

Removal of heavy metals from waste water using the calcium alginate



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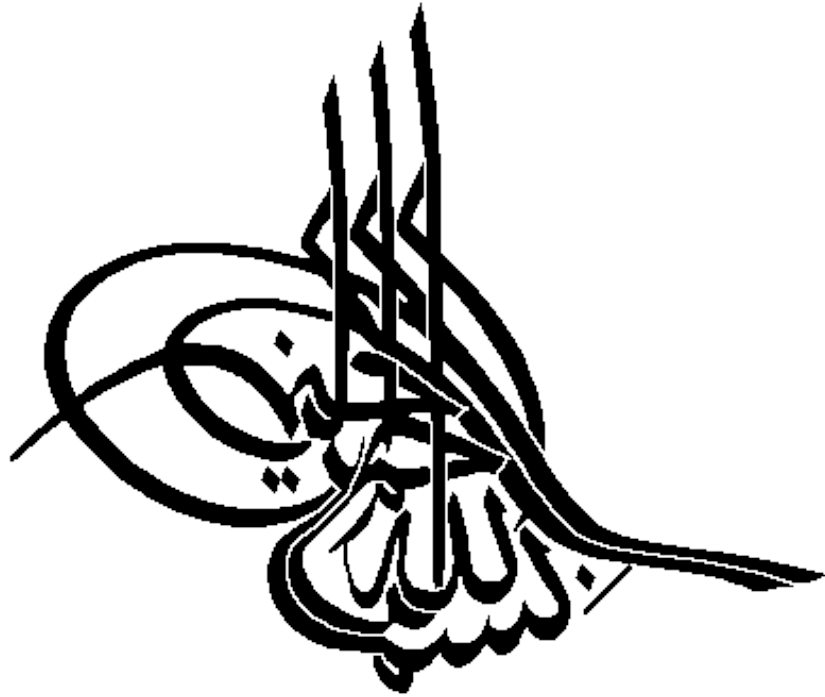
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SESSION: 2015-2017

**DEPARTMENT OF CHEMISTRY
SCHOOL OF SCIENCE
UNIVERSITY OF MANAGEMENT AND TECHNOLOGY,
LAHORE, PAKISTAN**



In the name of

Allah,

The most Compassionate,

The most merciful

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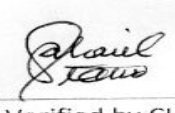
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Certified that the research work contained in this thesis titled, “**Removal of Heavy Metals from waste water using the Calcium Alginate**” has been carried out and completed by, **ID: 15004140017**. The quantum and the quality of the work contained in this thesis is adequate for the award of Degree of MS/M.Phil.

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This thesis is dedicated to all the people who never stop believing in me and who along with Allah, have been my

*Father, Mother, Brothers; Syed Ali Imran,
Syed Ali Rizwan*

and my dearest fellow

Kumal Raza,

Without their love and support I could not complete this task.



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ABSTRACT

Aqueous solution of sodium alginate extracted from the algae on interaction with calcium chloride formed the gel beads of calcium alginate. The beads were washed again and again with distilled water and then dried at room temperature to remove extra water. Later these gel beads were characterized by FTIR and SEM analysis. FTIR spectrum confirmed different functional groups whereas SEM images explained surface morphology of gel beads of calcium alginate. Gel beads of calcium alginate showed adsorption due the higher ratio of M/G. The percentage adsorption showed by the gel beads for lead was high as compared to other metals *i.e.* nickel and chromium due to coordination of oxygen atoms that are around the metal ion. Thus the order of adsorption is lead > nickel > chromium. The experiments showed that percentage adsorption for each metal remains same irrespective of the concentration of the solution for each metal, whereas the amount of metal uptake increased as the concentration of respective metal increases. The increase in metal adsorption is quite regular.

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CHAPTER-1

Introduction

1.1: Overview

Humans have utilized the freshwater from different resources like rivers, lakes, canals, groundwater and marshlands for several urban, industrial and agricultural actions, but have neglected its value in supporting the ecosystems. Fresh water is essential to the human lives and well-being of society and thus its use as drinking water, irrigation and transportation has long taken primacy above other products and services of freshwater ecosystems. However, it is increasingly recognized that functionally unharmed and biologically multifaceted aquatic ecosystems offer several long-term economic services of value and benefits to society (Baron *et al.* 2002).

Supply of water and its treatment are vital requirements of the social order. Previously, it was known that quality of water involves aesthetic and concerns to health depending on the needs of the utilization and also contaminants. Therefore, the reason of treatment of water is to generate harmless and refined water. For this purpose the water should be free of injurious chemicals and microorganisms, as well as have an adequate flavor and aroma. The prospective for health troubles that are connected with polluted drinking water is immense because numerous diseases are transferred from one place to other by water which is polluted with microbes or viruses. Therefore, all over the world, the quality and control of water principles are graded depending on the purpose of water consumption. For example, in the United States, primary drinking water principles are directly associated to health and secondary standards refer further to the manifestation and to non-consumptive uses of water. Primary principles are obligatory, while secondary principles are recommended as higher restrictions for non-health parameters.

REFERENCES

1.2: Industries Causing Water Pollution

The enhancement of industrial activities along with the growth of pollutants, like heavy metals, artificial compounds, nuclear hazardous wastes, etc has increased the environmental contamination and the degradation of ecosystems, particularly water. In recent years, growing anxiety about the environment's toxic metals effect resulted in the most stringent environmental principles for discharge of metal containing effluents from industrial applications containing metals. Tanneries are characteristically regarded as pollution concentrated industries which produce extensively unstable and of high intensity wastewater.