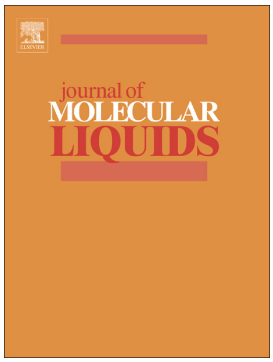

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Scalable Preparation of Hierarchical Porous Carbon from Lignin for Highly Efficient Adsorptive Removal of Sulfamethazine Antibiotic

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Abstract

In order to efficiently remove sulfamethazine (SMZ) antibiotic from wastewater, in this work, we first described a facile and scalable synthesis of hierarchical porous carbon using industrial by-product sodium lignosulfonate (SLS) as raw source and potassium hydroxide as inorganic template and chemical activator, by a self-templating and *in-situ* activation method. The Lignin-derived hierarchical porous carbon obtained at an optimal mass ratio of SLS and alkali of 1:3 (LHPC-3) exhibited a largest specific surface area of 2235 $m^2 g^{-1}$ and pore volume of 1.512 $cm^3 g^{-1}$. LHPC-3 possessed a very high saturated monolayer adsorption capacity of 854.7 mg g^{-1} at 288 K. The pseudo-second-order rate model described the adsorption kinetics data. It was found that this carbon could be also effective in the high salt environment. Physical adsorption played in an important role in the process of capture SMZ molecules from water. This hierarchical porous carbon had good stability and regeneration property, providing the possibility for the practice application. We gave a novel, simple and effective technique to obtain high-performance hierarchical porous carbon for various use, especially for wastewater treatment.

Keywords: Sulfamethazine; Industrial lignin; Alkali self-template and activation; Hierarchical porous carbon; Adsorption

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