

REMOVAL OF IRON CONTENT FROM DRINKING WATER BY USING COCONUT COIR AND SUGAR BAGASSE

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ABSTRACT: Sustainability of good health depends upon the purity of water. However groundwater may be exposed towards to contamination by various anthropogenic activities such as agricultural, domestic and industrial. Groundwater quality problem are typically associated with high level of iron concentration in West Mugapair, Chennai. The normal drinking water contains permissible limit of iron concentration 0.3mg/l but the West Mugapair Groundwater contains 17mg/L of iron concentration. In the present study sugarcane bagasse (SCB) and Coconut coir (COC) from agricultural waste have been selected as solid phase extractor for removal total iron. Sugarcane bagasse, Coconut coir exhibits remarkable binding characteristics for removal total iron, so special interest was devoted for optimizing its uptake and studying its selectivity properties under static and dynamic conditions. The parameters such as effect of pH, adsorbent dosage, contact time, initial concentration, etc., were studied. Maximum removal of total iron was observed in the pH range of 4-5. The highest percentage removal of total iron was observed at Coconut coir (96%) compared than sugarcane bagasse (93%).

Key words: Ground water, Sugarcane, bagasse, coconut coir, Biosorbents.

drinking water as a germicide, oxidizes and corrodes iron. The iron content is prescribed to 0.3 ppm or less as a drinking water quality standard.

Purified water is essential for living a healthy life as such everyone should have access to it. Drinking water conditions have great impacts on people's everyday life, especially in the rural and remote areas where access to safe drinking water is very crucial. Surface water often is the only source, thus water contaminations are difficult to avoid due to rigorous and reckless use of surface water. Unsafe drinking water may result in fatal diseases. Statistics shows that these diseases resulted in ninety percent of all deaths of children under five years old in developing countries, due to low immunization of children to infections.

The focus of the present study was to assess the potentiality of Banana peel activated carbon (BPAC), a commonly available waste material as a low-cost, natural and ecofriendly biosorbent for the economical removal of manganese ion from aqueous solution as an ideal alternative to the current expensive methods of removing metals from groundwater. The effects of various parameters such as, pH, biosorbent dose, initial metal ion concentration and contact time on the biosorption capacity were investigated.

I. INTRODUCTION

II. OBJECTIVES

Iron is one of the major impurities that is commonly found in many sources of water. Iron deposited in the distribution system may promote the growth of microorganisms leading to high contamination in drinking water. Iron pipes may release corroded iron in water. Chlorine and Bleaching powder added to

- Removal of iron from water by using different adsorption media which are locally available at a low cost
- Development of a ceramic filter with clay and rice husk and studying the efficiency of removal of turbidity
- Designing a simple household setup for water filtration focusing on removal of iron and turbidity. Cost estimation of all the adsorption media used as well as the ceramic filter
- Analysis of filtration effectiveness in removal of iron for different filter media

III. IRON AND MANGANESE SOLUBILITY

- Iron and manganese exist in many different chemical forms. The presence of a given form of iron or manganese in geologic materials or water depends on many different environmental factors. We can often anticipate iron and manganese problems in water by observing a few general principles that affect water chemistry.
- An important principle to remember about chemical reactions is that, if allowed enough time, they will reach an equilibrium with the surrounding environment. When the conditions of that environment are changed, such as pumping water from an underground aquifer, the chemical equilibrium is upset. This will lead to either solution or precipitation of certain elements such as iron and manganese.
- A general rule of thumb is that oxygenated water will have only low levels of iron and manganese. The reason is that both iron and manganese react with oxygen to form compounds that do not stay dissolved in water. Surface water and shallow groundwater (Figure 1) usually have enough dissolved oxygen to maintain iron and manganese in an undissolved state. In surface water, iron and manganese are most likely to be trapped within suspended organic matter particles.



IV. IRON AND MANGANESE BACTERIA

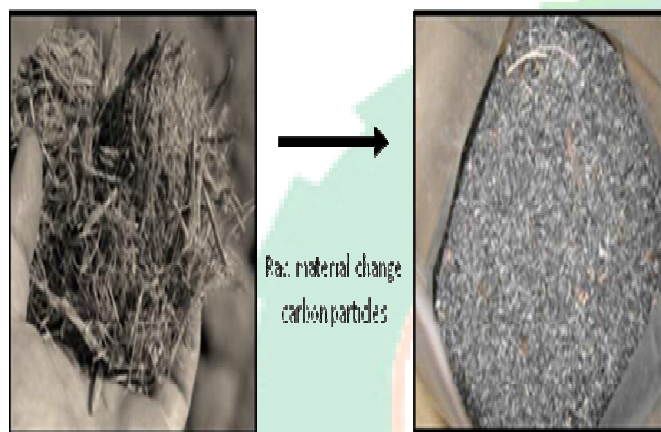
Some types of bacteria derive their energy by reacting with soluble forms of iron and manganese. These organisms are usually found in waters that have high levels of iron and manganese in solution. The reaction changes the iron and manganese from a soluble form into a less soluble form, thus causing precipitation and accumulation of black or reddish brown gelatinous material (slime). Masses of mucous, iron, and/or manganese can clog plumbing and water treatment equipment and can slough off in globs that become iron or manganese stains on laundry.

