

Eco-Fashion Dyeing of Denim and Knitwear with Particle-Dyes

Authors : Adriana Duarte, Sandra Sampaio, Catia Ferreira, Jaime I. N. R. Gomes

Abstract : With the fashion of faded worn garments the textile industry has moved from indigo and pigments to dyes that are fixed by cationization, with products that can be toxic, and that can show this effect after washing down the dye with friction and/or treating with enzymes in a subsequent operation. Increasingly they are treated with bleaches, such as hypochlorite and permanganate, both toxic substances. An alternative process is presented in this work for both garment and jet dyeing processes, without the use of pre-cationization and the alternative use of "particle-dyes". These are hybrid products, made up by an inorganic particle and an organic dye. With standard soluble dyes, it is not possible to avoid diffusion into the inside of the fiber unless using previous cationization. Only in this way can diffusion be avoided keeping the centre of the fibres undyed so as to produce the faded effect by removing the surface dye and showing the white fiber beneath. With "particle-dyes", previous cationization is avoided. By applying low temperatures, the dye does not diffuse completely into the inside of the fiber, since it is a particle and not a soluble dye, being then able to give the faded effect. Even though bleaching can be used it can also be avoided, by the use of friction and enzymes they can be used just as for other dyes. This fashion brought about new ways of applying reactive dyes by the use of previous cationization of cotton, lowering the salt, and temperatures that reactive dyes usually need for reacting and as a side effect the application of a more environmental process. However, cationization is a process that can be problematic in applying it outside garment dyeing, such as jet dyeing, being difficult to obtain level dyeings. It also should be applied by a pad-fix or Pad-batch process due to the low affinity of the pre-cationization products making it a more expensive process, and the risk of unlevelness in processes such as jet dyeing. Wit particle-dyes, since no pre-cationization is necessary, they can be applied in jet dyeing. The excess dye is fixed by a fixing agent, fixing the insoluble dye onto the surface of the fibers. By applying the fixing agent only one to 1-3 rinses in water at room temperature are necessary, saving water and improving the washfastness.

Keywords : denim, garment dyeing, worn look, eco-fashion

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