

Extended Abstract

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Bio-sorption of Co(II) Metal by Original and KMnO4 Pretreated Trapa natan Biopolymer

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Abstract

Bio-adsorption of Co(II) metal ions from the aqueous medium using Trapa natan peels biomass was examined for preliminary pH, initial metal absorption and contact time. Pre-treatment of biomass were carried out with oxidizing agents. The maximum uptake q (mgg-1) for Co(II) obtained by KMnO4 - TNP was about (53.92) as compared to NativeTNP (24.28) at pH 5. The equilibrium and kinetics models were applied over data. The Langmuir and Freundlich equilibrium adsorption models were investigated and observed to the fit the data. The Freundlich model gave better fit than the Langmuir model with R2 value of 0.9951. Kinetic study revealed that adsorption was fast in first 60 minutes and equilibrium was achieved after 120 minutes for Co(II) metal. The suitability of a pseudo second order chemical reaction for the sorption of Co(II) onto this bio-sorbent was apparent. The results revealed that Trapa natans peels biomass is effective, potential and best beneficial biosorbent for removal of heavy metals.

Keywords

Biosorption; Trapa natan peels; KMnO4 ; Co(II)

INTRODUCTION

Heavy metals pollution arises from different sources in the result of industrial actions and scientific improvement but most commonly is due to purification of metals. Discharge of the Heavy metals in the water bodies because of Anthropogenic actions is most important water pollution source. Co, Zn, Cu, Ni, Pb, Hg, are frequently detected in engineering wastewaters, which instigate as of metal plating, mining activities, smelting, battery construct, tanneries, oil refining, smear manufacture, pesticides, dye manufacture, printing and picturesque industries, etc. [1]. Heavy metals must be removed before discharge because unlike organic wastes, heavy metals are non-biodegradable and build up in gulp of air tissues, and responsible for various diseases and disorders [2]. Cobalt is an odourless, steely-gray, shimmering, rigid metal. Everyone is unwrapping to the fundamentals to small levels of Cobalt in atmosphere, stream and foodstuff. 2 adm³ of Cobalt in consumption water has been estimated. Cobalt has both advantageous and destructive special effects on physical condition. Important natural sources of Cobalt in the atmosphere are loam, grime and marine irrigate. The sensitive Co (II) poisoning cause dangerous health hazards in humans like asthma, failure of heart, harm to liver and thyroid [3]. Many physicochemical techniques have been urbanized in favour of the eradication of metals from wastewater, for example mining, ion exchange, chemical rainfall and crust intake partition process. Development of professional and inexpensive partition processes is therefore of tremendous significance. Adsorption is another established technique for the exclusion of heavy metals from wastewater [4]. Bio-sorption is the potential of dynamic sites on the shell of biomaterials to connect and deliberate heavy metals from even the most adulterate aqueous solutions. [5]. The effectiveness of biomass be determined by on factors such as no. of sites on the biosorbent matter, their ease of access and chemical state such that the availability and the resemblance between sites and metal [6]. The

largest advantage of bio-sorption are the low working rate, chemical's capacity to be minimized and disposal of organic slush and many competence in detoxifying very thin effluents [6].

Materials and Methods

The research work reported in this text was performed in the Research laboratory of Department of Chemistry, University of Agriculture Faisalabad, Pakistan. The research was carried out during 2013 to observe the bio-srption of heavy metals from the aqueous solutions by water chest nuts (Trapa natans. L) peels as biosorbent. All the samples of Trapa natans L. used were collected from Jhung bazaar of Faisalabad. This sampling area does not have any aforementioned history of contamination by heavy metals.

RESULTS AND DISCUSSION

In this research work, dried biomass of Trapa natans peels was used by the side of with pretreated biomass. The principle of inventive biomass of Trapa natans peels were to know its biosorption capability and then evaluate with the adsorption capacity of chemically pretreated biomass.

Conclusions

Even though the technology also suffers inherent disadvantages like early saturation of biomass, little biological control over the characteristics of biosorbents. It offers several advantages, including cost effectiveness, high efficiency, minimization of chemical/ biological sludge, and regeneration of biosorbent with possibility of metal recovery. In countries, with the rush for rapid industrial development coupled with lack of awareness about metal toxicity, there is an urgent need for developing an economical and eco-friendly technology which satisfies these demands where other conventional methods fail. These findings demonstrated that Trapa natans L. is cost effective, potential and a novel biosorbent for the removal of heavy metals such as Co (II) from the aqueous solution. The pre-treatment method thus can be used to prepare high-efficiency biomass for heavy metal remediation.

References

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