Bacterial reactions with iron and manganese do not cause any additional precipitation compared to normal exposure to oxygen. However, precipitation caused by bacteria occurs faster and tends to concentrate staining, thus making it more apparent.

Sugarcane Bagasse

Sugarcane bagasse is a new alternative as a replacement to existing product of activated carbon. Bagasse pitch is a waste

product from sugar refining industry. It is the name given to the residual cane pulp remaining after sugar has been extracted (Figure 3). Bagasse pitch is composed largely of cellulose, pentosan, and lignin. Previous researcher, studied on adsorption of Cd (II) and Pb(II) onto functionalized formic lignin from sugarcane bagasse. It was reported that the removal of Cd(II) and Zn(II) is found to increase as pH increases beyond 2 and at pH > 8.0 the uptake is 100%



VIII. MATERIALS AND METHODS

A. Reagents:

The chemicals used were Hydrochloric acid, hydroxylamine hydrochloride, 1,10 Phenanthroline, ammonium acetate and Ferrous ammonium sulphate. NaOH and pH buffer solutions.

B) Water samples:

Ground water (GW) and drinking, tap water (DTW) we will collect from West Mugapair, Chennai. Doubly distilled water (DDW) will obtain from private lab.

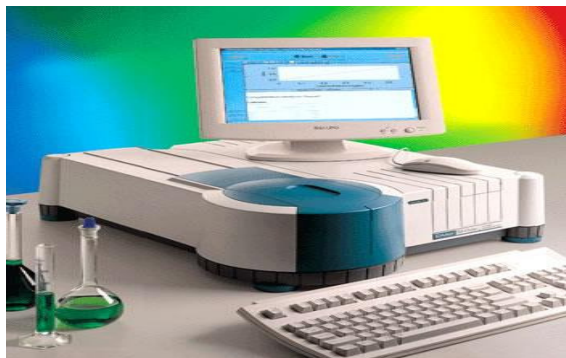
C) Instrumentation

UV-VIS spectra of SCB, Coconut coir ,ELICO SL159 UV-VIS spectrophotometer. A ELICO pH meter model L1120 calibrated against two buffer solutions at pH 4.0 and 9.2 was used for all pH-measurements. Magnetic stirrer (REMI 1MLH) will be use for stirring experiments.

COCONUT COIR:



V.
VI.
VII.



D) Preparation of the SCB and Coconut coir adsorbent:

SCB and Coconut coir will be wash thoroughly with distilled water to remove the dust particles, then soaked overnight in 0.1 N NaOH Solutions

E) Preparation of iron solution:

The standard iron solution 1000mg/L will be prepare by adding calculate amount of ferrous ammonium sulphate in double distilled water. Then 5mg/L synthetic solution will be prepare from the stock solution.

F) water sample collection:

Ground water samples will collect from tube wells at west Mugapair, Chennai, India.

removal efficiency 100% is observed at dosage of 100mg for both adsorbents. This is expected because more binding sites for metal ions are available at higher dose of adsorbents.

D) Effect of initial concentration

The pH of synthesis metal ion the solution was adjusted to 5 and then fixed dosage of adsorbent is 50mg is added and shaking for 60mins. It can be seen from the figure that the percentage removal decreases with the increase in initial metal ion concentration. At lower initial metal ion concentrations, sufficient adsorption sites are available for adsorption of the heavy metals ions. However, at high concentration the available sites of adsorption become fewer and hence the percentage removal of heavy metal is dependent upon the initial concentration.

E) Effect of Temperature :

The effect of temperature on the removal of total iron by both SCB ,COC adsorbents were studied with different temperatures of 30 °C to 50 °C. When we increasing the temperature the adsorption efficiency of both adsorbents is increases due to the attractive forces between the adsorbents surface and iron metal ions is increases. The increase in adsorption efficiency with temperature indicated that the reaction follows the endothermic pathway.

F) Effect of contact time:

The equilibrium is reached within in the first 60min of shaking time and reached a saturation level. The highest percentage removals SCB, COC adsorbents . As the contact time increased the active sites on the sorbent were filled.

IX. RESULT

A) Physicochemical characteristics of ground water:

The physicochemical characteristics such as turbidity, alkalinity, hardness, TDS, Chloride and other ions concentration will be measure for ground water.

B) Effect of pH

The pH of the aqueous solution is an important operational parameter in the adsorption process because it affects the solubility of the metal ions, concentration of the counter ions on the functional groups.

C) Effect of adsorbent dose:

The weight of SCB, COC was varied from 25 to100 mg keeping all the other experimental variables, viz pH 5.0, initial concentration (5mg/L), and contact time 60 min. It is shows that there is a sharp increase in percentage removal with increasing adsorbent dose for total iron. The highest

X. CONCLUSION

The present study deals that activated carbon will be prepare from Sugarcane bagasse and Coconut coir may be very well for removal synthetic iron , ground water, double distilled water samples. According to some authors' When comparing both natural adsorbents the iron removal for Coconut coir carbon is higher than SCB carbon. The percentage removals (93, 96) of SCB, COC adsorbents may be maximum at pH 5 and the removal efficiency increases with lower initial metal concentration and with higher adsorbent dose. Since sugarcane bagasse and Coconut coir is an agricultural solid waste, easily available, it can be used in Ground water treatment industries and wastewater treatments. The natural agricultural waste as environmentally friendly material for removal of iron from ground water.

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