

Monitoring the accumulation of polycyclic aromatic hydrocarbons in the water bodies around Kelanitissa and Kerawalapitiya power plants in Sri Lanka

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Polycyclic aromatic hydrocarbons (PAHs) are a group of environmental contaminants which are formed due to natural processes such as forest fires and anthropogenic activities including incomplete combustion of organic matter (eg. wood, carbon, coke, fossil fuel etc.). These ubiquitous contaminants have attracted attention due to their toxicity and carcinogenicity. The Agency for the Toxic Substances and Disease Registry (ATSDR) and the United States Environmental Protection Agency (US EPA) have identified 16 PAHs as priority pollutants based on their health effects.

In this study, the water samples which were collected from Sebastian canal near Kelanitissa power plant and Hamilton canal near Kerawalapitiya power plant were extracted using dichloromethane and were analyzed by HPLC with UV-DAD (254 nm) and FLD (excitation at 250 nm, emission at 410 nm) detectors. This study aim to determine the seasonal variation and accumulation trend of the PAH content in water bodies around Kelanitissa and Kerawalapitiya power stations in Sri Lanka.

The study revealed the presence of low, medium and high molecular weight PAHs in the water samples obtained from Sebastian canal near Kelanitissa power plant and Hamilton canal near Kerawalapitiya power plant. Total concentration of PAHs in surface water samples obtained from Sebastian canal during rainy season (April 2015), dry season (July 2015) and rainy season (June 2016) were 0.11-1.71 µg/L, 2.36-14.68 µg/L and 6.88 µg/L - 10.05 µg/L, respectively. Furthermore, PAH content in water samples obtained from Hamilton canal during rainy season (April 2015), dry season (July 2015) and rainy season (April 2016) were 0.16-2.74 µg/L, 11.06-54.89 µg/L and 5.35 - 7.79 µg/L, respectively. As expected, high amount of PAHs were detected during the dry season due to the accumulation. However, the total PAHs in the Sebastian canal during the rainy season of June 2016 has shown a significantly high amount than during the rainy season of April 2015. Also the same trend can be observed in Hamilton canal where high amount of PAHs were detected during the rainy season of April 2016 than during the rainy season of April 2015. This may indicate an accumulation of PAHs with time in the water bodies near the power plants. Further monitoring for longer durations is required to identify the accumulation trend.

Keywords: PAH, Power plant, Seasonal variation