
Removal of different types of microplastics from the water by coagulation and flocculation

Sanja Vasiljević^{*1}, Aleksandra Tubić¹, Maja Vujić¹, and Jasmina Agbaba¹

¹University of Novi Sad, Faculty of Sciences, Department of Chemistry, Biochemistry and Environmental Protection – Trg Dositeja Obradovica 3, Novi Sad, Serbia, Serbia

Abstract

Previous research has shown that wastewater treatment plants can be considered a place where microplastics are removed, but also, unfortunately, a place of concentration of these pollutants and their source in the environment. This was the reason why one of the subjects of research in this area was to examine the efficiency of microplastic removal in wastewater treatments. Among the studied processes, coagulation and flocculation have been identified as potentially efficient processes that are also often used in water treatments. Therefore, the aim of this study was to investigate the efficiency of removing selected microplastics (PE and PVC) from water by treatment by coagulation and flocculation. Two coagulants, ferric chloride (FeCl₃) and polyaluminium chloride (PACl) were used in different water matrices (synthetic matrix and waste water from washing machine). The particle sizes of the microplastics were 0.5 mm and 0.171-0.279 for PE and PVC, respectively. The obtained results, expressed as a percentage, indicate that FeCl₃ proved to be a better coagulant in removing PE from synthetic matrix, compared to PACl, which shows results of 3-70% for FeCl₃, while PACl did not show significant removal for PE. In synthetic matrix PVC was effectively removed by both coagulants. The results obtained for waste water from washing machine indicate that both coagulants were quite effective for removal PE, which shows values of 8-63% for FeCl₃, and 36-48% for PACl. In this case, PVC was better removed with FeCl₃ (41-45%) while PaCl did not show any removal efficiency. This research will provide a better understanding of the possibilities of removing different types of microplastics in water treatments. In particular, it will contribute to a better understanding of the microplastic removal mechanism at wastewater treatment plants with conventional techniques that are readily available.

Keywords: microplastics, coagulation and flocculation, ferric chloride, polyaluminium chloride

^{*}Speaker