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ANALYSIS OF MICROFIBRES RELEASED FROM DOMESTIC LAUNDRY WITH EXPERIMENTAL METHODS AND SIMULATION MODELS

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Abstract

Microplastics, especially microfibres, have been identified in aquatic sources worldwide. This study aims to determine the amount of microfibres discharged into wastewater from the washing of textile products domestically in the province of Tekirdağ, Thrace Region of Turkey. Experimental studies were conducted to measure the release of these microfibres from the domestic laundry of fabrics with different fibre compositions. The wastewater collected from the washing machine outlet was passed through filters of different sizes, such as 200 μm , 100 μm , 50 μm and 5 μm . A simulation model was built to evaluate the accumulation of these microfibres between 2017 and 2030 by taking into account regional population dynamics and social behaviour patterns in the province. The literature review and questionnaire study constituted data for the model. As a result of this study, it was determined that the 200 μm (62.3%) and 5 μm (19%) filters show the highest uptake rate respectively and the weight of microfibres held in the 200 μm filter varies between 52.59% and 70.94%. It was estimated that the microfibre release resulting from the annual laundry activity in Tekirdağ could reach approximately 55.9 tonnes (35.6 tonnes for >200 μm , 5 tonnes for 100-200 μm , 5.2 tonnes for 50-100 μm and 10.1 tonnes for 5-50 μm). The sensitivity analysis of the model simulation also showed that the accumulation of microfibres in Tekirdağ is estimated to range between 30 and 200 tonnes for the project period. It was determined that if 200 μm filters are used in machines, approximately 53% of microfibre accumulation can be prevented without passing into the aquatic ecosystem, compared to using 5 μm filters.

Key words: domestic laundry, filters, microplastics, sensitivity analysis, simulation model

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