

**Characterization and Concentration and Source  
Identification of Polycyclic Aromatic  
Hydrocarbons in Selected Sites of Kota Kinabalu  
Port, Sabah**

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## Abstract

Sixteen US-EPA priority pollutant Polycyclic Aromatic Hydrocarbons were analyzed from the sedimentary samples collected in 9 stations from Kota Kinabalu Port, Sabah on 2013. Top 2-3 cm sediments were collected from samples, placed inside pre-cleaned glass jars and placed in the cooler box under ice condition and transferred immediately inside the freezer. In laboratory, the samples were kept under room temperature to defrost, homogenized using spatula and dried in sodium sulfate. The samples then transferred inside cellulose thimbles and placed in the glass chamber at Soxhlet as extraction apparatus using Dichloromethane as organic solvent for 11 hours. The extracted materials were treated with activated copper, reduced its volume in rotary evaporator system then cleaned in 5% deactivated silica gel in hand packed glass column. Isolated sample then fractionated in another column using silica gel as stationary phase and Hexane:DCM (3:1, v:v) to get the PAHs fraction. The fraction was sent to Gas Chromatography Mass Spectrometry for instrumentation analysis. A group of PAHs authentic standards were employed to recover the compounds' lost, quantify and qualify the target compounds as internal, surrogate and native standards. The results have shown that except Benzo(a)pyrene other 15 PAHs are existed in the studied area from one station to another. The concentration in total ranged from 28 to 625 ng/g d.w. Toxic PAHs were more abundant than carcinogenic PAHs in studied area. Stations near the main loading area of the port, deep depository sedimentary environment and near busy human activities were significant and ranging from 400-600 ng/g d.w. The PAHs pattern has shown a fresh hydrocarbon input to the study area mostly coming from nearby locations at city center activities via daily rain wash off. Considerable amount of PAHs, its combination and isomer pair ratio have shown that internal combustion engines and small and heavy shipping vessels have contributed significantly into the PAHs deposition in the study area. Further scientific survey is suggested to be implemented for other ports across Sabah and evaluating the sources of PAHs by employing a class of biomarker such as pentacyclic triterpanes. Several studies by postgraduate students would be able to help in these scientific inquiries.

**Keywords:** Polycyclic Aromatic Hydrocarbons, Kota Kinabalu Port, Benzo(a)pyrene, pyrogenic, shipping