

## Microfiber Release During Laundry Under Different Rinsing Parameters

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**Abstract :** Microplastics are contaminants that are widely distributed in the environment with a detrimental ecological effect. Besides this, recent research has proved the existence of microplastics in human blood and organs. Microplastics in the environment can be divided into two main categories: primary and secondary microplastics. Primary microplastics are plastics that are released into the environment as microscopic particles. On the other hand, secondary microplastics are the smaller particles that are shed as a result of the consumption of synthetic materials in textile products as well as other products. Textiles are the main source of microplastic contamination in aquatic ecosystems. Laundry of synthetic textiles (34.8%) accounts for an average annual discharge of 3.2 million tons of primary microplastics into the environment. Recently, microfiber shedding from laundry research has gained traction. However, no comprehensive study was conducted from the standpoint of rinsing parameters during laundry to analyze microfiber shedding. The purpose of the present study is to quantify microfiber shedding from fabric under different rinsing conditions and determine the effective rinsing parameters on microfiber release in a laundry environment. In this regard, a parametric study is carried out to investigate the key factors affecting the microfiber release from a front-load washing machine. These parameters are the amount of water used during the rinsing step and the spinning speed at the end of the washing cycle. Minitab statistical program is used to create a design of the experiment (DOE) and analyze the experimental results. Tests are repeated twice and besides the controlled parameters, other washing parameters are kept constant in the washing algorithm. At the end of each cycle, released microfibers are collected via a custom-made filtration system and weighted with precision balance. The results showed that by increasing the water amount during the rinsing step, the amount of microplastic released from the washing machine increased drastically. Also, the parametric study revealed that increasing the spinning speed results in an increase in the microfiber release from textiles.

**Keywords :** front load, laundry, microfiber, microfiber release, microfiber shedding, microplastic, pollution, rinsing parameters, sustainability, washing parameters, washing machine

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