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Removal of Dissolved Phosphorus Using Iron or Aluminum Oxide Impregnated Wood Residues

Various products developed from agricultural waste materials or residues for removing contaminants from water or wastewater have been introduced. This study examined the feasibility of developing poplar (*populus deltoides*) wood chips impregnated with Fe or Al oxide and the efficacy of the products to remove dissolved phosphorus (P) from water or waste water. Impregnation of the wood chip with Fe or Al oxide could be easily made by treating the chips with 1 M FeCl_3 or AlCl_3 solution, followed by exposure of the treated chips to NH_3 vapor to facilitate Fe or Al precipitation as hydrous oxides. The impregnated wood chip contained an average of 1.10 mmole Fe g^{-1} or 0.91 mmole Al g^{-1} chip. The amount of P retained by the impregnated chip increased with increasing size (weight) of the chip, with the amount of P sorbed reaching a level equivalent to 5% or more of the impregnated Fe or Al. The rate of P sorption by the Fe or Al impregnated chip was rapid and increased with increasing size (weight) of the chip. It was well described by pseudo second-order rate equation. Greater than 81% of the sorbed P was readily desorbed in 0.1 M NaOH and the rate of desorption was also well described by the second-order equation. Ageing had no apparent effect on the desorption of the sorbed P in 0.1 M NaOH. The study demonstrated that wood could be easily activated to become an effective P sink after impregnation with Fe or Al oxide.

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