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ABSTRACTS**

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Removal of Cd²⁺ ions from aqueous solutions by gamma irradiation activated biochar of plum pomace

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The use of waste biomass for the production of fuels, sorbent of different pollutants or natural fillers has significant economic and environmental benefits.

Plum (*Prunus domestica*) is a lush fruit consisting of bones, flesh and skin. It can be consumed fresh, dried or used to make juices, jams and brandies known as plum brandy. Plum is also known as a laxative. During processing, plum pomace is formed as a by-product of plum brandy production. Plum pomace contains a large proportion of polyphenols, so it can be used to produce dietary supplements.

Therefore, in this study, the gamma irradiation activated biochar of plum pomace was examined as a low-cost biosorbent of Cd²⁺ ions from aqueous solution. It was prepared using pyrolysis process at 500 °C for a reaction time of 1 h, then was activated by gamma irradiation. The characterization of plum pomace before and after pyrolysis was done by Fourier transform infrared spectroscopy (FTIR), scanning electron microscopy (SEM), thermogravimetric analysis (TGA) and differential thermal analysis (DTA).

Analysis of morphology and functional groups presented the formation of cracks on the biochar surface, which are mainly dominated by oxygen-rich functional groups. The adsorption capacity of activated biochar was higher than inactivated biochar because its improved surface functional properties after gamma activation.

The Cd²⁺ ions contents in aqueous solution were analyzed using ICP-OES. The adsorption capacity was estimated using the Langmuir and Freundlich model. The findings of this study confirm that pyrolysis is a promising way to produce efficient environmentally friendly sorbents for wastewater treatment.

Keywords: Plum pomace, biochar, Cd²⁺ ions adsorption, gamma irradiation

