



## Experimental studies on the removal of heavy metal ion concentration using sugarcane bagasse in batch adsorption process

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### ABSTRACT

Removal of toxic heavy metal ion concentration (Cr, Pb, and Zn) from the aqueous solution has been investigated using sugarcane bagasse as an adsorbent. The various properties of sugarcane bagasse powder were analyzed and the Fourier transmission infrared spectra, scanning electron microscopy, and energy dispersive X-ray analysis of sugarcane bagasse powder, before and after adsorption of Cr(VI), Pb(II), and Zn(II) were also examined. Test results show that the maximum adsorption efficiency of 95.65% for Cr(VI), 87.26% for Pb(II), and 83.32% for Zn(II) were attained at the pH of 6.0, the temperature of 30°C, the contact time of 60 min, the adsorbent dosage of 2.5 g/L with 25 mg/L of metal ion concentrations. The Langmuir and Freundlich isotherm models were adopted for the batch adsorption experimental work and the results prove that the pseudo-second-order model was fitted well with kinetic data. Also, the thermodynamic study confirms that adsorption mechanism is endothermic in nature with the best possible correlations.

*Keywords:* Heavy metals; Adsorption; Fourier transmission infrared; Scanning electron microscopy; Energy dispersive X-ray; Thermodynamic studies; Sugarcane bagasse powder

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