

DETERMINATION OF POLYAROMATIC HYDROCARBON
AND HEAVY METAL IN BALLAST WATER FROM
SHIPS IN KUANTAN, PAHANG PORT

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**DETERMINATION OF POLYAROMATIC HYDROCARBON AND HEAVY
METAL IN BALLAST WATER FROM SHIPS IN KUANTAN, PAHANG
PORT**

By

Nik Nur Syafiza Binti Nik Mat

**Research Report submitted in partial fulfillment of
the requirements for the degree of
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DEPARTMENT OF MARINE SCIENCE
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DECLARATION AND VERIFICATION REPORT
FINAL YEAR RESEARCH PROJECT

It is hereby declared and verified that this research report entitled:

Determination of polyaromatic hydrocarbon and heavy metal in ballast water from ships in Kuantan, Pahang port by Nik Nur Syafiza Binti Nik Mat, Matric No. UK 21146 has been examined and all errors identified have been corrected. This report is submitted to the Department of Marine Science as partial fulfilment towards obtaining the Degree in **Bachelor of Science (Marine Science)**, Faculty of Maritime Studies and Marine Science, Universiti Malaysia Terengganu.

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Abbreviations

PAHs (Polyaromatic Hydrocarbon)

ANOVA (Analysis of Variance)

IMO (International Maritime Organization)

µg/L (microgram per Liter)

ICP-MS (induced coupled plasma-mass spectrometry)

GC-MS (Gas Chromatography-Mass Spectrometry)

HNO₃ (nitric acid)

NaOH (Sodium Hydroxide)

MIBK (Methyl isobutyl ketone)

Rpm (rotation per minutes)

Na₂SO₄ (sodium sulphate)

DCM (Dichloromethane)

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ABSTRACTS

The objective of the study is to determine the concentration of heavy metal element in ballast water from ships in Kuantan, Pahang port. In this study, seven element of heavy metals were studied. They are chromium, manganese, iron, cooper, zinc, cadmium and lead. The results show that zink may become the most potential dangerous element to the environment especially marine life followed by iron. The other objective of this study is to determine the concentration of polyaromatic hydrocarbon (PAHs) compound in ballast water from ships in Kuantan, Pahang port. The target compound groups that were highlighted in this study are PAHs. The PAHs compounds are Naphthalene, Acenaphthylene, Acenaphthene, Fluorene, Phenanthrene, Anthracene, Fluoranthene, Pyrene, Chrysene, Benz[a]anthracene, Benzo[k]flouranthene, Benzo[b]fluoranthene, Benzo(a)pyrene, Indeno[1,2,3-cd]pyrene, Dibenz[a,h]anthracene and Benzo[ghi]perylene. The hydrocarbon and heavy metal was assessed by one-way ANOVA test. The investigation shows that Benzo (a) pyrene is consider an indicator of contamination because it usually occurs in mixtures of PAHs. Results shows that, there is an absent of benzo (a) pyrene in port water sample collected in Kuantan, Pahang Port. But there are present of Naphthalene, Phenanthrene and Anthracene in every station studied. The introduction of heavy metal compound through ballast water has been identified as one of the greatest threats to the world's ocean. In Malaysia, the ships ballast water management just being implemented. Before this, there is no specific regulation towards the usage of ballast water in Malaysia. There is no recent study on ballast water in Malaysia especially towards water quality in the coast of Malaysia.

Kajian Menentukan Jumlah Hidrokarbon Dan Logam Berat Dalam Air Balast Dari Kapal
Di Pelabuhan Kuantan Pahang

ABSTRAK

Objektif kajian ini adalah untuk menentukan jumlah kepekatan unsur logam berat di dalam air balast dari kapal di Pelabuhan Kuantan Pahang. Dalam kajian ini, tujuh unsur logam berat dikaji iaitu kromium, mangan, besi, kuprum, zink, cadmium dan plumbum. Keputusan menunjukkan logam zink adalah paling berpotensi mencemarkan alam sekitar khususnya hidupan marin diikuti logam besi. Objektif lain kajian ini adalah menentukan jumlah kepekatan hidrokarbon poliaromatik di dalam air balast dari kapal di Pelabuhan Kuantan Pahang. Antara sebatian yang ditekankan di dalam kajian ini adalah Naftalena, Acenaphthylene, Acenaphthene, Fluorene, Phenanthrene, Anthracene, Fluoranthene, Pirin, Chrysene, Benz[a]anthracene, Benzo[k]fluoranthene, Benzo[b]fluoranthene, Benzo(a)pirene, Indeno[1,2,3-cd]pirene, Dibenz[a,h]anthracene and Benzo[ghi]perylene. Hidrokarbon dan logam berat dianalisis menggunakan one-way ANOVA. Kajian menunjukkan Benzo (a) pirena adalah penunjuk pencemaran kerana ia biasanya berlaku dalam campuran PAHs. Keputusan menunjukkan ketidakhadiran sebatian Benzo (a) pirena di dalam air pelabuhan di Pelabuhan Kuantan. Tetapi didapati wujudnya sebatian Naftalena, Phenanthrene and Anthracene di setiap stesen kajian. Kemasukan logam berat melalui air balast dikenalpasti sebagai salah satu ancaman pada dunia marin. Di Malaysia, pengurusan air balast baru diaplikasikan. Sebelum ini, tiada undang-undang terperinci mengenai mengurus air balast di Malaysia. Tiada kajian yang dijalankan mengenai air balast di Malaysia setakat ini terutamanya terhadap kualiti air di perairan Malaysia.