CURRENT RESEARCH AND DEVELOPMENT IN BIOTECHNOLOGY ENGINEERING AT IIUM

VOLUME IV

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IIUM PRESS

INTERNATIONAL ISLAMIC UNIVERSITY MALAYSIA

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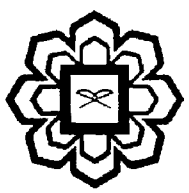

IIUM Press

Published by:
IIUM Press
International Islamic University Malaysia

First Edition, 2011

Perpustakaan Negara Malaysia Cataloguing-in-Publication Data

Ma'an Alkhatib, Abdullah Al Mamun & Faridah Yusof: Current Reasearch and Development in Biotechnology Engineering at IIUM Volume IV

ISBN: 978-967-418-136-9

Member of Majlis Penerbitan Ilmiah Malaysia – MAPIM
(Malaysian Scholarly Publishing Council)

Printed by :
IIUM PRINTING SDN. BHD.
No. 1, Jalan Industri Batu Caves 1/3
Taman Perindustrian Batu Caves
Batu Caves Centre Point
68100 Batu Caves
Selangor Darul Ehsan

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CARBON NANOFIBERS TO REMOVE NICKEL

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ABSTRACT

Removal of Ni ions from aqueous solution using carbon nanofibers (CNFs) as the adsorbent is reported in this chapter. The effects of pH, CNFs dosage, contact time and agitation speed were studied at 27°C. Adsorption study was conducted to observe the relationships between the parameters used. Design Expert 6.0.8 was used to study the interactions among the selected process parameters and to develop the optimized regression equation that represents the optimum adsorption parameters. The results indicated that the highest removal (79.7%) of Ni can be attained at pH 7.00 with CNFs dosage of 300 mg/L, contact time of 30 min and agitation speed of 100 rpm.

Keywords: adsorption, aqueous, nanofibers, optimization

INTRODUCTION

Human activities lead to many kinds of pollution affecting our planet. One of them is water pollution. As we all know, water covers about 70% of the earth's surface and is also a very important for all living beings. Nowadays, the water that we consume is not clean and pure as before. This precious compound of earth should be a supplement to our health but nowadays it has become a threat to the living beings' health due to increased pollution. Polluted water may contain large amount of hazardous materials and it is unfit for intended use. Contamination due to heavy metals is still a concern for many users and industries.

Nanoscience involves research to discover new behaviors and properties of materials with dimensions at the nanoscale. This nanoscale ranges from 1 to 100 nanometer (Masciangioli and Zhang, 2003). Nanotechnology is the way discoveries made at the nanoscale is put to work. Nanotechnology also requires the ability to manipulate and control the nanoscale materials in a useful way. Materials can have different properties at the nanoscale in which some are better at conducting electricity or heat, some are stronger and some have different magnetic properties. Nanomaterials also have larger surface areas, which mean more surfaces are available for interactions with other materials around them (Meyyapan, 2005).

Some heavy metals such as copper, zinc, arsenic and nickel are poisonous at high concentration. It is necessary to remove heavy metal as they tend to bioaccumulate, which means an increase in the concentration of a chemical in a biological organism over time, compared to the chemical's concentration in the environment (Smith, 2000). Heavy metals can enter a water supply by industrial and consumer waste, or even from acidic rain breaking