

Cynodon Dactylon - A Cost Effective, Eco-Friendly Adsorbent for Removal of Lead

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Abstract: Increased urbanization and industrialization has prompted a situation of higher amounts of lead in wastewater that has turned into a significant issue. Lead removal includes advances that have traditionally been utilized (oxidation, precipitation/coagulation/film separation) with far less attention paid to adsorption by plant biocarbon. Effect of pH, adsorbent portion and contact time on percentage removal of lead from aqueous solutions using plant adsorbent have been analyzed in this method is more economical and safe in present study.

Keywords: Biocarbon, heavy metals, wastewater, ppm, lead

I. INTRODUCTION

The major reason for inclusion of heavy metals into the environment especially in the water bodies is increased industrialization. Heavy metal ion contamination of aqueous stream is becoming a danger to aquatic system, because of their high toxicity even at exceptionally low concentration. Heavy metals ions discharged by number of industrial procedures are the major pollutants in marine, ground, industrial and even in treated wastewaters. They can be extremely toxic because they can harm nerves, liver, kidney, bone (M. Singanan, 2011).

Lead is a metal ion which is toxic and carcinogenic in nature. Lead toxicity may causes anaemia, kidney malfunction (Arbabi, Mohsen et al, 2015), (Bablu Alawa et al, 2015) hypertension, encephalopathy, fatigue, irritability, hyperactivity, memory loss, abdominal pain (Abdullahi, M. S., 2013) and miscarriage, low birth weight (Joshua N. Edokpayiet et al, 2015). It may affect nervous system (P. Muthusamy, 2016). According to the Indian Standard Institution, the tolerance limit of presence of lead for drinking water is 0.05 mg/L (Achla Kaushal, Singh SK, 2017).

Different procedures for removal of lead are enormously utilized like adsorption, ion exchange, turn around assimilation, precipitation and electro dialysis. Eco-friendly and versatile adsorption procedure using biocarbon has numerous advantages over other methods including recuperation of metal worth, selectivity, cost effectiveness (Achanai Buasri et al, 2012), (Rakesh Kumar et al, 2012).

II. MATERIALS AND METHOD

Preparation of biocarbon: Cynodon dactylon grass washed several times with demineralized water to expel soil. Then this biomass was dried under sunlight for 5-6 days. Crisped biomass powdered in mortar-pestle to make powder and kept in 1:1 HCl for 3 hrs for activation. Resulting item kept in air-dried broiler at 200°C for 2hrs followed by washing several times by demineralized water to expel excess acid then dried at 120°C. Resulting dark colored material store in airtight container for further use (Prachi N. Raut et al, 2019).

Preparation of synthetic wastewater: Stock solution of Pb is prepared from AR grade PbCl₂ and from which working standard of 100-ppm solution is prepared. Adsorption of Pb ions was measured by UV spectrophotometer. The percentage removal of Pb was calculated as:

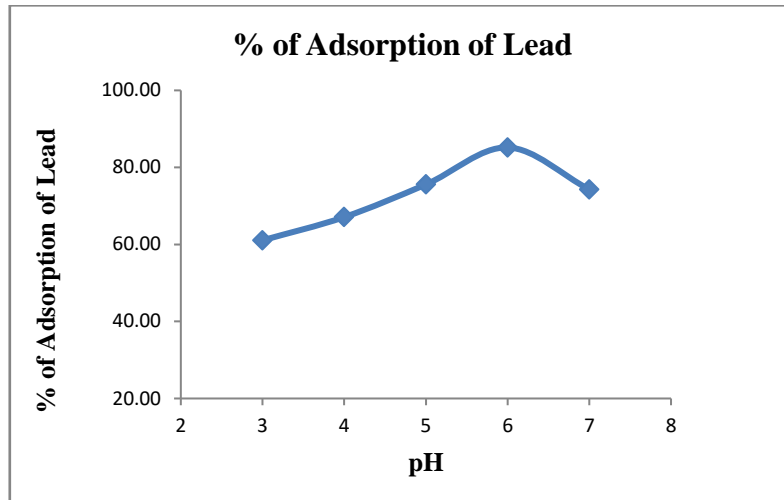
$$\% \text{ Removal} = (C_0 - C_t / C_0) \times 100$$

