

DETERMINATION OF ALIPHATIC AND AROMATIC
HYDROCARBON CONCENTRATION IN THE
SURFICIAL SEDIMENTS OFF THE COAST
OF PULAU PINANG

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**DETERMINATION OF ALIPHATIC AND AROMATIC HYDROCARBON
CONCENTRATION IN THE SURFICIAL SEDIMENTS OFF THE COAST OF
PULAU PINANG**

By

Mohd Mursyid bin Mohd Sanip

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

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FINAL YEAR PROJECT REPORT VERIFICATION

PENGAKUAN DAN PENGESAHAN LAPORAN

It is hereby declared and verified that this project report titled **Determination of Aliphatic and Aromatic Hydrocarbon Concentration in the Surficial Sediments Off the Coast of Pulau Pinang** by **Mohd Mursyid bin Mohd Sanip, UK 31077** have been examined and all errors identified have been corrected. This report is submitted to the School of Marine and Environmental Sciences as partial fulfillment towards obtaining the **Bachelor of Science (Marine Science** from School of Marine and Environmental Sciences, Universiti Malaysia Terengganu.

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DECLARATION

It is hereby declared and verified that this project report titled **Determination of Aliphatic and Aromatic Hydrocarbon Concentration in the Surficial Sediments Off the Coast of Pulau Pinang** by **Mohd Mursyid bin Mohd Sanip, UK 31077** have been examined and all errors identified have been corrected. This report is submitted to the School of Marine and Environmental Sciences as partial fulfillment towards obtaining the **Bachelor of Science (Marine Science)** from School of Marine and Environmental Sciences, Universiti Malaysia Terengganu.

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LIST OF ABBREVIATIONS

PAH	-	Polycyclic Aromatic Hydrocarbon
TAH	-	Total Aliphatic Hydrocarbon
CPI	-	Carbon Preference Index
TAR	-	Ratio of n-alkanes for terrigenous over aquatic input
UCM	-	Unresolved Complex Mixture
UCM/R	-	UCM/Resolved
LMW	-	Low Molecular Weight
HMW	-	High Molecular Weight
Σ PAH	-	Sum of PAHs
Nap	-	Napthalene
Ace	-	Acenaphthene
Acp	-	Acenaphthylene
Flo	-	Fluorene
Phe	-	Phenanthrene
Ant	-	Anthracene
Fla	-	Fluoranthene
Pyr	-	Pyrene
BaA	-	Benzo(a)anthracene
Chr	-	Chrysene
BbF	-	Benzo(b)fluoranthene
BkF	-	Benzo(k)fluoranthene
BeP	-	Benzo(e)pyrene
BaP	-	Benzo(a)pyrene

Pery	-	Perylene
Ind	-	Indeno(1,2,3-cd)pyrene
DBA	-	Dibenzo(a,h)anthracene
BghiP	-	Benzo(g,h,i)perylene

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ABSTRACT

The surficial sediment from 10 stations of the coast of Pulau Pinang were collected, and analysed for the concentration of aliphatic hydrocarbons (AHs) and polycyclic aromatic hydrocarbons (PAHs) by using Gas Chromatography-Mass Spectrometer (GC-MS) right after the extraction and separation processed. Sediment were extract using ultrasonication method followed by fractionation using silica-alumina column. 27 targeted aliphatic hydrocarbon ranging from n-Dodecane (C12) to n-Hexatriacontane (C36), and 19 targeted species identified and quantified by matching their retention time with a aliphatic and PAH standards respectively. Total aliphatic hydrocarbons (TAH) and PAHs (Σ PAH) found in this study ranged 233.91-1698.26 ng/g and 1.87-787.85 ng/g respectively. The concentration of TAH and Σ PAH were affected by the characteristic of area near to the stations. Σ PAH and other ratios such as low molecular weight/high molecular weight (LMW/HMW); Benz[a]anthracene/benz[a]anthracene+chrysene (BaA/ Σ 228); Phenanthrene/Anthracene (Phe/Ant); Anthracene/(Anthracene+Phenanthrene) Ant/(Ant+Phe) in each station indicated that, the study areas were considered as low pollution area and were affected by the type of PAH sources. For TAH, Carbon Preference Index (CPI) 13-35, alkanes ratio for terrigenous over aquatic input (TAR), and ratio of low molecular weight /high molecular weight (LMW/HMW) indicated that the biogenic inputs were significantly higher than the anthropogenic inputs. On other hand, the unresolved complex mixture (UCM), and ratio of UCM/resolved (UCM/R) in certain study areas indicated the presence of petrogenic superimposed with biogenic sources.

IDENTIFIKASI KEPEKATAN ALIFATIK DAN AROMATIK HIDROKARBON DALAM SEDIMEN PERMUKAAN PERAIRAN PULAU PINANG

ABSTRAK

Permukaan sedimen dari 10 stesen kawasan perairan Pulau Pinang telah dikumpulkan, dan dianalisis untuk mengkaji kepekatan hidrokarbon alifatik dan hidrokarbon aromatik polisiklik (PAH) dengan menggunakan *Gas Chromatography-Mass Spectrometer* (GC-MS) selepas pengekstrakan dan pengasingan. Sedimen telah diekstrak dengan kaedah ultrasonikasi kemudian dipisahkan menggunakan ruangan silika-alumina. Untuk alifatik terdapat 27 spesies sasaran yang terdiri daripada n-Dodecane (C₁₂) ke n-Hexatriacontane (C₃₆), manakala bagi PAH terdapat 19 spesies sasaran telah dikenal pasti dan dinilai dengan memadankan masa tahanan mereka dengan masa tahanan piawai alifatik dan piawai PAH. Jumlah hidrokarbon alifatik (TAH) dan PAH (Σ PAH) yang terdapat dalam kajian ini adalah di antara 233,91-1698,26 ng / g dan 1,87-787,85 ng/ g. Kepekatan TAH dan Σ PAH terjejas oleh ciri-ciri kawasan berhampiran stesen. Σ PAH dan nisbah lain seperti rendah berat molekul / berat molekul yang tinggi (LMW / HMW); Benz [a] anthracene / binz [a] anthracene + chrysene (BAA / Σ 228); Phenanthrene / Anthracene (Phe / Ant); Anthracene / (Anthracene + Phenanthrene) Ant / (Ant + Phe) dalam setiap stesen menunjukkan bahawa, kawasan kajian tercemar dengan kadar rendah dan dipengaruhi oleh jenis sumber PAH. Untuk TAH, indeks karbon keutamaan (CPI) 13-35, nisbah alkana terigen terhadap akuatik (TAR), dan nisbah berat molekul yang rendah / berat molekul yang tinggi (LMW / HMW) telah menunjukkan imput biogenik adalah lebih tinggi daripada yang antropogenik. Selain itu, campuran tidak dapat diselesaikan kompleks (UCM), dan nisbah UCM / diselesaikan (UCM / R) di kawasan kajian tertentu telah menunjukkan terdapatnya imput daripada hasil petrogenik dan biogenik.