CHEMICAL CHARACTERIZATION AND SOURCE APPORTIONMENT OF PARTICULATE MATTER (PM): PRE AND POST FLOOD IN KELANTAN

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PARTICULATE MATTER (PM): PRE AND POST FLOOD KELANTAN

By
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VERIFICATION AND APPROVAL FORM

This PITA research report entitled *Chemical Characterization and Source Apportionment of Particulate Matter (PM): Pre and Post Flood Kelantan* prepared and submitted by Daryl Lee Jia Jun, Matric No. UK29562 in partial fulfillment of the requirements for the award of the degree of Bachelor of Technology (Environment) has been examined and is recommended for approval of acceptance.

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DECLARATION

I hereby declare that this PITA research report entitled *Chemical Characterization and Source Apportionment of Particulate Matter (PM): Pre and Post Flood Kelantan* is the result of my own research except as cited in the references.

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ABSTRACT

Flood is one of the natural disasters that can be contributed by nature itself or through anthropogenic activities. The aftermath of flood are generally followed by unsanitized vicinity, poor water quality, growth of mold and debris. These dried up muds or debris fills the atmosphere with particulate matter (PM) which posts an air pollution concern to the general public. PM is a hazardous pollution which can degrade not only human health but also the surrounding. Hence, the aim of the study is to estimate the composition and sources of PM during pre and post flood in Kelantan. A portion of loaded filter paper with the ambient air quality of flood event was used to carry out water soluble ionic species analysis using ion chromatography. The data sets were then analyzed using Principal Component Analysis (PCA) and validated by Hierarchical Cluster Analysis (HCA) to identify the possible sources of PM based on their chemical species. Result shows that there were five estimated sources for pre and post flood event mainly from soil crustal, vehicle exhaust, marine aerosol, secondary aerosol and biomass burning. Level of PM lies below the compliance limit and the chemical profiles for pre flood were vehicle exhaust, soil crustal, marine aerosol and secondary aerosol whereas that of post flood were biomass burning, vehicle exhaust, soil crustal and marine aerosol. In terms of composition, the major contributor which is vehicular emission and biomass burning shows a higher percentage in total variance in comparison to that for pre flood event and could be associated with entry of traffic in conjunction with relief mission and burning of solid waste in the surrounding. However, more analysis on major, trace and rare earth element should be conducted to achieve a more comprehensive estimation of the sources of PM.

PENCIRIAN KIMIA DAN PENENTUAN SUMBER JIRIM ZARAHAN (PM10): BANJIR DI KELANTAN

ABSTRAK

Banjir merupakan salah satu bencana alam yang boleh disumbangkan oleh alam itu sendiri atau melalui aktiviti antropogenik. Kejadian selepas banjir biasanya diikuti oleh kekotoran persekitaran, kualiti air kotor, pertumbuhan kulat dan serpihan. Lumpuh yang sudah kering atau serpihan mengisi atmosfera dengan zarah (PM) yang boleh menimbulkan kebimbangan pencemaran udara di antara orang awam. PM adalah pencemaran yang sangat berbahaya yang bukan sahaja boleh merendahkan kesihatan manusia malah persekitarannya. Oleh itu, tujuan kajian ini adalah untuk menganggarkan komposisi dan sumber PM sebelum dan selepas banjir di Kelantan. Sebahagian daripada kertas penapis dimuatkan dengan kualiti udara ambien sebelum dan selepas banjir telah digunakan untuk menjalankan analisis larut spesies ionik air menggunakan kromatografi ion. Set data telah dianalisis menggunakan Analisis Principal Component (PCA) dan Analisis Hierarchical Kluster (HCA) untuk mengenal pasti punca-punca PM berdasarkan spesies kimia mereka. Keputusan kajian menganggarkan lima jenis spesis yang mewakilkan tanah bumi, pelepasan kenderaan, wap-wap laut, aerosol sekunder dan pembakaran biomass. Tahap PM berada di bawah had pematuhan dan profil kimia bagi sebelum banjir adalah pelepasan kenderaan, tanah bumi, wap-wap laut dan aerosol sekunder sedangkan selepas banjir adalah pembakaran biomass, pelepasan kenderaan, tanah bumi dan wap-wap laut. Dari segi komposisi, penyumbang utama merangkumi pelepasan kenderaan dan pembakaran biomass menunjukkan peratusan yang lebih tinggi dalam jumlah varians sekiranya dibanding dengan keputusan sebelum banjir, ini boleh dikaitkan dengan kemasukan kenderaan sempena misi bantuan dan pembakaran sisa pepejal di sekitar. Walaubagaimanapun, analisis berkaitan dengan major, trace dan rare earth element harus dijalankan untuk mencapai anggaran yang lebih komprehensi tentang sumber PM.