C₀: Initial Lead (Pb) concentration

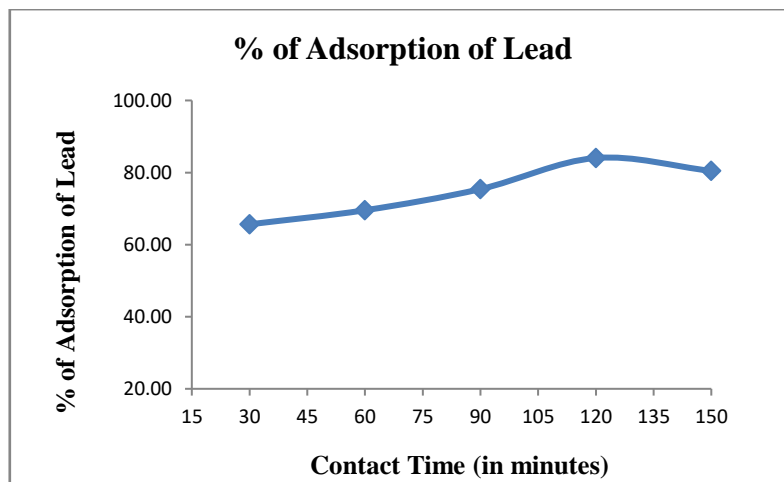
C_t: Lead (Pb) concentration at equilibrium after treatment with adsorbent

III. RESULT

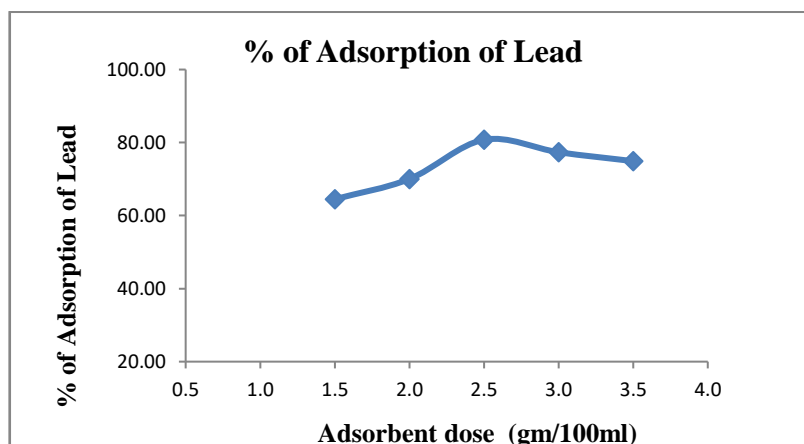
Effect of pH of solution: The solution pH is one of the parameters with greatest influence on the adsorption of metal ions as it affects both the surface charge of adsorbent and the degree of ionization of the heavy metal in solution (Vaishnav Vinod et al, 2011). Maximum adsorption 85.19% was observed at pH 6.



Effect of contact time: For the metal ions present in the synthetic wastewater, there was a progression in the percentage removal of metal ions present in the synthetic wastewater with time. Maximum adsorption was observed at 120 minutes is 84.02%



Study of effect of adsorbent dose: It is important to fix the measure of the activated biocarbon to plan the ideal treatment systems and for a fast reaction of the analysis. Maximum adsorption was observed at 2.5 g/100ml is 80.78 %



IV. CONCLUSION

From the above analysis, it has been reasoned that the procedure of adsorption using minimal effort adsorbents is a basic, financially savvy and an eco-accommodating technique for the treatment of wastewater containing lead ions. Productivity of the procedure depends not just on the physical and chemical properties of the material utilized as adsorbent, yet additionally on the different factors like pH, adsorbent portion, metal ion concentration, temperature, contact time and so on. These parameters must be improved to make the procedure more productive and prudent. Appreciable adsorption of Pb is at pH 6, Contact time 120 minutes and Adsorbent dose 2.5 g. Plant biocarbon can be used commercially for removal of Pb from industrial wastewater.

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