USAGE OF AGRICUTURAL WASTES IN REMOVING HEAVY METALS FROM WASTEWATER

A Thesis
Submitted to the Faculty of Engineering
Ain Shames University for the Fulfillment
of the Requirement of M.Sc. Degree
In Civil Engineering

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Date: - ---/--/2014

Dedication

This thesis is lovingly dedicated to all the close, special and beautiful people in my life.

A special dedication to

my supportive parents

and to

my wonderful sisters and brothers

and finally special dedication to

my lovely wife

for encouraging me to complete this work and for always being there for me.

STATEMENT

This dissertation is submitted to Ain Shams University, Faculty of Engineering for the degree of M.Sc. in Civil Engineering.

The work included in this thesis was carried out by the author in the department of Public Works, Faculty of Engineering, Ain Shams University, from October 2012 to June 2014.

No part of the thesis has been submitted for a degree or a qualification at any other University or Institution.

The candidate confirms that the work submitted is his own and that appropriate credit has been given where reference has been made to the work of others

Date: - ---/-- /2014

Signature: - ----------------

Name: - ***MAHMOUD MOHAMED ABDELMOMEN ELSAYED***

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ABSTRACT

Name: MAHMOUD MOHAMED ABDELMOMEN ELSAYED

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Faculty: Faculty of Engineering, Ain Shams University.

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Abstract:-

This thesis has been carried out to study the efficiency of using agricultural wastes (untreated) in removing heavy metals from wastewater, The problem of the environmental pollution is created by the continuous and accelerated disposal of wastes. One of the main contaminants is the industrial wastewater. Most of industrial wastewater contains high concentration of toxic heavy metals. In this study, the adsorption method using raw agricultural wastes (palm waste fiber and output trimming tree (ficus)) to remove heavy metals Zn^{+2} and Cr(VI) from wastewater was made.

It achieves removal ratios using palm waste fiber 93.67%, 89.20% for Zn^{+2} and Cr(VI), respectively.

Also; it success in achieving removal ratio using output trimming tree (ficus) 68.67%, 77.80% for Zn^{+2} and Cr(VI).

The thesis illustrated best removal efficiency in removing zinc and chromium using palm waste fiber, and output trimming tree (ficus)as adsorption material which is cheap material, these material can offers additional solution for the disposal of agricultural wastes and low cost in removing heavy metals from wastewater, which encourage the factories in using this method.

The results explain that, the removal efficiency increased by increasing the adsorption contact time, and the flow rate were decreased.

SUPERVISORS

Prof.Dr. Mohamed El Hosseiny El Nadi,
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Assistant Prof. Dr. Sayed Ismail Ali Ahmed.

KEY WORDS

Wastewater Treatment, Chemical Treatment, Heavy Metals Removal, Absorption, Application of Agricultural wastes.

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CHAPTER I
INTRODUCTION

1.1 BACKGROUND

Heavy metals have been excessively released into the environment due to rapid industrialization and have created a major global concern. Cadmium, zinc, copper, nickel, lead, mercury and chromium are often detected in industrial wastewaters, which originate from metal plating, mining activities, smelting, battery manufacture, tanneries, petroleum refining, paint manufacture, pesticides, pigment manufacture, printing and photographic industries, etc**…**

The problem of protecting the environment from pollution and contamination by various types of discharges is now in the focus of attention all over the world. Together with the development and growth in the assortment of chemicals, there is a continuous increase in pollution of the biosphere by industrial effluents. The problem created by the continuous, accelerated pollution of the hydrosphere, especially in large cities and industrial centers is extremely acute. At present, hundreds of millions of tons of diverse substances which are a source of harm to the health of people, plant life and useful microorganisms are discharged to the environment. The volume of these discharges is continuously increasing together with industrial growth. In the last decade the volume has doubled. In large industrial cities and centers, the concentration of harmful impurities is already impermissibly high and the level is dangerous for health and plant life.

At present environmental protection from industrial discharges is achieved mainly by employing various techniques for purifying gaseous and aqueous plant effluents. Discharge to the atmosphere and water basins results both in product losses and determent to the environment.

However, almost in all cases there is a possibility for partial or complete recuperation of discharged matter. i.e., for reprocessing of purified products to return as a valuable components to the production process,

Industrial aqueous discharges represent the largest volume of toxic substances to waters. It should be remembered always that, even small permitted levels of these toxic substances are not absolutely harmless for plant and animal life.