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Study on Biosorption of Heavy Metals by Modified Lignocellulosic Waste

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Abstract: Heavy metal laden effluent coming out of various industries is posing a huge pressure on the environment. This in turn, necessitates the development of a noble low cost and efficient technology for the removal of such wastes from industrial effluents. In this particular research, the heavy metal (lead (II) biosorption capacity of modified agri-waste (rice husk and sugarcane bagasse) has been studied, taking the two biosorbents as abundant and low cost biosorbents with promising potential to remove hazardous heavy metal wastes from effluent streams. In the study, options to enhance metal sorption capacity by chemical and thermal modification of the sorbents have been investigated. Impact of modifier chemicals used include sodium hydroxide, sulfuric acid, nitric acid, citrc acid, acrylic acid and glutamic acid in case of rice husk and modifiers like Sodium Dodecyl Sulfate (SDS), Sodium bicarbonate, Cetyl trimethyl diammonium bromide (CTAB), sodium methylate and urea, in case of sugar cane bagasse in addition to those used with rice husk. Characterization of the sorbents surfaces has been made before and after chemical and thermal modification and after sorption of heavy metals using Fourrier Transform Infra-Red Spectroscopy (FTIR) and Scanning Electron Microscope (SEM). Some studies have also been done on mechanism of sorption. In addition impact of concentration of sodium hydroxide and citric acid as effective chemical modifier has been studied. Tests to understand impact of particle size have also been conducted and results for the two biosorbents have been compared.

Key words: Biosorption, chemical and thermal modification, agri-waste