

Advancements in the remediation of Cadmium contaminated water by Biochar [†]

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Abstract: Heavy metal toxicity in water is of major concern throughout the world as it has severe adverse effects on soil, plants and even human beings. Toxicity of heavy metals unlike the organic materials is non biodegradable in nature and does gets transferred to the food chain via bioaccumulation. A number of techniques have been adapted for removal of heavy metal from water but amongst all the technologies Biochar is preferred the most due to its low cost, high efficiency and environment friendly approach. It has a great sorption potential for cadmium separation from water. Biochar has a very significant effect on remediation of heavy metal in wastewater. Biochar is a carbonaceous, porous and finely ground product obtained from pyrolysis of biomass under oxygen deficient condition. This review compares Cadmium (Cd) sorption by biochar produced by a variety of biomasses and each prepared at different pyrolysis temperatures and also it's quantitative contribution. Various mechanisms of biochar have proven to be effective in removing Cadmium from water like ion exchange, precipitation, electrostatic interaction, membrane filtration, complexation and physical sorption. The adsorption potential of unmodified biochar is limited. Biochar is porous and hence its sorption property is strongly affected by its surface area. Therefore, increasing the surface area of biochar by adding nanoparticles helps in increasing its metal sorption property. Slow pyrolysis synthesis of biochar, nanoscale modification and regeneration has been found highly effective. The modification of biochar is correlated with the mechanism being adapted. Finally future research needs and its directions are proposed at the end.

Keywords: Biochar; Cadmium; Toxicity, Heavy Metals; Water.

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Conflicts of Interest

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