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HYDROCARBONS IN SEDIMENT OF PAHANG COASTAL
WATERS, SOUTH CHINA SEA DURING PRE-MONSOON AND POST-MONSOON

By

SUZANNE MATHAN

Research Report submitted in partial fulfillment of
the requirements for the degree of
Bachelor of Science (Marine Science)

Department of Marine Science
Faculty of Science and Technology
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**CERTIFICATION AND APPROVAL OF REPORT FOR
RESEARCH PROJECT I AND II**

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LIST OF ABBREVIATIONS

%	-	Percentage
m	-	Meter
mm	-	Millimeter
g	-	Gram
mg	-	Milligram
mg/kg	-	Milligram/kilogram
mg/kg dw	-	Milligram/kilogram dry weight
mL/min	-	Mililiter/minute
µg	-	Microgram
nm	-	Nanometer
cm	-	Centimeter
µg/L	-	Microgram/liter
mL	-	Millilitre
µL	-	Microlitre
ng.mg ⁻¹	-	Nanogram/miligram
gm ⁻¹	-	Gram per metre
ppm	-	Parts per million
ppb	-	Parts per billion
v/v	-	Volume/volume
DCM	-	Dichloromethane
U.S. EPA	-	United States Environmental Protection Agency

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ABSTRAK

Kehadiran hidrokarbon petroleum dalam persekitaran marin boleh dikaitkan dengan pencemaran minyak. Oleh itu, kehadiran hidrokarbon di dalam sedimen marin adalah petunjuk yang baik bagi pencemaran minyak. Satu aspek semulajadi yang dikelilingi oleh antara negara-negara perindustriaan membangun dan dilayari oleh kapal dari serata dunia, Laut China Selatan sangat terdedah kepada pencemaran minyak. Oleh yang demikian, 26 stesen penyampelan dipilih selari dengan garis pantai untuk mengkaji tahap hidrokarbon di dalam sedimen dari stesen-stesen ini. Kajian kuantitatif dan kualitatif juga dilakukan untuk menentukan konstituen hidrokarbon yang hadir di dalam sampel sedimen. Kajian ini mendapati bahawa kandungan hidrokarbon sedimen persisiran pantai Pahang sebelum monsun adalah antara 7.69 mg/kg sedimen kering dan 47.77 mg/kg sedimen kering. Bagi selepas monsun pula, kandungan hidrokarbon adalah diantara 6.92 mg/kg sedimen kering dan 43.17 mg/kg sedimen kering. Umumnya, tahap hidrokarbon yang dikenalpasti didapati lebih tinggi dalam sedimen sebelum monsun berbanding sedimen selepas monsun. Bagi komposisi kimia hidrokarbon dalam sedimen pula, tahap TAH yang dikenalpasti adalah lebih tinggi daripada tahap PAH. Keputusan menunjukkan Anthracene merupakan kompaun PAH yang paling banyak dikenalpasti di dalam sample. Kompaun PAH lain yang dikenalpasti adalah Benzo (a) Anthracene, Benzo (b) Fluoranthene and Benzo (a) Pyrene. Bagi kompaun TAH pula, n-Octadecane (C18) paling banyak dikenalpasti pada kedua-dua musim dalam sedimen daripada 3 stesen yang dianalisa. Kompaun lain yang dikenalpasti adalah n-Octane (C8), n-Dodecane (C12), n-Tridecane (C13), n-Heneicosane (C21), n-Docosane (C22), n-

Tricosane (C23), n-Tetracosane (C24), n-Pentacosane (C25), n-Hexacosane (C26), n-Heptacosane (C27), n-Octacosane (C28), n-Nonacosane (C29), n-Triacontane (C30) and n-Dontriacontane (C32). Berdasarkan keputusan yang diperoleh daripada kajian ini, tahap hidrokarbon dalam sedimen daripada perairan persisiran pantai Pahang masih dibawah tahap yang umumnya dianggap sebagai tahap pencemaran iaitu 100 mg/kg sedimen kering. Oleh itu, penemuan kajian ini mencadangkan bahawa kawasan persisiran pantai Pahang masih tidak tercemar oleh hidrokarbon.

ABSTRACT

The presence of petroleum hydrocarbons in the marine environment can be associated to oil pollution. Hence, the presence of hydrocarbons in marine sediment is a good indicator of oil pollution. A significant aspect of nature, bordered by amongst the world's most rapidly industrializing nations and traversed by ships from all around the world, the South China Sea is vulnerable to oil pollution. Therefore, 26 sampling stations were established off the coast of Pahang to study the levels of hydrocarbon in sediment taken from these stations. Quantitative and qualitative studies were also conducted to determine the constituents of hydrocarbons present in the sediment samples. This study indicates that the level of hydrocarbons in sediment from Pahang coastal waters during pre-monsoon was between 7.69 mg/kg dry sediment and 47.77 mg/kg dry sediment. As for post monsoon, the level of hydrocarbons was between 6.92 mg/kg dry sediment and 43.17 mg/kg dry sediment. Generally, the levels of hydrocarbon detected were higher during pre-monsoon as compared to post-monsoon. As for the chemical composition of hydrocarbons in sediment, levels of TAH compounds detected were higher than levels of PAH compounds. The results shows Anthracene as the most abundant PAH compound in the samples. Other PAH compounds detected were Benzo (a) Anthracene, Benzo (b) Fluoranthene and Benzo (a) Pyrene. For TAH compounds, n-Octadecane (C18) was prevalent in all 3 stations analyzed during both samplings. Other compound that were detected were n-Octane (C8), n-Dodecane (C12), n-Tridecane (C13), n-Heneicosane (C21), n-Docosane (C22), n-Tricosane (C23), n-Tetracosane (C24), n-Pentacosane (C25), n-Hexacosane (C26), n-Heptacosane (C27), n-Octacosane (C28), n-Nonacosane (C29), n-

Triacontane (C30) and n-Dontriacontane (C32). Based on the results obtained from this study, the level of hydrocarbons in the sediment of Pahang coastal waters is still below the level generally accepted as the pollution level which is 100 mg/kg dry sediment. Hence, Pahang coastal waters are still unpolluted by hydrocarbons.