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Retention efficiency of Cd, Pb and Zn from agricultural by-products activated carbon and biochar under laboratory conditions

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The immobilization of inorganic contaminants by using biochar in soils has played an increasingly important role and it is seen as an attractive alternative for the remediation of heavy metals. Although, the production of activated carbon (CA) from agricultural by-products has received special attention, the activation of the the organic source has been studied in order to increase its porposity, surface area and chemical polarity, resulting in higher adsorption of metals. Therefore, this study aimed to evaluate the effectiveness of BC and CA samples, obtained from a eucalyptus husks and cane sugar bagasse after activation with 20% phosphoric acid and pyrolyzed at 450oC in the retention of Zn, Cd and Pb using contaminated individual solutions. The experiment was performed using samples of activated carbon of eucalyptus husk (CCA), eucalyptus husk biochar (BC), activated carbon of sugar cane bagasse (CBA) and sugar cane bagasse biochar (BB) previously treated with Zn, Cd (range of tested solution from 0.1 up to 12 mmol L-1) and Pb (from 0.1 up 50 mmol L-1) which were submitted to stirring with ammonium acetate solution at pH 4.9 for 48 h. The results obtained were adjusted with Langmuir desorptiom isotherms. The pH of the resulting solution, were the meatls were analyse, was measure and remained in the range 4.9 – 5.0. The lower pH found in activated samples (range 2.4-2.5) resulted in larger desorption of metals than the biochar samples (pH of 9.7 for BC and 7.0 for BB). This result is surprising since for the biochar samples it was expected that any precipated metals were dissolved by the desorption solution in addition to metals released by ion exchange. Although the desorption results of activated samoels is still unclear, hich we belive may be explaibed by some adicitonal insterumental analysis, biochar samples showed better potential for application in contaminated soils than the previous.