

Spatial biomonitoring of airborne heavy metals emitted from a steel recycling plant

Received 28 July 2019
Revised 10 September 2019
27 November 2019
Accepted 11 December 2019

Abayomi Isaac Adeleke

*Department of Chemical Engineering, Faculty of Technology,
Obafemi Awolowo University, Ile-Ife, Nigeria*

Bamidele Sunday Fakinle

Department of Chemical Engineering, Landmark University, Omu Aran, Nigeria

Olayemi Abosede Odunlami

*Department of Chemical Engineering, College of Science and Technology,
Covenant University, Ota, Nigeria, and*

Jacob Ademola Sonibare

Department of Chemical Engineering, Obafemi Awolowo University, Ile-Ife, Nigeria

Abstract

Purpose – The study investigated the heavy metal flux around the vicinity of a steel recycling factory using passive biomonitoring technique with several pollution indices to assess the quality of the ambient environment.

Design/methodology/approach – The vegetation around the facility was identified, and the most abundant species were selected for analysis. The collected samples were dried, milled, sieved and analyzed for elemental composition using energy dispersive X-ray fluorescence (ED-XRF). Pollution indices were used to quantitatively assess the data.

Findings – Results show that maximum contamination occurs at the vicinity of factory. Generally, the deterioration of the ambient air around the vicinity of the steel recycling plant decreases with increasing distance from the steel recycling plant. However, for the radius considered in this study – 1 km, the ambient air at 1 km of the steel recycling facility is quickly deteriorating, and there is an urgent need for measures to mitigate the air quality impact of the steel recycling facility.

Originality/value – The study shows that the metal recycling process emits high levels of heavy metals to the environment, and there is an urgent need for personal protective equipment for the human population working in and around the close proximity of the recycling plant.

Keywords Biomonitoring, Steel recycling plant, Heavy metal, Contamination factor

Paper type Research paper