

Cinnamon wood as an adsorbant for the removal of Cu²⁺ from aqueous solutions

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Heavy metal water pollution remains one of the most harmful ecological and health issues globally, and Cu²⁺ is a common pollutant found in water bodies. Cinnamon (*Cinnamomum verum* or *Cinnamomum zeylanicum*) is native to Sri Lanka. Cinnamon wood is discarded as firewood, making it an ideal candidate as a locally available low cost adsorbent for Cu²⁺.

Cinnamon wood from Ratnapura was cut into small pieces, washed with distilled water and dried in sunlight. It was further dried in an oven at 100 °C for two hours and ground. The saw dust was in 2.0 mm, 1.7 mm, 0.6 mm, 0.5 mm and 0.15 mm particle size. A stock solution of 1000 ppm Cu²⁺ solution was prepared from CuCl₂·2H₂O and deionized water.

Batch adsorption experiments were carried out to study the effect of contact time, particle size and optimum mass of adsorbent for the adsorption of Cu²⁺ onto cinnamon sawdust. All experiments were performed in duplicate, with 1000 ppm Cu²⁺ without cinnamon wood as the control. Particle size of cinnamon sawdust at which maximum adsorption takes place was investigated by incubating 1.0 g of cinnamon wood of particle size 0.15 mm, 0.50 mm, 0.60 mm, 1.70 mm and 2.00 mm with 25.00 mL 1000 ppm Cu²⁺ solution for 120 min in a shaker at 200 rpm. Optimum shaking time was determined by incubating 1.0 g of cinnamon wood saw dust of 2.00 mm particle size and 25.00 mL of 1000 ppm Cu²⁺ solution in 50.00 mL plastic tubes in a shaker for 30, 60, 90 and 120 minutes at 200 rpm. Optimum mass of adsorbent was determined by incubating 0.2 g, 0.4 g, 0.6 g, 0.8 g, and 1.0 g of 2.00 mm particle size cinnamon sawdust with 25.00 mL 1000 ppm Cu²⁺ solutions in 50.00 mL plastic tubes for 120 minutes at 200 rpm. After shaking, samples were filtered using Whatman No 14 filter paper and the residual copper in the aqueous solution was determined by Atomic Absorption Spectroscopy using a Hitachi ZA3000 AAS Spectrophotometer. Percentage removal of Cu (II) by sawdust and its binding capacity were calculated.

According to this study, the removal efficiency for Cu (II) was highest when the contact time was 60 minutes. Highest removal of Cu (II) was observed when

the mass of adsorbent was 0.4 g per 25.00 mL of 1000 ppm Cu (II) solution, and cinnamon sawdust of particle size 0.6 mm. In optimum conditions, removal of Cu (II) was 16.4 mg/g of cinnamon sawdust (69.4%). The results obtained demonstrates the potential use of cinnamon wood as a low cost adsorbent of Cu(II) which can be used for treatment of industrial wastewater.