2024-03-29

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Springer Nature

https://doi.org/10.1007/978-3-031-53688-5_11

Adsorptive Removal of Heavy Metals from Wastewater Using Low-Cost Adsorbents Derived from Agro-based Materials.

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Abstract

Recently, anthropogenic activities have evolved into sources of pollution, particularly when it comes to the discharge of harmful heavy metals into the natural environment. As a result, the concentration of diverse heavy metal ions in surface and ground waters significantly increases, compromising aquatic life. Given that toxic heavy metals have undesirable consequences on the health of all living things, their presence in the aquatic environment is a major worry. However, the drawbacks of conventional wastewater treatment technologies, such as their high consumption of energy, production of hazardous secondary sludge, and high operating costs, made them uneconomical and non-sustainable for developing nations. This book chapter presents and discusses the most recent developments and advances in the adsorptive removal of various heavy metals from aquatic systems through the application of low-cost adsorbents derived from agricultural waste materials. The influence of independent adsorption parameters as well as the mechanism of heavy metals removal from aqueous media have been explained using adsorption isotherm and kinetic models. This book chapter has demonstrated that the adsorptive removal of heavy metals using low-cost adsorbents derived from agricultural waste materials has several advantages. Almost all the studies on the adsorptive decontamination of various heavy metals from aqueous solutions revealed that adsorbents synthesized from agro-based materials are promising, eco-friendly, and cost-effective. However, several gaps exist, which need to be addressed to increase the application of the adsorption technology in treating industrial wastewater at a large scale. Hence, at the end of this book chapter, some future perspectives providing knowledge gaps that require consideration and further research have been enumerated.

Keywords

Heavy Metal, Wastewater, Adsorbents Derived and Adsorptive Removal