farooq, A., Ali, S., Abbas, N., Fatima, G., & Ashraf, M. A. (2013). Comparative performance evaluation of conventional bleaching and enzymatic bleaching with glucose oxidase on knitted cotton fabric. *Journal of Cleaner Production*, 42, 167-171.
4. Špička, N., Zupin, Ž., Kovač, J., & Tavčer, P. F. (2015). Enzymatic scouring and low-temperature bleaching of fabrics constructed from cotton, regenerated bamboo, poly(lactic acid), and soy protein fibers. *Fibers And Polymers*, 16, 1723-1733.
5. Perinçek, S., & Duran, K. (2016). Optimization of enzymatic & ultrasonic bio-scouring of linen fabrics by aid of Box-Behnken Experimental Design. *Journal of Cleaner Production*, 135, 1179-1188.
6. Degani, O., Gepstein, S., & Dosoretz, C. (2002). Potential use of cutinase in enzymatic scouring of cotton fiber cuticle. *Applied Biochemistry and Biotechnology*, 102-103, 277-289.
7. Rehman, A., Raza, Z. A., Masood, R., Hussain, M. T., & Ahmad, N. (2015). Multi-response optimization in enzymatic desizing of cotton fabric under various chemo-physical conditions using a Taguchi approach. *Cellulose*, 22, 2107-2116.
8. Chand, N., Nateri, A., Sajedi, R., Mahdavi, A., & Rassa, M. (2012). Enzymatic desizing of cotton fabric using a Ca2+-independent α-amylase with acidic pH profile. *Journal of Molecular Catalysis B-enzymatic*, 83, 46-50.
9. Dehabadi, V. A., Opwis, K., & Gutmann, J. (2011). Combination of acid-demineralization and enzymatic desizing of cotton fabrics by using industrial acid stable glucoamylases and α-amylases. *Starch-starke*, 63, 760-764.

10. Mori, T., Sakimoto, M., Kagi, T., & Saki, T. (1997). Enzymatic desizing of polyvinyl alcohol from cotton fabrics. *Journal of Chemical Technology & Biotechnology*, 68, 151-156.
11. Colombi, B. L., Valle, R. C. C. R., Valle, J. A., & Andreaus, J. (2021). Advances in sustainable enzymatic scouring of cotton textiles: Evaluation of different post-treatments to improve fabric wettability.
12. Gururaj, P., Khushbu, S., Monisha, B., Selvakumar, N., Chakravarthy, M., Gautam, P., & Devi, G. N. (2020). Production, purification and application of Cutinase in enzymatic scouring of cotton fabric isolated from Acinetobacter baumannii AU10. *Preparative Biochemistry & Biotechnology*, 51, 550 - 561.
13. Hassan, M. M., & Saifullah, K. (2019). Effect of Enzymatic Bio-scouring on the Dyeability, Physicochemical, and Mechanical Properties of Jute Fabrics. *Fibers And Polymers*, 20, 578-587.
14. Patil, H., Mudaliar, S., & Athalye, A. (2022). Ultrasound Assisted Enzymatic Scouring of Jute Optimized by Response Surface Methodology and its Natural Dyeing. *Coloration Technology*.
15. Gonçalves, I., Herrero-Yniesta, V., Arce, I. P., Castañeda, M. E., Cavaco-Paulo, A., & Silva, C. (2014). Ultrasonic pilot-scale reactor for enzymatic bleaching of cotton fabrics.. *Ultrasonics sonochemistry*, 21 4, 1535-43 .
16. Mojsov, K. (2018). Enzymatic scouring and bleaching of cotton terry fabrics – opportunity of the improvement on some physicochemical and mechanical properties of the fabrics. *Journal of Natural Fibers*, 15, 740 - 751.
17. Raja, A., Arputharaj, A., Saxena, S., & Patil, P. G. (2017). Single bath enzymatic scouring and bleaching process for preparation of absorbent cotton.
18. Herold-Majumdar, O. M., Loureiro, P., Ullrich, R., & Felby, C. (2019). The reaction of lignin model compounds during enzymatic bleaching with a Curvularia verruculosa haloperoxidase: impact on chlorination. *Holzforschung*, 74, 156 - 165.
19. Gupta, G. K., Kapoor, R., & Shukla, P. (2020). Advanced Techniques for Enzymatic and Chemical Bleaching for Pulp and Paper Industries.
20. Wang, W., Yu, B., & Cheng-Zhong (2012). Use of ultrasonic energy in the enzymatic desizing of cotton fabric. *Journal of Cleaner Production*, 33, 179-182.
21. Grujić, D., Savić, A., Papuga, S., Milošević, M., Kolar, M., Milanović, P., & Milanovic, J. Z. (2023). "OPTIMIZATION OF ENZYMATIC DESIZING AND SCOURING OF COTTON FABRIC BY RESPONSE SURFACE METHODOLOGY". *Cellulose Chemistry and Technology*.

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