MICROPLASTICS EXTRACTION AND QUANTIFICATION IN ORGANIC WASTE SAMPLES FROM KAUNAS MBT

Anastasiia Sholokhova
Gintaras Denafas
Kaunas University of Technology

Abstract

Microplastic pollution is an urgent problem. Between 75,000 and 300,000 tonnes of microplastics are released into the environment each year in the EU. The presence of microplastics has been confirmed in marine, fresh water, drinking water, atmosphere, soil and biota. Mechanical biological treatment (MBT) facilities potentially can be one of the main sources of microplastics. However, this source is still poorly understood and there is no standardized protocol for microplastics investigation in such samples. This paper provides a brief overview of already existing research on MBT as a source of microplastics. Based on literature review, authors developed algorithm for microplastic extraction and identification in organic waste sample. The advantages and limitations of methods for each steps were compared to indicate the best methods for microplastic analysis. The main steps in this algorithm for microplastic extraction was determinated as sieving with pore size 5 mm to separate all particles with appropriated size, reduction of organic matter by oxidation with Fenton's reagent, density separation of microplastics from heavy fraction like glass and stones, vacuum filtration and concentration of microplastics on filter. For microplastics quantification, authors proposed to use Nile Red fluorescent staining and quantify particles using automated plugin for ImageJ. Based on this algorithm, the first results on microplastics investigation in samples from Kaunas MBT were obtained and presented in this work. Further directions of research were outlined.

Keywords: microplastic, MBT, density separation, Fenton's reagent, fluorescent staining