Original Research Paper Environmental Science

# CONTROLLING ARSENIC FROM COAL MINING AREA WATER SAMPLES BY USING MIXED ALGAE

**Mallesh kumar** Centre for Environment and Climate Change, School of Environmental Sciences , Jawaharlal Nehru Institute of Advanced studies Secunderabad.

**D.Sirisha** Centre for Environment and Climate Change, School of Environmental Sciences , Jawaharlal Nehru Institute of Advanced studies Secunderabad.

**ABSTRACT** Arsenic contamination in the groundwater has been termed as one of the largest mass poisoning in history. The problem of arsenic toxicity in drinking water that occurs through transfer of arsenic from contaminated underground soil is of great concern because of its potential health hazards. Among the various methods, bioremediation of arsenic is the most desirable because of low cost, environmental safety and sustainability. This article focuses on the investigation of water samples of Nalgonda Region and controlling technology using Mixed Algae and Immobilized Mixed Algae as Bio-Adsorbents. Apart from controlling technology, effects of various parameters such as Concentration, Contact Time, Dosage and Temperature on percentage removal of arsenic using bio-adsorbents are studied. More to it Adsorption isotherms and Thermodynamic parameters are calculated. Information gathered in this article is likely to enhance our knowledge about the arsenic bioremediation among the people who use ground water for drinking purpose and where the problem of arsenic contamination in underground water is severe

**KEYWORDS** :

**SELECTION OF MIXED ALGAE AS ADSORBENT**

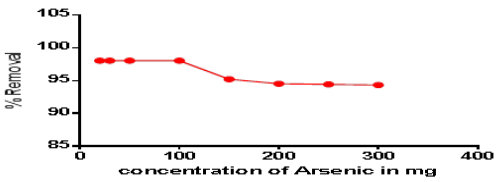
Green algae especially cladophera species are the bio indicators of aquatic bodies contamination by nutrients and toxic gases. The present work examines the possibility of using well known physicochemical method of adsorption for the removal of heavy metal Arsenic. Algae samples were selected from the water storage tanks located in dairy farm. The experiments were conducted with respect to contact time, concentration and dosage.

**Adsorption experiments**

Batch adsorption experiments were carried out with respect to contact time, concentration and with respect to dosage. The analysis of the results were carried out by using standard arsenomolybdnate method.

**Effect of Concentration on Mixed Algae**

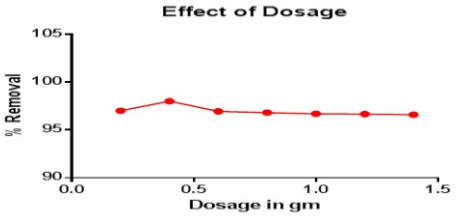
Discussion: The adsorption data of Arsenic is collected at different initial concentrations ranging from 20-300mg. However the experimental data were measured at 24hrs to make sure that full equilibrium was attained. The percentage (%) removal of Arsenic is more and it is ranging between 95-98%. The percentage removal **decreases** as the concentration **increases. The results are given in fig1**




**Effect of Dosage**

**Discussion:** To study the effect of adsorbent dose (g) on the uptake of Arsenic, experiments were done with 100ml of 20mg solutions, while the amount of adsorbent added was varied from 0.2-1.4gms. Percentage Removal of Arsenic from aqueous solution increases with the adsorbent dose and reached the optimum at 0.4gms of sorbent by 98 % of percentage removal. The increase in ion removal was due to the increase in the available sorption surface area.

Initially the Percentage Removal increases with increase in adsorbent dose, and then attained a constant value which indicates optimum dosage and equilibrium. Results are shown in fig 2.




**1.1. Effect of Contact Time**

Discussion: The study reveals that as contact time increases the Percentage Removal increases. It indicates that initially the adsorption process is directly proportional to contact time and it attains equilibrium in 45 minutes. The experiment measure the effect of contact time on the batch adsorption of Arsenic and at initial concentration ranging from 10-30mg, optimum contact time is 30 minutes.

The nature of adsorbent and its available sorption site affected the time needed to reach the equilibrium. For mixed algae the time was 30 minutes. Results are given in fig 3.

There are various techniques for controlling Arsenic ,Chromium as they are cost effective and easy to adopt.

The sulphates and nitrates are very high and can also be removed by employing the techniques of adsorption and coagulation. The cheap materials like paper pulp can be employed

**ACKNOWLEDGEMENTS**

The authors are thankful to the President Dr Swaminadhan, to the registrar Dr Suresh, Jawaharlal Nehru Institute of Advanced Studies for providing laboratory and library facilities. Authors are thankful and they greatly acknowledge University GrantsCommission (UGC-SERO) for their financial assistance

**REFERENCES**

1. Ahmet Sarı, Mustafa Tuzen, Biosorption Of Pb(II) And Cd(II) From Aqueous Solution Using Green Alga (Ulva Lactuca) Biomass, Journal of Hazard Material (2008);

152(1):302-8.
2. Igwe, J. C.* and Abia A.A., A Bioseparation Process For Removing Heavy Metals From Waste Water Using Biosorbents, African Journal of Biotechnology (2006) Vol. 5 (12), pp. 1167-1179, ISSN 1684–5315.
3. Upendra Kumar, Agricultural Products And By-Products As A Low Cost Adsorbent For Heavy Metal Removal From Water And Wastewater, Scientific Research and Essay (2006) Vol. 1 (2), pp. 033-037, ISSN 1992-2248.
4. T. A. Davis, B. Volesky and R. H. S. F. Vieira, Sargassum Seaweed As Biosorbent For Heavy Metals, Wat. Res.(2000) Vol. 34, No. 17, pp. 4270±4278.
5. Jianlong Wang, Can Chen, Biosorbents For Heavy Metals Removal And Their Future, Biotechnology Advances 27 (2009) 195–226.
6. R. Jalali , H. Ghafourian , Y. Asef , S.J. Davarpanah , S. Sepehr, Removal And Recovery Of Lead Using Nonliving Biomass Of Marine Algae, Journal of Hazardous Materials B92 (2002) 253–262.
7. V.K. Gupta , A. Rastogi, Biosorption Of Lead From Aqueous Solutions By Green Algae Spirogyra Species: Kinetics And Equilibrium Studies, Journal of Hazard Material (2008) Volume 152, Issue 1, Pages 407–414.
8. Pairat Kaewsarn, Biosorption Of Copper(II) From Aqueous Solutions By Pre Treated Biomass Of Marine Algae Padina Sp., Chemosphere 47 (2002) 1081–1085.
9. Patricia Miretzky, Andrea Saralegui, Alicia Ferna´ndez Cirelli, Simultaneous Heavy Metal Removal Mechanism By Dead Macrophytes, Chemosphere 62 (2006) 247–254.
10. A. Wilke, R. Buchholz, G. Bunke, Selective Biosorption Of Heavy Metals By Algae, Environmental Biotechnology (2006) 2 (2), 47-56.
11. M. Azizur Rahman , H. Hasegawa, Aquatic Arsenic: Phytoremediation Using Floating Macrophytes, Chemosphere 83 (2011) 633–646.
12. Kathryn Vander Weele Snyder Portland, Removal of Arsenic from Drinking Water by Water Hyacinths (Eichhornia crassipes), K. V. W. Snyder / J. U.S. SJWP (2006) Vol. 1:41.
13. Hossein Eisazadeh, Removal of Arsenic in Water Using Polypyrrole and its Composites, World Applied Sciences Journal (2008) 3 (1): 10-13, ISSN 1818-4952.