

CURRENT RESEARCH AND DEVELOPMENT IN BIOTECHNOLOGY ENGINEERING AT IIUM

VOLUME IV

Editors:

Ma'an Alkhatib
Abdullah Al Mamun
Faridah Yusof



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(VOLUME IV)

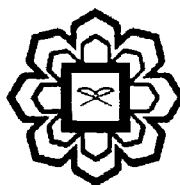
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CONTENTS

	PREFACE	viii
CHAPTER 1	REMOVAL OF ZINC FROM WASTEWATER BY CARBON NANOTUBES <i>Nassereldeen A. Kabbashi, Ahmad Fadzil Ahmad Shuhaili, Md Z. Alam</i>	1
CHAPTER 2	REMOVAL CHARACTERISTICS OF MANGANESE (MN ²⁺) BY CNTS <i>Nassereldeen A. Kabbashi, Suleyman A.M, Mohamed E.S. Mirghani, Farhana I.Y</i>	8
CHAPTER 3	REMOVAL TECHNIQUES OF CADMIUM FROM WASTEWATER BY CNTS <i>Nassereldeen A. Kabbashi, Muhammad Fikri Bin Rosly, Suleyman Muyibi</i>	15
CHAPTER 4	KINETICS OF ACTIVATED CARBON FROM EFB IN MERCURY REMOVAL <i>Nassereldeen. A. Kabbashi, Ma'an F. Alkhatib, Mohammed Elwathig and Ili Nadirah Bt Jamil</i>	21
CHAPTER 5	CARBON NANOFIBERS TO REMOVE ARSENIC <i>Abdullah Al Mamun, Ma'an Alkhatib, Zahirah Abd. Kadir</i>	26
CHAPTER 6	CARBON NANOTUBES TO REMOVE CHROMIUM <i>Abdullah Al Mamun, Ma'an Alkhatib, Aishah Jamaluddin Ahmad</i>	32
CHAPTER 7	CARBON NANOTUBES TO REMOVE NICKEL <i>Abdullah Al Mamun, Ma'an Alkhatib, Siti Melor Asnida Zainudin</i>	38
CHAPTER 8	ADSORPTION ISOTHERM OF CARBON NANOTUBES IN REMOVING HEAVY METALS <i>Abdullah Al Mamun, Faridah Yusof, Norsyafini Ishak</i>	44
CHAPTER 9	CARBON NANOFIBERS TO REMOVE NICKEL <i>Abdullah Al Mamun, Ma'an Alkhatib, Halema Shajahan</i>	50
CHAPTER 10	ADSORPTION OF LEAD BY CNTS GROWN ON GAC <i>Abdullah Al Mamun, Ma'an Alkhatib, Iman Hawari</i>	54
CHAPTER 11	ADSORPTION OF CADMIUM BY CNTS GROWN ON GACS <i>Abdullah Al Mamun, Ma'an Alkhatib, Nada Hamid Al Samawi</i>	59
CHAPTER 12	PERFORMANCE OF CNTS COLUMN IN REMOVING LEAD FROM WATER <i>Abdullah Al Mamun, Md Zahangir Alam, Muhammad Akram Abdul Hadi</i>	63
CHAPTER 13	STABILITY OF DISPERSION OF (SW-CNT)-CARBOXY-METHYL CELLULOSE (CMC) IN AQUEOUS SOLUTION <i>Ahmad T. Jameel, Mohammed S. Jami and Syarifah R. Kamaruzaman</i>	68
CHAPTER 14	OPTIMUM COLLOIDAL DISPERSION OF CARBON NANOTUBE IN ETHYLENE GLYCOL USING TRITON X-100 AS DISPERSING AGENT <i>Ahmad T. Jameel, Faridah Yusof, Natrah Ibrahim and Alade A. Olanrewaju</i>	74
CHAPTER 15	CHARACTERIZATION OF IMMOBILIZED LIPASE ON MULTI-WALLED CARBON NANOTUBE <i>Nur Hidayah Zainan, Maan Fahmi Al-Khatib and Hamzah Mohd. Salleh</i>	80
CHAPTER 16	PURIFICATION OF SKIM LATEX PROTEIN USING CARBON NANOTUBES AS THE CHROMATOGRAPHIC MEDIA <i>Faridah Yusof and Peer Mohamed</i>	86

