Optimization of lead (II) ions adsorption on to chemically activated carbon from sugarcane bagasse.

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Abstract.

The adsorption of Lead (II) ion on to chemically activated carbon has been studied and optimized in a batch reactor system. The zinc chloride impregnated sugarcane bagasse was thermal activated in a fixed bed reactor in the presence of argon gas. The surface morphology, surface functional group and thermal stability were determined. The SEM micrograph revealed porous structures which enhance the sorption capacity of the developed activated carbon. The derivative thermal analysis (DTA) and thermogravimetric analysis (TGA) profile of the activated carbon were employed in the proximate analysis. The BET surface area shows a high microporous surface area and micropore volume of 840.38 m^2/g and 0.30 cc/g respectively which aids sorption efficiency. The adsorption of lead ion was optimized using 2^k factorial experimental design where pH, mass of absorbent, temperature and time was studied in a batch reactor. pH has the highest positive impact on the adsorption of Pb^{2+} while considering single effect as studied using atomic absorption spectrophotometer. After estimating the main effects, the interacting factors affecting the removal of Pb^{2+} were determined by performing the analysis of variance (ANOVA) with R-Square of 99.97%. This study has demonstrated that Zinc chloride activated carbon has high affinity for lead ion sorption.

Keywords: Sugarcane Bagasse, Activated Carbon, Characterization, Adsorption and Optimization.

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