



**SCHOOL OF OCEAN ENGINEERING
UNIVERSITI MALAYSIA TERENGGANU**

VERIFICATION AND APPROVAL FORM

This PITA research report entitled *Study of Biosorbent from Agricultural Waste (Rice Husk) for Phosphate Removal in Wastewater* prepared and submitted by Nur Saadiah Binti Zaini, Matric No UK29514 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 *Study of Biosorbent from Agricultural Waste (Rice Husk) for Phosphate Removal in Wastewater* is the result of my own research except as cited in the references.

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STUDY OF BIOSORBENT FROM AGRICULTURAL WASTE (RICE HUSK) FOR PHOSPHATE REMOVAL IN WASTEWATER.

ABSTRACT

Phosphate is one of the essential elements in the earth but the excessive amount of phosphate can contribute to the environmental problems. Adsorption is one of the most effective and economical technique to remove phosphate in wastewater. Nowadays, researches have been discovered the potential and beneficial of the agricultural waste as a low cost adsorbent. This study aimed to prepare and characterize the efficiency of rice husk as biosorbent for phosphate removal in wastewater. Six types of adsorbent were prepared, which are Rice Husk Ash and Activated Rice Husk at five different temperatures. The prepared adsorbents were characterized in terms of functional groups by using FTIR Spectroscopy and in terms of morphology structure by using SEM method. The performance of the prepared adsorbents was evaluated for phosphate removal at two different parameters, which are the effect of type of adsorbent and the effect of initial concentration. The efficiency of the prepared adsorbents was also analyzed for adsorption capacity of phosphate by using two types of adsorption isotherm models, which are Langmuir adsorption isotherm and Freundlich adsorption isotherm. The best type of adsorbent has been recorded by Activated Rice Husk (ARH 750 °C) when it achieved 82 % phosphate removal at 2 mg/L initial concentration. While the adsorption mechanism of this study fitted with Langmuir adsorption isotherm which indicated to the homogeneous adsorption.

KAJIAN PENJERAPAN DARI SISA PERTANIAN (SERKAM PADI) BAGI PENGYINGKIRAN FOSFAT DALAM AIR SISA.

ABSTRAK

Fosfat adalah salah satu elemen yang penting dalam bumi tetapi jumlah fosfat yang berlebihan boleh menyumbang kepada masalah alam sekitar. Penjerapan adalah salah satu teknik yang paling berkesan dan menjimatkan untuk menyingkirkan fosfat dalam air sisa. Pada masa kini, kajian telah dibuat untuk mengenalpasti manfaat dan potensi sisa pertanian sebagai penjerap yang berkos rendah. Kajian ini bertujuan untuk menyediakan dan mencirikan kecekapan sekam padi sebagai biosorbent untuk penyingkiran fosfat dalam air sisa. Enam jenis penjerap disediakan, iaitu debu serkam padi dan serkan padi yang diaktifkan pada lima jenis suhu yang berbeza. Adsorben yang telah disediakan dicirikan dari segi kumpulan berfungsi dengan menggunakan FTIR Spektroskopi dan dari segi morfologi dengan menggunakan kaedah SEM. Prestasi adsorben yang telah disediakan dinilai bagi penyingkiran fosfat dalam air sisa pada dua parameter yang berbeza, iaitu kesan jenis penjerap dan kesan kepekatan awal. Kecekapan adsorben yang disediakan juga dianalisis bagi kapasiti penjerapan fosfat dengan menggunakan dua jenis model isoterma penjerapan, iaitu Langmuir isoterma penjerapan dan Freundlich penjerapan isoterma. Jenis penjerap terbaik dicatatkan adalah ARH 750 °C dimana telah mencapai 82 % penyingkiran fosfat pada kepekatan awal fosfat yang rendah iaitu 2 mg/L. Manakala, mekanisme penjerapan telah dikaji menunjukkan adalah penjerapan isoterma Langmuir yang merujuk kepada penjerapan homogenius.