

# Composite carbon materials from winery composted waste for the treatment of effluents contaminated with ketoprofen and 2-nitrophenol

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## Abstract

The present work consisted of preparing and characterizing composite carbon materials (WRCC) from raw winery residues (WR) activated with zinc chloride to produce a carbon adsorbent. The WRCC was used for the adsorption of emerging contaminants in aqueous media. The WRCC presented a morphology with favorable characteristics for the adsorption process, giving an abundant porous structure with pores of different sizes. The results show the WRCC's effectiveness, presenting surface area values ( $227 \text{ m}^2 \text{ g}^{-1}$ ) and total pore volume ( $0.175 \text{ cm}^3 \text{ g}^{-1}$ ). The general order kinetic model predicted the experimental curves sufficiently. The Sips model better described the two adsorbates' equilibrium data, with maximum adsorption capacities of  $376.0$  and  $119.6 \text{ mg g}^{-1}$  for 2-nitrophenol and ketoprofen, respectively. The WRCC carbon material was also highly efficient, with maximum removal of  $81.4\%$  and  $94\%$  in  $1000 \text{ mg L}^{-1}$  of the compounds 2-nitrophenol and ketoprofen. Finally, the prepared material has essential characteristics that make it an efficient adsorbent in treating effluents with emerging contaminants.

## Keywords

Adsorption, Emerging contaminants, 2-nitrophenol, Ketoprofen, Composite carbon

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