

Adsorptive removal of chromium (VI) by chemically activated agricultural waste sugarcane bagasse

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ABSTRACT - The ability of chemically modified sugarcane bagasse for the removal of Cr (VI) from aqueous solution was investigated as a function of change in pH at temperature $28\pm 1^\circ\text{C}$, concentration 1.987×10^{-4} M and particle size <55 μm . The adsorption of Cr (VI) on chemically modified bagasse (MB) was nearly 8% higher against unmodified bagasse (UB). The acidic pH of the medium promoted the rate of Cr (VI) adsorption on the adsorbent while inhibited at neutral or alkaline pH and gave good fit for adsorption kinetics equation.

Key words - Sugarcane bagasse, Adsorption, Chemically activated, Adsorbents, Chromium (VI)

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Toxic metals release into the environment has been increasing continuously as a result of man's activities which poses a significant threat to environmental quality and public health. Several episodes due to heavy metal contamination in aquatic environment increased the awareness about the heavy metal toxicity. Among these, minimata and *itai-itai* due to mercury and cadmium, respectively, in Japan are well known. Chromium (VI) compounds are toxic which can even cause lung cancer, often used in metal processing, electroplating, leather tanning, paints and pigments, canning industries, wood preservatives etc. Chromium is discharged, from there industries as in waste water effluents.

A number of techniques have been reported in literatures to reduce the heavy metal ions from waste water effluents (Deitz, 1956; Dean *et al.* 1972; Braukmann, 1990). These methods have been found to be limited, since they are often involved high capital and optimal cost and may be associated with generation of secondary wastes. On the other hand agricultural products and byproducts are an abundant waste material and need proper disposal. The idea of using various

agricultural products and byproducts, available a little or no cost due to waste products for the removal of heavy metals from solution has been investigated by a number of investigators (Khawas and Dara, 1994; Egila and Okore, 2002; Saraswathi *et al.*, 2009; Singh and Pandey, 2011). Lignin based materials were also investigated for cation (Garg and Sud 2005, Singh and Pandey, 2012). The present work describes the batch adsorption characteristics of Cr (VI) on chemically modified sugarcane bagasse at different pH for the removal of Cr (VI) from aqueous solution were investigated.

EXPERIMENTAL METHODOLOGY

Preparation of adsorbent:

Sugarcane bagasse was obtained formers of local area and boiled with water for 30 minutes to removal the soluble sugar. Boiled bagasse was dried at 120°C in a hot air oven for 24 hrs. Dried material was ground and sieved. Sieved bagasse was treated with 0.1M citric acid for 24 hrs for chemical modification and then washed with double distilled water. After washing chemically treated bagasse powder was dried for a constant weight.