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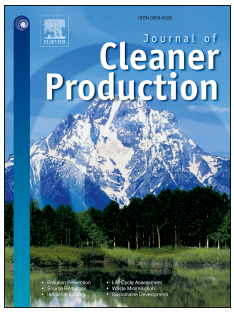

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Continuous Dyeing Processes for Zipper Tape in Supercritical Carbon Dioxide

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Abstract

Supercritical carbon dioxide (SC-CO_2) dyeing is an ecological waterless dyeing method without any dyeing auxiliaries and waste water discharge. In this paper, we introduce continuous dyeing processes of zipper tape in SC-CO_2 while recycling the gas simultaneously. Compared to water dyeing, this new processes could reduce CO_2 gas consumption and increase production efficiency, and lead to 20% cost decrease. The dyed products also present excellent color fastness to fading, staining, drying, and wetting, which are all rated at a grade of 4–5. The dyed zipper tapes show excellent shade consistency by different dyeing autoclaves, proving that this continuous processes is suitable for the rapid and diverse color change of smaller lots.

Keywords: Continuous Processes; Supercritical; Consistency; Zipper Tape

1. Introduction

The textile dyeing industry is one of the major contributors to environmental pollution worldwide, of which wastewater pollution predominates. Firstly, the textile dyeing industry consumes large amounts of water. Based on statistical analysis, the liquor ration (the weight of the bath solution relative to the weight of the dry material being dyed) is 1:10 (L/kg) customarily, so 100 m of cloth (about 35–50 kg) consumes 0.3–0.5 t water in the textile dyeing industry. Additionally, the water textile dyeing process also discharges heavy amounts of dyeing auxiliaries, such as inorganic salts, alkalis, inorganic salts, and other processing aids such as surfactants and organic matter, which seriously