VISVESVARAYA TECHNOLOGICAL UNIVERSITY, BELGAUM

A Project Report on

BIOENCAPTUREMENT OF CHROMIUM (Cr VI) USING ASPERGILLUS NIGER

Submitted by

FASIHA TABASSUM	**(4VV08EV012)**
MAHESH S.	**(4VV08EV021)**
KUSUMA Y.	**(4VV09EV402)**
SURAKSHA M. N.	**(4VV05EV051)**

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Guide: **Mrs. SHILPA B. S.**
Associate Professor

DEPARTMENT OF ENVIRONMENTAL ENGINEERING

VIDYAVARDHAKA COLLEGE OF ENGINEERING

GOKULAM III STAGE, MYSORE- 570 002

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ABSTRACT

Remediation of heavy metals from industrial effluents poses a significant challenge. Hexavalent chromium is one such heavy metal, prevalent in industrial wastewaters, which has been proven to be toxic to humans and other living organisms. Heavy metals are major pollutants in marine, ground, industrial and even treated wastewaters. Ingestion of some of these heavy metals such as copper, chromium, arsenic and so on beyond permissible quantities causes various chronic disorders in human beings. The commonly used methods for heavy metal removal are Chemical Precipitation, Electrochemical Treatment, Solvent Extraction and Membrane Technology. All of these have many disadvantages like high reagents consumption, incomplete metal removal and so on. For these reasons new method was being developed as Sorption process.

Biosorption can be an effective technique for the treatment of heavy metal bearing wastewater resulting from humans and industrial activities. In the present research work, column studies were performed to obtain preliminary information about the biosorption capacity of the immobilized beads. *Aspergillus Niger* was immobilized in sodium alginate matrix. Column studies were carried out to know the effect of various bed heights under different flow rates on efficiency of biosorption. Fourier Transform Infrared spectroscopy (FTIR) analysis of immobilized *A. Niger* was used for a qualitative and preliminary analysis of chemical functional groups present on its cell wall which provided the information on nature of cell wall and Cr (VI) interaction during the process of biosorption.

Metal uptake by the immobilized beads was found to be maximum when the pH of synthetic solution was 8. The rate of absorption resulted from the process is equal to 88% with inlet velocity of 8ml/min and bed depth of 15 cm. Chromium removal efficiency for industrial effluent by immobilized beads was found to be 37.64 %. The work result reveals that all the immobilized cells have potential application for the removal Cr (VI) from industrial wastewater.

Keywords: *Heavy metal, Biosorption, Aspergillus Niger, Chromium (Cr VI), FTIR*