Phosphoric Acid Treated Rice Husk as a Low cost Biosorbent for Cadmium Removal from Wastewater

P.B.Ranaweera, H.M.Madushanka, S.V.Udayakumara*
Department of Materials Science and Engineering, University of Moratuwa
**email: sudasingha@gmail.com*

Heavy metals, a contaminant present in polluted water pose a major threat to humans due to its ability to cause various health risks such as cancers, defective bone mineralization and chronic kidney disease. The most affected areas are developing nations: mainly Asia and South America. Since most of these countries do not have the ability to use expensive water filtration techniques like saltwater desalination or using graphene-based water purifiers, it's essential to come up with a water purifier/filter made of affordable materials.

Adsorption behavior of Cadmium ions to phosphoric acid treated rice husk has been studied in this project. Rice husk samples obtained from a local rice mill was cleaned and heat treated initially. Chemical treatment for the rice husk was done by treating with phosphoric acid under uniform conditions. SEM images of the rice husk after treating with phosphoric acid showed significant increase in pores proving the higher efficiency of adsorption due to increased surface area. Artificially contaminated water samples were prepared by diluting a stock solution of Cd2+ ions. Contaminant concentrations in the ppm and ppb range was then filtered by the treated rice husk.

Experimental results proved favorable adsorption of Cadmium into phosphoric acid treated rice husk. Ppm range Cd^{2+} samples had an average adsorption rate of ~30% and the data fitted well for Langmuir and Freundlich isotherms. The highest adsorption percentage was observed in the 100-ppb region with an adsorption rate of ~90%.

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