

Fiber Release from Fabrics with Various Weave Parameters and Finishing Treatments during Washing and Their Marine Biodegradation

Authors : Seoyoun Kim, Chunghee Park

Abstract : Microplastics have recently become an issue due to their potentially harmful effects on the marine environment and the human body. The purpose of this study is to investigate the correlation of fiber emissions during the home laundering with the fabric parameters such as yarn density, warp/weft density, and weave structure. Also, the effect of finishing treatments such as reactive dyeing, water-repellent finish, peach skin finish on fiber emissions was evaluated. Furthermore, we studied the biodegradability of fibers in the marine environment compared to those in soil burial and the impact of finishing treatment on the biodegradability. Biodegradability was evaluated by measuring BOD values and tensile strength reduction. The results showed that more fibers were released in the thicker yarn, lower weave density. Also, a weave structure which has less compactness, released more fibers. Peach skin finish with microfibers exposed on the surface caused more fiber release, whereas water-repellent finish reduced the fiber emission. In addition, the biodegradability of the fabrics submerged in the marine environment were lower compared with those buried in the soil. Also, the water-repellent fabric was less biodegradable than the untreated one. Further research is suggested considering the fabrics with various chemical components or geometry and their fouling behavior in the marine environment.

Keywords : biodegradation, fibers, microplastic, pollution

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