

Review

Oil palm biomass-based activated carbons for the removal of cadmium—a review

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Abstract: Serious water pollution due to climate change as the consequences of non-ecological wastewater treatment and unsustainable agricultural activities had emerged water scarcity problem. The utilization of oil palm biomass into cadmium adsorbent could play a role in killing two birds with one stone, which is to solve the oil palm biomass disposal issue and cadmium pollution issue. The adsorbent modifications discussed in this review focused on furnace heating and microwave heating as well as the combined methods with chemical activating agents. Among the modification methods, the output of chemical activation followed by microwave-induced irradiation of palm kernel shells (PKS) produced activated carbon with high specific surface area (854.42 m²/g) and high adsorption capacity, q_{\max} (227.27 mg/g). This review is to provide a comprehensive understanding of cadmium adsorption mechanisms and up-to-date progress of modification technologies for different types of oil palm biomass.

Keywords: adsorption; activated carbon; oil palm biomass; cadmium

1. Introduction

Water quality worldwide is degrading gradually due to industrial wastewater and unsustainable agricultural activities which affected around one-tenth of all river stretches in Latin America, Africa, and Asia with severe and moderate salinity pollution (fertilizer runoffs, stormwater runoffs, and urban wastewater discharge). As in a report published by The United Nations Educational, Scientific and Cultural Organization (UNESCO) in 2020 entitled “Water and climate change”, the quality of freshwater system is one of the consequences of climate change and this problem can be solved using