

**ASSESSING THE EFFICACY OF CARBONISED AND
ACTIVATED RICE HUSK, COCONUT COIR FOR THE
REMOVAL OF SELECTED HEAVY METALS, CADMIUM (Cd),
COPPER (Cu), AND BARIUM (Ba)**



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ABSTRACT

Water is a critical resource essential for all life on Earth. With increasing industrialisation and urbanisation, consumable water sources are under threat, particularly from contamination by heavy metals (HMs) like Cd, Cu, and Ba, which pose significant health risks even at low concentrations. While several methods exist to remove HMs from water, many are cost-intensive. Concurrently, organic waste management in urban areas is a growing concern. Biosorption and utilising organic waste materials, offers a potential solution to both problems. This study aims to evaluate the effectiveness of activated and carbonised Rice Husk (RH) and Coconut Coir (CC) in removing Cd, Cu, and Ba from water. Activated and carbonised forms of RH and CC were prepared, and 100 ppm initial concentrations of Cd, Cu, and Ba solutions were tested at pH 7.0. A column test setup was used, with biosorbents compacted to a height of 12 cm. The removal efficiency of the HMs was analysed, and a simple statistical investigation was conducted to determine the skewness of the data. The study found that untreated RH performed best for Ba removal (38.03%), while CC was most effective for Cd (57.60%) and Cu (49.77%). Activation was more efficient than carbonisation, with both biosorbents removing approximately 70% of Cu and over 64% of Cd after activation. In contrast, the removal efficiency for Ba increased by only 5-10% after the enhancement processes. The activation process is more effective than carbonisation for the removal of Cu, Cd, and Ba, with Cu and Cd showing the highest removal efficiencies through performance-enhanced RH and CC.

Key Words: Activation, Adsorption, Biosorbents, Carbonisation, Coconut Coir, Heavy Metals, Rice Husk

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