Comparison on physical, chemical, and adsorption properties of activated carbon derived from different solid wastes

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**ABSTRACT**

Four activated carbons (ACs) were prepared from four different solid wastes (SWs), including *Enteromorpha prolifera*, Kraft lignin, hair, and petroleum coke, using KOH as the activating agent. The fabricated ACs were characterized by N$_2$ adsorption, scanning electron microscopy, transmission electron microscopy, X-ray diffraction, Fourier transformed infrared and X-ray photoelectron spectroscopy to compare their pore structures and surface chemical properties of the ACs. It was found that ACs produced from *E. prolifera* and Kraft lignin were rich in mesopores, whereas petroleum coke and hair were inclined to produce ACs with more micropores. Meanwhile, ACs derived from *E. prolifera* possessed the largest surface area of 3,471 m$^2$ g$^{-1}$ and pore volume of 2.681 cm$^3$ g$^{-1}$. In addition, ACs prepared from various SWs displayed different chemical nature. Adsorption behavior of hexavalent chromium on the four fabricated ACs was studied as well, and the adsorption data were all well fitted by Freundlich equation, indicating the similar multilayer adsorption behavior of hexavalent chromium on the heterogeneous surface of the ACs.

**Keywords:** Solid waste; Activated carbon; Physicochemical properties; Adsorption; Hexavalent chromium

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