The investigation of heterobifunctional reactive dyes on nylon fibers: dye moiety analysis and comparison of wash fastness

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In general, acid dyes have attracted much attention to nylon substrates due to their interaction mechanism and an easy method for application. However, to achieve satisfactory levels of wash fastness, recourse is commonly required to an aftertreatment with a commercial syntan(synthetic tanning agent) and other fixing systems. While an aftertreatment of the dyed nylon substrates can improve wash fastness, not only this treatment can impart a change in shade of the ground color but it is temporary in nature.

In this point of view, application of reactive dyes to nylon substrates has attracted interests to solve those problems. Reactive dyes react chemically amino groups within nylon fibers to form a covalent bond. Theoretically, by virtue of the covalent nature of the dye-fiber bond, reactive dyeings on nylon fibers can display excellent wash fastness without any recourse to an aftertreatment. Especially, reactive dyes containing heterobifunctional groups can provide great opportunity for efficient dye-fiber reaction due to the sulphatoethylsulphone and monochlorotriazinyl reactive systems, which may cover a wide range of application temperatures.

Thus, this experiment concerns the build-up characteristics and wash fastness properties of the mixed anchor reactive dyes, namely heterobifunctional reactive dyes. Exhaustion(%E), fixation(%F) and fixation efficiency(%FE) were examined in terms of various pH conditions and dyeing temperatures. In addition, LC/MS analysis of dye moieties in the dye solution using different pH conditions was investigated to determine the dye structures occurring from hydrolysis reaction. Finally, the level of fastness obtained by reactive dyeings on nylon fibers to extended washings was compared to acid dyeings aftertreated with syntan and syntan/fixing agent systems.

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