

## Removal of Hg(II) ions with CD/DVD waste-derived aminated polycarbonate: adsorption and optimization studies

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### ABSTRACT

A massive quantity of plastic waste is generated daily, leading to serious environmental issues. As one of the plastic wastes, the waste optical discs contain polycarbonates that can be recovered and utilized as value-added materials. In this work, polycarbonate was recovered from waste discs and aminated. The adsorption of aqueous Hg(II) ions onto the aminated PC was investigated, where the experimental variables were evaluated with a Box–Behnken design. The response surface model revealed that 1 mg L<sup>-1</sup> of initial Hg(II) ions concentration, pH 7, and 10 min contact time as the optimal settings for mercury removal. According to the validation study on spiked samples, the mercury removal efficiency was ranged from 97% to 99%, which is consistent with the model prediction and considerably independent from the effect of sample matrices under the experimental conditions of this work. Regarding the best fitting among the investigated adsorption models, the adsorption process is well-described by the Freundlich isotherm, which indicated monolayer adsorption. The adsorption process was also found to follow the pseudo-second-order kinetic model that described the chemisorption. The result of this study suggested that the waste-derived aminated polycarbonate could be a potential adsorbent for the treatment of mercury in contaminated water.

*Keywords:* E-waste; Experimental design; Mercury; Plastic; Water treatment

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