JETIR.ORG ISSN: 2349-5162 | ESTD Year : 2014 | Monthly Issue
JOURNAL OF EMERGING TECHNOLOGIES AND INNOVATIVE RESEARCH (JETIR)
An International Scholarly Open Access, Peer-reviewed, Refereed Journal

"REMOVAL OF LEAD Pb(II) FROM INDUSTRIAL WASTE WATER BY USING BIO-ADSORBENTS"

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ABSTRACT

In present work we are using two types of leaf. One of which is *Ficus bengalensis* (banyan) tree and other is *Ficus religiosa* (pipal) used as a bio adsorbent for removal of lead from the industrial waste water. It is a best technique for the purification of hazardous material from the industrial waste.

Key words: *Ficus bengalensis, Ficus religiosa*

INTRODUCTION

Water is precious gift of nature to us and without of which, none can survive but we are damaging the nature in various ways, one of which through environmental pollution various sewage, industrial waste, use of pesticides, insecticides and chemical fertilizers and other domestic waste, but the most dangerous water pollution due to various toxic metal ions present in the industrial effluent are the major sources of pollution. Different methods are suggested for the removal of such toxic metal ions from aqueous solution such as ionexchange, solvent extraction. The most useful and economic process is adsorption method. Researcher used different kind of adsorbent materials for the removal of metal ions.

A. Kapoor and T. Virarghavan[1] studied the fungal bio absorption in alternative treatment option for heavy metal bearing waste water. Volesky et al[2] reported that metal adsorption by dead biomass is more effective than the living organism. A.J. Anne[3] studied the characterization and electrodialytic treatment of wood combustion fly ash for removal of cadmium. E. Somers[4] studied the uptake of copper in fungal spore. Recently, Joshi[5] and Kanamadi[6] studied material from solution or industrial effluents. The particular amount of metal found in the biosorbent depends however, not only on chosen biosorbent but also on the type of the metal ion.

MATERIALS AND METHODS

I] Preparation of biosorbent from the tree leaves:

Here we are using two types of leaf. One of which is *Ficus bengalensis* (banyan) tree and other is *Ficus religiosa* (pipal). Very first we dried the leaves in oven up to the temperature range of 60-70^{0}C. The drying of leaves in oven is done for 2-3 days. Then we ground those dried leaves in grinder / mixer. The powder obtained is then sieved in a 0.5 mm mesh size serve for getting 0.5 mm particle size; to increase surface area. The leaf powder biomass was further digested using chemical methods by two ways : **a) Acid Treatment:**

Acid treatment was given by using 1N HNO3. The 10 gm of leaf biomass powder sample and 100 ml or 400 ml of acid were taken into conical flask. The mixture was gently heated on burner for 15 min. After boiling started, washing of treated biomass was carried out by using distilled water the washing was done to maintain pH between 6.0-6.5. The powder is again dried in oven at 40^{0}C for one day.

b) Alkali Treatment : Alkali treatment was given by using 0.5 N NaOH the rest of the treatment is same as that of acid treatment. Here the washing was done to maintain pH between 7.0 - 7.5.

II] Preparation of Adsorbates i.e. Synthetic Waste Water : Synthetic waste water containing lead ions was prepared using analytical grade lead nitrate various standard of 10 ppm of lead were prepared.

III] The State - of - Art, Technology of Adsorption: The adsorption studies was carried out by batch process at room temperature. Here we made the adsorption tower or column. The column is packed type column, which is packed with powder of biosorbents. The different columns were made for different powder i.e. the separate column is made for acid treated *Ficus bengalensis* (banyan) tree biosorbent and alkali treated *Ficus bengalensis* tree biosorbent, same is true for *Ficus religiosa* (pipal) tree biosorbent. Very first we washed the column with distilled water, then we were kept glass wool in the column at the bottom as well as top for support point of view to bed and in between those glass wool, biosorbents were filled without leaving any air packet.

Then 20 or 100 ml of synthetic waste water containing required amount of metal ions was treated with biosorbent in a glass column. The outlet flow rate was maintained such that the flow was laminar (i.e. drop wise flow is maintained). Three runs were carried out by 20 ml or

100 ml solution such as after each run 5 ml or 20 ml was taken for analysing the metal ions adsorbed in biosorbent. The analysis was done using Atomic Absorption Spectroscopy (AAS) principle. The biosorbent can also be reduced by desorption. The desorption was carried out using 0.1 N HCl as a desorbent.

RESULT AND DISCUSSION

Lead ion present in sample after adsorption.

Metal ion present in the solution in % and ppm	Ficus bengalensis		Ficus religiosa	
	Acid Treatment	Alkali Treatment	Acid Treatment	Alkali Treatment
%	2.4	2.2	3.8	3.4
ppm	0.00024	0.00022	0.00038	0.00034

It is observed from above table that, after treating acid and alkali solutions with *ficus bengalensis* and *ficus religiosa* leaves, maximum ppm or percentage of lead removed from waste water from ficus bengalensis by treating alkali so as compared to ficus *religiosa*, ficus bengalensis is as a good adsorbing agent.

CONCLUSION

The percentage of lead ion remains in the waste water after passing to the bed of *Ficus religiosa* and *Ficus bengalensis* leaves which used as biosorbent . From value we can calculate the percentage of removal of lead ion from the waste water.

ACKNOWLEDGEMENT

The authors are very much thankful to the Principal and the Head, Department of Chemistry for providing necessary facilities.

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