CHAPTER 17	COMPUTATIONAL STUDIES OF ADSORPTION GLYCINE <i>Ibrahim Ali Noorbacha, Hamzah Mohd Salleh and Nursafuraa Abu Talib</i>	92
CHAPTER 18	KINETIC STUDIES ON ENHANCED MERCURY ADSORPTION USING ACTIVATED CARBON <i>Nassereldeen Kabbashi, Noor Illi</i>	97
CHAPTER 19	ANALYSIS OF CROSS FLOW ULTRAFILTRATION MEMBRANE <i>Mohammed Saedi Jami, Tariq Jameel and Norasila Binti Ali Mahmud</i>	103
CHAPTER 20	APPLICATION OF CARBON NANOTUBES IMPREGNATED ON ACTIVATED CARBON FOR CADMIUM REMOVAL FROM AQUEOUS SOLUTION <i>Ma'an Alkhatib, Abdullah Al-Mamun, Nurhazwani Muhamad Nor</i>	109
CHAPTER 21	BIOPROCESSING OF MORINGA OLEIFERA FOR REMOVAL OF HEAVY METALS (CADMIUM AND CHROMIUM) <i>Suleyman Aremu Muyibi, Jamal Parveen, Wan Mohd Syraif Wan Sulaiman</i>	117
CHAPTER 22	COAGULATION PERFORMANCE OF BIOACTIVE CONSTITUENTS ISOLATED FROM MORINGA OLEIFERA SEED IN LOW TURBIDITY WATER TREATMENT <i>Suleyman A. Muyibi, Eman N. Ali, Mohamad Ramlan Mohamed Salleh, Hamzah Mohd Salleh and Md Zahangir Alam</i>	123
CHAPTER 23	DESIGN AND PRODUCTION OF CARBON NANOTUBE-BASED BIOSENSOR <i>Ma'an Alkhatib, Mohamad Faizal Bin Khamis, Waleed Fekry Faris</i>	130
CHAPTER 24	DESIGN OF AN ADSORPTION SYSTEM FOR THE REMOVAL OF PHENOL FROM WATER USING ACTIVATED CARBON <i>Ma'an Alkhatib, Ahmad Tariq Jameel, Mohammad N. A. Alherbawi</i>	138
CHAPTER 25	FEASIBILITY STUDY ON THE PRODUCTION OF BIODIESEL FROM MICROALGAE <i>Ma'an Alkhatib, Md. Zahangir Alam, Salma A. S. Binsilm</i>	148
CHAPTER 26	IDENTIFICATION OF SUITABLE RESIN TO BE MIXED WITH COMMERCIALY AVAILABLE CASSAVA STARCH FOR RIGID PACKAGING APPLICATION <i>Ma'an Alkhatib, Noorhaza Bt Alias</i>	155
CHAPTER 27	IMMOBILIZATION OF LIPASE ON MULTI-WALLED CARBON NANOTUBES <i>Ma'an Alkhatib, Hamzah Mohd Salleh, Anas M. N. Sultan</i>	162
CHAPTER 28	INTEGRATION OF ARTIFICIAL NEURAL NETWORK AND PRINCIPAL COMPONENT ANALYSIS TECHNIQUES FOR WASTEWATER TREATMENT PLANT EVALUATION <i>Mohammed Saedi Jami, Nassereldeen A. Kabbashi and Mustapha Mujeli</i>	169
CHAPTER 29	ISOLATION OF BACTERIA FROM OIL-CONTAMINATED SOIL FOR CRUDE OIL DEGRADATION <i>Ma'an Alkhatib, Humaidah Bt Dr Hj Muhammad Nur Lubis, Alade Abass Olanrewaju</i>	175
CHAPTER 30	ISOLATION OF BACTERIA FROM SOIL FOR PLASTICS DEGRADATION <i>Ma'an Alkhatib, Nur Amalina Binti Ahmad, Alade Abass Olanrewaju</i>	183

