Research of the Assessment Method for Microplastics Removal Efficiency in Washing Machine

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Abstract

Textile manufacturing and home laundry process inevitably releases a large amount of microplastics (MPs), which pass through the wastewater and sewage treatment and then flow into ocean as the final sink. In response to this, France enacts the 'Anti-waste law for a circular economy No.7 Add a plastic microfibre filter on new washing machines' by 2025 and other nations also propose the bills to regulate the MPs released from electrical laundry appliances. As the standard method of global stakeholders for measuring the microplastic removal efficiency is needed, we suggested the new method of measuring MPs which is based on synthetic fiber mass and by using the total organic carbon (TOC) analyzer. This method has difference that only remains and targets the synthetic fibre by purification using the suitable reagent. Comparing the results of each steps, collected mass of fiber loss from synthetic and natural blended fabric (PET/cotton : 40/60) using ISO 4484-1 was 2.10 mg and synthetic fibre mass using TOC after purified by 70% sulfuric acid was 0.62 mg (0.008% of the specimen). This new test method using TOC showed 90 ~ 105% recovery of real sample while 94 ~ 108% recovery rate of ISO adjacent fabric and it shows the applicability of commercial garment. This study is expected to apply to microplastic removal filter on washing machine and can save analysis time to evaluate the performance of MPs reduction efficiency.

ISBN: 978-81-957605-3-4 DOI: 10.21467/abstracts.142

Acknowledgement

This work supported by Korean Agency for Technology and Standards (KATS) through National Standard Technology Improvement Project, funded by Ministry of Trade, Industry and Energy.

ISBN: 978-81-957605-3-4
Series: AIJR Abstracts
DOI: 10.21467/abstracts.142