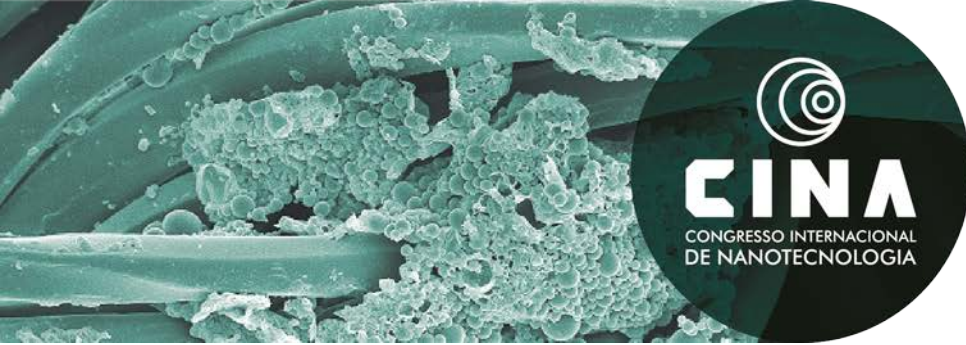


MAGNETIC NICKEL FERRITE NANOPARTICLES FOR REMOVAL OF NIMESULIDA FROM AQUEOUS SOLUTIONS

Vinícius de Ávila Severo¹
Marcel Finger¹
Luis Otávio de Sousa Bulhões¹

Pharmaceutically active compounds (PACs), an important type of environmental contamination, have attracted many researchers to the study of their removal from aqueous solutions. Adsorption technology is a fast, efficient, and economical physicochemical method that is extensively used in wastewater treatment. Activated carbon and other carbon-based materials have been widely used as highly effective adsorbents for contaminant removal from aqueous solution. This selection as first choice materials as adsorbent are due to their large specific surface area, high porosity, and high reaction activity. However, one problem that needs to be resolved with carbon materials for environmental remediation is the difficulties in collecting those nanosized materials from treated aqueous solution. Magnetically recyclable materials, such as NiFe_2O_4 ferrite are developed in recent years and can be very useful to facilitate the effective separation and recovery in a liquid-phase reaction by a magnet, which is an attractive alternative to filtration or centrifugation processes. In addition, the composite containing active carbon and NiFe_2O_4 exhibit a cooperative or synergetic effect between the adsorption in carbon and the photocatalysis due to the ferrite. In this work, synthesized nickel ferrite nanoparticles decorating the active carbon surface is proposed for removal of nimesulida in aqueous solution using adsorption and photocatalysis. NiFe_2O_4 / active carbon hybrid was prepared via a hydrothermal method. In detail, 1 mmol of $\text{Ni}(\text{NO}_3)_2 \cdot 6\text{H}_2\text{O}$ and 2 mmol of $\text{Fe}(\text{NO}_3)_3 \cdot 9\text{H}_2\text{O}$ were dissolved in 25 mL of deionized water. Meanwhile 0,4 g of active carbon was dispersed in 30 mL of deionized water by sonication for 30 min to get a homogeneous suspension of active carbon. Then the active carbon suspension was mixed with the Ni-Fe solution and the system pH was adjusted to 13 by adding 6 M NaOH solution. After a vigorous magnetic stirring for 20 min at room temperature the mixture was transferred to a 150 mL a Teflon reactor and maintained at 200 °C for 10 h and then

¹ Centro Universitário Franciscano, Santa Maria- RS.



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cooled to room temperature naturally. The resulting precipitate was filtrated, washed thoroughly with deionized water, and dried at 100 °C during 2 h. The powder phases were characterized using X-ray diffraction, the morphology by electron scanning microscopy and the magnetic properties were measured on a vibrating sample magnetometer. Nimesulide contains a sulfonic group in the molecule and their maximum solubility in aqueous solution occurs at pH above 8, thus the adsorption and photocatalysis experiments were performed at pH 10. The maximum adsorption capacities at 25°C were 159.2 mg g⁻¹. The adsorption follows a pseudo second order kinetics and after 60 min of dark adsorption the photocatalysis during 60 min reduces the nimesulida content by 90%.

Keywords: Nickel ferrite. Nanoparticles. Nimesulida. Environmental contamination.