CHAPTER 31	OPTIMIZATION OF CELLULASE ENZYME PRODUCTION USING ARTIFICIAL NEURAL NETWORK	190
	<i>Mohammed Saedi Jami, Md. Zahangir Alam and Lamija Subasic</i>	
CHAPTER 32	POTENTIAL OF ARTIFICIAL NEURAL NETWORKS IN THE PREDICTION OF WASTEWATER TREATMENT PLANT PERFORMANCE	196
	<i>Mohammed Saedi Jami, Nassereldeen Ahmed Kabashi and Norhafiza Binti Abdullah</i>	
CHAPTER 33	PRODUCTION OF ACTIVATED CARBON FROM OIL PALM EMPTY FRUIT BUNCH FOR ADSORPTION OF CADMIUM IN AQUEOUS SOLUTION	202
	<i>Suleyman A. Muyibi, Ma'an Alkhatib, Jeminat Omotayo Amode</i>	
CHAPTER 34	PRODUCTION OF ACTIVATED CARBON FROM PALM OIL EMPTY FRUIT BUNCH BY CHEMICAL ACTIVATION	209
	<i>Ma'an Alkhatib, Monawar Munjid</i>	
CHAPTER 35	REMOVAL OF AQUEOUS ZINC (II) USING PROCESSED MORINGA OLEIFERA SEEDS	217
	<i>Suleyman A. Muyibi, Isam Y. Qudsieh, M. H. A. Rahman</i>	
CHAPTER 36	REMOVAL OF COLOUR FROM PALM OIL MILL EFFLUENT USING GRANULAR ACTIVATED CARBON (GAC)	224
	<i>Ma'an Alkhatib, Abdullah Al Mamun, Iqrah Akbar</i>	
CHAPTER 37	THERMAL PROPERTIES ENHANCEMENT FOR THE DEVELOPED OF ETHYLENE VINYL ACETATE/EPOXIDIZED NATURAL RUBBER/CARBON NANOTUBES NANOCOMPOSITES	232
	<i>Faridah Yusof and Norazlina Mohamed Yatim</i>	
CHAPTER 38	EFFECT OF CARBON NANOTUBES LOADING ON THE MECHANICAL PROPERTIES OF ETHYLENE VINYL ACETATE/EPOXIDIZED NATURAL RUBBER NANOCOMPOSITES	242
	<i>Faridah Yusof and Norazlina Mohamed Yatim</i>	
	INDEX	251

CHAPTER 16

PURIFICATION OF SKIM LATEX PROTEIN USING CARBON NANOTUBES AS THE CHROMATOGRAPHIC MEDIA

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ABSTRACT

Skim latex is the by-product of latex concentrating process. Skim latex contain large portion of aqueous phase which is called skim latex serum. Studies show about 23.6% of skim latex serum is protein. In order to recover and purify these valuable proteins, Hydrophobic Interaction Chromatography (HIC) method is employed. However, instead of the commercially available media, carbon nanotubes (CNT) were used as the chromatographic media. This experiment aimed at optimizing the process parameters in running HIC. Three running parameters (pH, buffer concentration, and concentration of neutral salts) are chosen in the optimization process. The experimental design was carried out using Central Composite Design method. The response for the experiments is the area under graph of the elution chromatogram which is the measure of the interaction between skim latex proteins and CNTs. The absorbance at 280nm has linear relations with the protein concentration. The maximum total area under graph is achieved when HIC was conducted by running at pH 9, with buffer concentration of 100 mM along with 2 M ammonium sulfate as the neutral salt. The total area under this condition is 3.29 absorbance units (AU). Bradford protein assay and SDS-PAGE were done in order to further confirm that the compound purified is protein.

Keywords: carbon nanotubes, hydrophobic interaction chromatography, skim latex protein, purification, column chromatographic media

INTRODUCTION

Malaysia is one of the major producers of natural rubber. Natural rubbers are produced either in the form of dry rubber or latex. The production of latex in 2008 is recorded to be 153,709 tones. Natural rubber latex is not shipped directly because of its high water content. Most of the industrialist would prefer to concentrate latex before transporting since it is much more economical to do so. About 10-15% of the natural latex solution is eluted as byproduct of which known as skim latex (Blakely, 1997). Skim latex contains very insignificant amount of dry rubber particle and most often pretreated prior to discharging it into the environment.

Study reported that the skim latex contained about 7% total solid content and 5% dry rubber content. Upon rubber coagulation skim latex serum is obtained. This serum is composed of various components such as amino acids, lipids and carbohydrates. The largest group present in the serum, which accounts for almost half the total weight of serum is the