Research Paper :

A study on adsorption of Fe (ii) by Accacia bark

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ABSTRACT
The present paper deals with adsorption of Fe (ii) on Accacia bark. The variation in pH of the solution has no effect on the basic nature of time growth or adsorption time or saturation period. The adsorption was initially rapid and finally became constant due to slow removal near saturation. The extent of adsorption varies significantly with change in pH of the solution and attained a peak level to 74 per cent at pH 5.5 and thereafter decreased to 56.4 per cent at pH 9.5. It is obvious from results that pH of the medium plays an important role in adsorption of Fe (ii) from metallic solution.

KEY WORDS : Adsorption, Fe (ii), Accacia Bark

Waste containing metals may arise from a variety of individual operations such as chemical, metal processing, electroplating, metal polishing and cleaning, paints, battery manufacturing etc. Metals are available in suspension to metal ions and complexes in solution. Organometallic compounds in the environment are often produced by biomethylation where the transfer of methyl groups is biologically mediated from a donor molecule to the inorganic form of elements. Once added to the environment they are often accumulated in tissues. Several mishaps due to heavy metal contamination in aquatic environment increased the awareness about heavy metal toxicity and draw attention towards the studies

Removal of metals from wastes is a challenging problem and has been practiced for several decades. The conventional methods are usually expensive and sometime not effective. Therefore, there is a need for some alternative technique which should be efficient and cost effective. Adsorbents based on living and non living microorganisms and plants are one of promising tools for the adsorption of heavy metals from water and waste water (Lee and Davis, 2000, Bhattacharya *et al.,* 2004, Abia and Asuquo, 2006; Pehlivana *et al.,* 2006; Gupta and Sharma, 2010; Geetha and Belagali, 2010; Singh and Pandey, 2010). The present work is devoted to study the effect of pH on the adsorption of Fe (ii) from aqueous solution in order to find out the appropriate pH range for the maximum efficiency of the process by using Accacia Arabica (Babool) bark as an adsorbent.

EXPERIMENTAL METHODOLOGY
Processing of Accacia bark:
Acacia Arabica (commonly known as babool), bark was collected locally and sieved to particle size >53µm pore size sieves, after drying and grinding. Two parts of material was treated with 0.5N H_2SO_4 and one part with 39 per cent HCHO. The mixture was kept at 50^0C for 4 to 6 hours under shaking condition. HCHO insoublised the coloured water soluble tannins from bark. It was washed with remineralized water for several times. The treated bark was sun dried for two days and preserved in a plastic container.

Preparation of metal solution:
Ferrous amonium sulphate was dissolved in one litre distilled water and finally prepared $1.07 \times 10^{-4}M$ solution for stock solution for batch adsorption experiment.

Adsorption rate constant:
From liquid phase to solid phase ion can be considered as reversible reaction under equilibrium between two phases. First order reaction kinetics was used for the rate of reaction (Hellferich, 1962) by using the following equation

$$Kc = \frac{C_{BO}}{C_{AC}}$$

where K_C=Equillibrium constant
C_{BO}= Initial concentration of adsorbate on adsorbent