

**Summary Table of Cotton Manufacturing, Process & Potential Chemical Use**

Manufacturer	Key Process	Possible Chemical Use	Function of Chemicals
Farmer	Cotton farming & harvesting	Pesticides	Used at farm level to protect cotton plants from pests, or to remove foliage before mechanical harvest
Ginner	Cotton ginning	Typically, no chemicals are added	-
Spinner	Pre-treatment	Spinning oil, lubricants or other chemical agents	Applied to reduce static electricity, minimize fiber breakage, and improve processing speed and yarn quality
	Spinning	Typically, no chemicals are added other than pre-treatment steps	-
	Yarn dyeing	Pre-treatment agents (e.g. de-sizing, scouring agents, surfactants, bleaching etc.)	Applied to prepare for the yarn dyeing process whenever necessary. For examples 1. De-sizing agents: Remove the sizing agents to allow for subsequent wet processing 2. Scouring agents: Remove natural waxes, and other impurities to improve absorbency 3. Surfactants / wetting agents: Aid emulsifying and removing impurities 4. Bleaching agents: Removal of colors and whiten the yarn
		Dyes, pigments, or other colorants	Dyestuff and colorants to color the yarn
		Auxiliary agents and additives	Applied to improve or control dyeing quality, e.g. color fixation, color evening, maintaining optimal pH etc.
	Yarn finishing	Pre-treatment agents (e.g. de-sizing, scouring agents, etc.)	Applied to prepare for the yarn finishing process whenever necessary. Mainly to remove

Manufacturer	Key Process	Possible Chemical Use	Function of Chemicals
			any sizing agents and impurities before finishing.
		Finishing	Applied to provide specific functions and features to the yarn. For example, <ol style="list-style-type: none"> <li>1. Anti-static: Provide anti-static functions for the final product</li> <li>2. Anti-microbial: Provide odor control or microbial functions for the final product</li> <li>3. Other finishings: Provide specific features or functions for the final product</li> </ol>
Fabric Mill	Pre-treatment	Sizing agents, lubricants or other chemical agents	Applied to reduce friction, adding a protective layer to reduce breakage during weaving and knitting
	Knitting and weaving	Typically, no chemicals are added other than pre-treatment steps	-
	Fabric dyeing and printing	Pre-treatment agents (e.g. de-sizing, scouring agents, surfactants, bleaching, mercerizing etc.)	Applied to prepare for the fabric dyeing process whenever necessary. For examples <ol style="list-style-type: none"> <li>1. De-sizing agents: Remove the sizing agents to allow for subsequent wet processing</li> <li>2. Scouring agents: Remove natural waxes, and other impurities to improve absorbency</li> <li>3. Surfactants / wetting agents: Aid emulsifying and removing impurities</li> <li>4. Bleaching agents: Removal of colors and whiten the yarn</li> <li>5. Mercerizing agents: Improve dye uptake, strength and luster</li> </ol>
		Dyes, pigments, or other colorants	Dyestuff and colorants to color the fabric

Manufacturer	Key Process	Possible Chemical Use	Function of Chemicals
		Auxiliary agents and additives	<p>Applied to improve or control dyeing quality. For example,</p> <ol style="list-style-type: none"> <li>1. Color fixing agents: Improve color fastness and reduce color bleeding</li> <li>2. Leveling agents: Ensure uniform color distribution</li> <li>3. Dispersing agents: Promote dye solubility</li> <li>4. Wetting agents: Improve penetration of the dye bath</li> <li>5. Sequestering agents: Prevent interference from water hardness</li> <li>6. pH regulator: Maintain optimal pH value of dye bath and / or dyed fabrics</li> <li>7. Washing: After treatment, remove unfixed dyes and impurities</li> </ol>
		Printing paste / ink, solvents & other auxiliary agents	<p>Printing agents apply to fabric for specific artwork</p> <ol style="list-style-type: none"> <li>1. Printing paste / ink: Colorants for printing process</li> <li>2. Hardener / curing agents: Facilitate curing or drying of printing paste or ink</li> <li>3. Solvents: Dilute printing paste / ink, use as cleaning agents.</li> </ol>
	Fabric finishing	Pre-treatment agents (e.g. de-sizing, scouring agents, etc.)	<p>Applied to prepare for the fabric finishing process whenever necessary. Mainly to remove any sizing agents and impurities before finishing.</p>
		Finishing agents	<p>Applied to provide specific functions and features to the fabric. For example,</p> <ol style="list-style-type: none"> <li>1. Anti-static: Provide anti-static functions</li> <li>2. Anti-microbial: Provide odor control or</li> </ol>

Manufacturer	Key Process	Possible Chemical Use	Function of Chemicals
			<p>microbial functions</p> <ol style="list-style-type: none"> <li>3. Water-repellent: Provide water-repellent function</li> <li>4. Softener: Provide desired hand feel and reduce stiffness</li> <li>5. Optical brightener: Provide whiter, less yellow appearance</li> <li>6. Other finishings: Provide specific features or functions</li> </ol>
Garment Factory	Cut & sew	Typically, no chemicals are added other than pre-treatment steps	-
	Embroidery & Applique	Typically, no chemicals are added other than pre-treatment steps	-
	Printing	Printing paste / ink, solvents & other auxiliary agents	<p>Printing agents apply to products for specific artwork</p> <ol style="list-style-type: none"> <li>1. Printing paste / ink: Colorants for printing process</li> <li>2. Hardener / curing agents: Facilitate curing or drying of printing paste or ink</li> <li>3. Solvents: Dilute printing paste / ink, use as cleaning agents.</li> </ol>
	Garment dyeing	Pre-treatment agents (e.g. de-sizing, scouring agents, surfactants, bleaching etc.)	<p>Applied to prepare for the garment dyeing process whenever necessary. For examples</p> <ol style="list-style-type: none"> <li>1. De-sizing agents: Remove the sizing agents to allow for subsequent wet processing</li> <li>2. Scouring agents: Remove natural waxes, and other impurities to improve absorbency</li> <li>3. Surfactants / wetting agents: Aid</li> </ol>

Manufacturer	Key Process	Possible Chemical Use	Function of Chemicals
			emulsifying and removing impurities 4. Bleaching agents: Removal of colors and whiten the yarn
		Dyes, pigments, or other colorants	Dyestuff and colorants to color the fabric
		Auxiliary agents and additives	Applied to improve or control dyeing quality. For example, 1. Color fixing agents: Improve color fastness and reduce color bleeding 2. Leveling agents: Ensure uniform color distribution 3. Dispersing agents: Promote dye solubility 4. Wetting agents: Improve penetration of the dye bath 5. Sequestering agents: Prevent interference from water hardness 6. pH regulator: Maintain optimal pH value of dye bath and / or dyed fabrics 7. Washing: After treatment, remove unfixed dyes and impurities
	Garment finishing	Finishing agents	Applied to provide specific functions and features to the yarn. For example, 1. Anti-static: Provide anti-static functions for the final product 2. Anti-microbial: Provide odor control or microbial functions for the final product 3. Other finishings: Provide specific features or functions for the final product
	Garment washing	Garment wash formula	Washing process to create special washed effect on the garment. Chemical varies by washing formula

Manufacturer	Key Process	Possible Chemical Use	Function of Chemicals
			<ol style="list-style-type: none"> <li>1. Detergent &amp; surfactants: Clean the garment and remove impurities</li> <li>2. Enzyme wash, bleaching &amp; other washing formula: Create special effect on finished product.</li> </ol>
Collector, Sorter & Recycler	Sorting & recycling	Typically, no chemicals are added for mechanical recycling process.	-