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## Sustainable and Economical One-Step Desizing, Scouring and Bleaching Method for Industrial Scale Pretreatment of Woven Fabrics

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Combining more than one processes in one-step is an effective approach for economical, ecological and efficient processing of textiles. The most commonly used alpha-amylase enzyme, suitable for desizing woven fabrics, is not compatible for combined desizing-scouring-bleaching process in one step due to lack of stability under high temperature and alkaline condition in the combined process. The aim of this study was to use a novel, non-enzymatic desizer, which is stable under high alkalinity and temperature condition in the combined process. The lab trials showed the effectiveness of non-enzymatic desizer for one-step pretreatment of polyester/cotton blended fabrics. After successful lab trials, the proposed one-step process for combined desizing-scouring-bleaching on polyester/cotton blended fabrics was optimized for industrial-scale application. The concentration parameters for hydrogen peroxide, sodium hydroxide and the desizer were optimized with the help of central composite experimental design (CCD) of response surface methodology. The results obtained in one-step pretreatment method, in terms of the physical properties of the treated fabrics, were comparable with the results obtained by separate desizing, scouring and bleaching processes carried out on the identical fabric. However, the proposed one-step pretreatment process is much more advantageous with respect to saving in chemicals, water and energy as well as reduction in the process time.

**Key Words:** sustainable, economical, industrial, combined pretreatment, woven fabric, novel desizer, process optimization, response surface methodology

### Highlights

- One-step desizing, scouring and bleaching process is proposed using a novel desizer
- The proposed process is more economical as compared to the traditional process
- The use of chemicals, water and energy is reduced than the traditional process
- Parameters of the proposed process are optimized using response surface methodology

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