Effective removal of non-steroidal anti-inflammatory drug from wastewater by adsorption process using acid-treated *Fagopyrum esculentum* husk

Dison S. P. Franco, Jordana Georgin, Matias Schadeck Netto, Edson L. Foletto, Daniel Allasia, Marcos L. S. Oliveira, Diana Pinto & Guilherme L. Dotto

Abstract

In this work, buckwheat husks (*Fagopyrum esculentum*) were modified by acid treatment and posteriorly employed to remove the ketoprofen in batch adsorption. The characterization results indicated that a more irregular surface with new empty spaces was generated after acid treatment. The adsorptive process was favored at acidic pH = 3. The dosage of 0.85 g L^{-1} was fixed for the kinetic and isothermal tests, obtaining good removal and capacity indications. The kinetic studies were better represented by pseudo-second-order, obtaining an experimental capacity of 74.3 mg g^{-1} for 200 mg L^{-1} of ketoprofen. An increase in temperature negatively affected the adsorption isotherm curves, resulting in a maximum capacity of 194.1 mg g^{-1}. Thermodynamic results confirmed the exothermic nature of the process with physical forces acting. The adsorbent presented high efficiency in treating a synthetic effluent containing different drugs and salts, 71.2%. Therefore, adsorbent development from buckwheat husks treated with a strong acid is an excellent alternative, given the good removal results and the low cost for its preparation.

Keywords

Fagopyrum esculentum, Buckwheat, Husk, Ketoprofen, Drug, Adsorption