Effective adsorptive removal of atrazine herbicide in river waters by a novel hydrochar derived from *Prunus serrulata* bark

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Abstract

In this work, a novel and effective hydrochar was prepared by hydrothermal treatment of Prunus serrulata bark to remove the pesticide atrazine in river waters. The hydrothermal treatment has generated hydrochar with a rough surface and small cavities, favoring the atrazine adsorption. The adsorption equilibrium time was not influenced by different atrazine concentrations used, being reached after 240 min. The Elovich adsorption kinetic model presented the best adjustment to the kinetic data. The Langmuir model presented the greatest compliance to the isotherm data and indicated a higher affinity between atrazine and hydrochar, reaching a maximum adsorption capacity of 63.35 mg g^{-1}. Thermodynamic parameters showed that the adsorption process was highly spontaneous, endothermic, and favorable, with a predominance of physical attraction forces. In treating three real river samples containing atrazine, the adsorbent showed high removal efficiency, being above 70 %. The hydrochar from Prunus serrulata bark waste proved highly viable to remove atrazine from river waters due to its high efficiency and low precursor material cost.

K**eywords**

Adsorption; Atrazine; Hydrochar; Prunus serrulata; River water