PRINTING – PART IV

REF: TT/ JUNE 2021/ WK 1

Reactive Printing Process

The following steps are involved in printing with reactive dyes.

Preparation	• **Fabric is prepared to ready for printing (RFD) stage**.
Printing	• **Prepared fabric is printed using reactive dyes.**
Steaming	• **Steaming is done to fix up the dye onto the fabric.**
Washing	• **This process is done to wash off the residual color from the surface of the printed fabric.**
Softening	• **After washing the fabric is passed through stenter for softening and to adjust the final width and shrinkage of the fabric.**

Fixation – In reactive dye printing, the fixation is majorly done by steaming process.

Steaming is the operation by which dyes are stably fixed to the fabric. The condensed humidity in the steamer, combines with heat to allow the dyes and all the products deposited during printing to penetrate from the surface layer into the fiber and get fixed.

The fiber and thickener absorb certain amount of moisture; which results into the swelling of the fiber and formation of the film of thickener. The dyes and chemicals incorporated in the printing paste pass into the solution. During this phase, the dye commences to penetrate the swollen fiber. And finally gets fixed onto it. In order to accelerate the process of fiber swelling and dyestuff penetration; the printing paste contains swelling agents, such as urea. The essential requirements in all print fixation processes

using steam are the pick-up of enough water to swell the thickener film. But not so much, so that it causes the print to spread. It must be swollen to allow penetration of dye, raising the temperature to a level that accelerates the processes of diffusion, especially into the fiber.
The steam used in the steamer is saturated steam. **Saturated steam** is the type of steam that occurs when the liquid and gaseous phases of water exist simultaneously at a given temperature and pressure. That means, the steam is in equilibrium with the heated water. During the saturated condition, the rate at which water is vaporized is equal to the rate at which it is condensed.

Sometime, reactive printing are fixed by thermo fixation or hot stentering process. In this process, the printed fabric is passed through hot-air stenter at recommended temperature and time depending upon the fabric quality. However, reactive dyes fixed by steaming give better yields than thermo fixation process.
Washing-off process – This is an important process in the printing. Washing is done to remove unfixed dye and to increase the color fastness properties. If the printed colors are all pale, it is possible that the dye fixation will be maximum and the unfixed dye on the fabric will be minimum. However, in most print designs there will be at least one medium or heavy color. And then, the dye fixation level goes down. Even when little unfixed dye is present the removal of it is essential. Removal of dye from the fiber will require washing off at high temperatures. While auxiliaries, thickening agents etc. can be swollen and removed by vigorous washing even at low temperature. The removal of thickener and other chemicals/printing auxiliaries is also required for the subsequent finishing processes. For example, the crosslinking of cellulosic fibers or the introduction of water-repellency properties will give unsatisfactory results on printed fabrics that have not been washed properly after printing. Hence, it is useful to identify the nature of the substances to be removed.
Staining of unprinted areas by adsorption of dyes from the wash liquor is a major hazard where the concentration of unfixed dye is allowed to build up in the washing off process. By careful selection of dyes, thickening agents and conditions of fixation, the amount of loose dye to be removed can be minimized.

References:

1. https://www.cottonworks.com/
2. https://www.cottoninc.com/
3. https://textilestudycenter.com/
4. https://www.contrado.co.uk/
5. https://onlinelibrary.wiley.com/

.....To be continued.....

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Last week`s Answers: 1) ALGINATE 2) RESIST 3) ADHESION 4) LOCUST

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