Biosorption of chromium in aqueous solutions using Bivalve Mollusk Shells through central composite design (CCD) model

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ABSTRACT

Pollution of water resources caused by heavy metals has been among the greatest concerns of environmentalists in recent years. Industrial wastewater contains chromium. Therefore, removing or reducing chromium from the industrial wastewater seems to be essential. In the present research, bivalve mollusk shells acted as the adsorbent. The statistical model in this research was central composite design, which analyzed the experiments. The optimal pH range for an adsorbent was about 3–5. An increase in the adsorbent dosage led to an increased efficiency. The optimal exposure time for the ion absorption mechanism of the solution was about 35 min. The absorption mechanism followed the Freundlich adsorption isotherm model. The most significant factor was found to be the independent effect of chromium initial concentration ($p = 0.0007$). Compared with other adsorbents such as fruit peels and the like whose availability depends on their consumption, the use of this adsorbent was economically beneficial due to its low cost and high availability.

Keywords: Adsorption; Heavy metals; Isotherm; Langmuir; Freundlich

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