

**ASSESSMENT OF MICROPLASTICS IN SELECTED WASTEWATER
TREATMENT PLANTS IN KENYA**

JOHN KARIUKI NDUNG’U

**A THESIS SUBMITTED IN PARTIAL FULFILMENT FOR THE AWARD OF THE
DEGREE IN MASTER OF SCIENCE IN CHEMISTRY IN THE UNIVERSITY OF
EMBU**

2026

ABSTRACT

Substantial amounts of microplastics (MPs) enter sewer systems daily from domestic and industrial sewer effluents and therefore, making WWTP key sources of microplastics pollution in ecosystem. Nevertheless, research on their levels, occurrence, and removal efficiency in WWTPs remains limited, particularly across Sub-Saharan Africa. Thus the study aimed to investigate the occurrence of MPs from three Kenyan WWTPs (Dandora Estate Treatment Plant (D-WWTP), Thika Sewerage Treatment Works (T-WWTP), and Embu sewerage treatment plant (E-WWTP). Wastewater physicochemical parameters were measured in the site; wastewater was sampled using grab sampling, filtered through a stack of sieves, and treated with H_2O_2 catalyzed with Fe^{2+} to digest the organic matter. Microplastics (MPs) recovered were classified by both visual identification and ATR-FTIR spectroscopy. MPs were quantified in all treatment plants with abundances declining markedly: from 26.533 ± 3.639 MPs/L in inlet to 0.0013 ± 0.001 MPs/L in the outlet at D-WWTP, from 21.733 ± 5.447 MPs/L to 0.034 ± 0.014 MPs/L at T-WWTP and from 12.900 ± 1.296 MPs/L to 0.371 ± 0.04 MPs/L at E-WWTP. MP colors were mainly white or transparent, red, blue, green, black, yellow, and orange for the three treatment plants. On morphotypes, fibers were the most abundant shapes in E-WWTP, while in D-WWTP and T-WWTP, fragments were prevalent. Additionally, ATR-FTIR spectroscopy revealed 20 different polymers in D-WWTP with a blended polyethylene-polypropylene (PE-PP) (16.81%) been predominant polymer. While in T-WWTP, 27 different polymers were identified with polystyrene (21.47%) been the most common, and lastly 13 polymers in E-WWTP with polyacrylamide (PAM) (27.42%) been prevalent. Correlational analysis showed a weak positive relationship between MPs abundance and electro-conductivity and total phosphorus, salinity and total nitrogen. Since little knowledge is known about microplastics in Kenyan WWTPs, the present study lays a baseline data that can be utilized to inform policy on the usage of WWTPs effluents and also on management of plastic waste pollution.

Keywords: Microplastics, Wastewater Treatment Plants, Pollution, Sub-Saharan Africa, Plastic waste management.