

ACTIVATED CARBON FIBERS FROM A NATURAL SOURCE AND THEIR USE FOR THE COMPETITIVE ADSORPTION OF PHARMACEUTICALS

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Pharmaceutically active compounds are emerging contaminants that represent a real risk to the environment, as well as a potential risk to human health. Sulfamethoxazole and metronidazole are among the most prescribed antibiotics and are frequently detected in surface water ecosystems since its natural biodegradation is very slow. Unfortunately, traces of these drugs reach the watercourses due to the ineffectiveness of the effluent treatments. Therefore it is imperative to find new technologies that allow the removal of these contaminants before they reach the watercourses. In this context, the use of activated carbon fibers (ACFs) obtained from agroindustrial residues is an interesting approach as it involves a dual environmental impact towards a circular economy via recycling of residues for obtaining a high added value product with applications in water treatment.

Taking this into account, the objective of this work is to study of the performance of ACFs obtained from sheep wool residues in the competitive adsorption of sulfamethoxazole (SMZ) and metronidazole (MNZ) from aqueous solution. The ACFs were synthesized by stabilization under air atmosphere, followed by carbonization under nitrogen atmosphere and activation with CO₂. The obtained ACFs presented a tubular shape and specific areas of ca. 945 m²g⁻¹. The adsorption studies of the pharmaceuticals were carried out at 22 °C, both in single component solutions and mixtures of varied concentrations (SMZ:MNZ ratios of 1:1, 2:1 and 1:2) to assess the competitive adsorption. The adsorption capacity of each pollutant decreased in the presence of a second micropollutant, being the effect more pronounced for MNZ.