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Characterisation of Organic Matter in Karadiyana Dumpsite Leachate by Fluorescence Tracing and Gas Chromatography Mass Spectrometry (GCMS) Studies

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SMPA Koliyabandara (https://papers.ssrn.com/sol3/cf_dev/AbsByAuth.cfm?per_id=3865092)
Faculty of Graduate Studies, University of Sri Jayewardenepura

AT Cooray (https://papers.ssrn.com/sol3/cf_dev/AbsByAuth.cfm?per_id=3865033)
Ecosphere Resilience Research Centre, Faculty of Applied Science, University of Sri Jayewardenepura

Sudantha Liyanage (https://papers.ssrn.com/sol3/cf_dev/AbsByAuth.cfm?per_id=3865104)
Department of Chemistry, Faculty of Applied Sciences, University of Sri Jayewardenepura

C Siriwardana (https://papers.ssrn.com/sol3/cf_dev/AbsByAuth.cfm?per_id=3865110)
Department of Chemistry, Faculty of Applied Sciences, University of Sri Jayewardenepura

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Abstract

Water pollution occurs from open dumpsites, typically producing leachate with a very high content of organic matter. The objective of this study is to identify the containing organic matter of landfill leachate produced by Karadiyana open dumpsite, Sri Lanka and to relate it with the measured physicochemical parameters such as BOD/COD, COD and pH. Leachate was extracted to CH₂Cl₂ (HPLC grade), and the extractant analysed using GCMS. Fluorescence Excitation Emission Matrix (EEM) were generated from filtered leachate samples at the excitation wavelength of 220–230 nm, and emission wavelength 340–370 nm. Semi-volatile compounds including aromatic compounds, long-chain hydrocarbons and halo hydrocarbons were identified in the extracted leachates. Components such as phenol, 4-hydroxypyridine-1-oxide, phthalic acid, nonadecane, eicosane, hexadecane, have been identified in leachate samples concluding Karadiyana leachate falls majorly into stabilized category though it receives fresh waste daily. Presence of high molecular weight and aromatic compounds, which is significant for humic acids and carbons substituted by functional groups including nitrogen, and oxygen atoms concluding its humic, fulvic nature. The fluorescence spectra of leachate showed the occurrence of tryptophan, tyrosine like substances and humic substances. These compounds are present in intermediate (5-10 years) and old/stabilized (more than 10 years) leachate where old leachate is characterized with a high molecular weight fraction. BOD/COD of leachate in present study varies in between 0.39-0.49 which categorises leachate into the age of intermediate where biodegradability is medium according to classification, further proved by average pH 6.81 ± 0.08 and average COD 2,221 ± 45.

Keywords: ammonia, BOD/COD, fluorescence, leachate, organic matter

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