

Article

Occurrence and Assessment of Organic Pollutants Residues in the Aquatic Environment of the Coastal Sediments

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Abstract: The current study aimed to monitor organic pollution on island and coastal environments using linear alkylbenzene (LAB). The aquatic environment is affected by the hazardous chemicals discharged through domestic and industrial waste. The distribution, composition, and sources of LABs in the sediments of Port Dickson coast and Pulau Merambong were identified using gas chromatography–mass spectrometry (GC–MS). Chains ranging from long to short (L/S), C₁₃/C₁₂ homologs, and internal to external (I/E) congeners were used to define the degradation rate of LABs and the efficacy of wastewater treatment plants. The results of this study revealed that the concentration of LABs in the sites under investigation varied from 67.4 in Pulau Merambong to 255.8 ng g⁻¹ dw, in Port Dickson. The LAB homologs had a significant difference and a significant percentage of sampling stations had C₁₃-LAB homologs. According to the determined LAB ratios (I/E), which ranged from 1.6 in Pulau Merambong to 4.1 in Port Dickson, treated effluents from primary and secondary inputs are being introduced into the aquatic ecosystem of these areas. The degradation of LABs was up to 64% in the interrogated locations. The conclusion is that the wastewater treatment system needs to be improved, and that LAB molecular markers are highly effective in tracing anthropogenic sewage contamination.

Keywords: sediment; I/E ratio; wastewater pollution; degradation; molecular marker



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1. Introduction

The world's ecosystem has faced several dangers and threats over the last decade, and some of it has been lost as a result of mounting pressure from unchecked human exploitation of natural resources [1]. An essential component of these hazards, stemming from the widespread practice of surfactants in daily life, industry, and agriculture during the past few years, is the pollution of coastal and riverine ecosystems. In spite of Malaysia's growing urbanisation and industry, the country's sanitary sewer systems, even those in populated and developed areas, are of low quality [2,3]. Several rivers and estuary areas acquire land-based contaminants, such as industrial and municipal sewage. The monitoring of these ecosystems is important to identify the occurrence of possibly hazardous pollutants and their adverse influences on the coastal environment, hence the need to provide the necessary data for possible environmental management and preservation [4].

Molecular markers are persistent organic molecules with source-specific structures or isotopic compositions that serve as carriers of source information for specific organic materials or environmental contamination [5]. These substances can have either natural or man-made sources, and each source's characteristics are particular to the molecular markers it produces. Additionally, because molecular markers have signatures from numerous previous geological eras and natural processes, they can be used to identify the origins of organic compounds [6].