

QbD Approach by Computer Aided Design and Response Surface Methodology for Molecularly Imprinted Polymer Based on Magnetic Halloysite Nanotubes for Extraction of Norfloxacin from Real Samples

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Abstract

This study describes the development, optimization, and evaluation of a novel composite imprinted polymer, on the basis of magnetic halloysite nanotubes (MHNTs-MIPs) using “Quality by Design (QbD)” approach combining computer simulation and response surface methodology. Norfloxacin, methacrylic acid, and ethylene glycol dimethacrylate were used as template, functional monomer and cross-linker, respectively. As a comparison, two MHNTs-MIPs have been prepared with the most suitable functional monomer methacrylic acid (MAA) along with acrylamide (AM). To explain the adsorption behavior, adsorption kinetics and isotherms were studied. Magnetic halloysite nanotubes molecularly imprinted polymers prepared from MAA (MHNTs-MIP1) displayed a high adsorption capacity ($349 \mu\text{g mg}^{-1}$) toward NOR. A magnetic imprinting solid phase extraction method coupled with high performance liquid chromatography (MHNTs-MISPE-HPLC-UV) was developed for the determination of NOR in serum and water samples, by applying MHNTs-MIP as a sorbent. The recoveries from 83.76% to 103.30% in water and from 90.46% to 99.78% in serum were obtained. Besides remarkable mechanical properties and specific recognition of MHNTs-MIP toward template molecule. It could be also collected and separated fastly by external magnetic field. Moreover, MHNTs-MIPs could be reused for several cycles with the recovery range from 83.25% to 100.96% for water sample and from 85.65% to 100.33% for serum sample. These analytical results of serum and water samples showed that the proposed method based on MHNTs-MIPs is applicable for fast and selective extraction of therapeutic agents from biological fluids and environmental water.

Biography:

I am an engaged, talented PhD who has done her PhD at China Pharmaceutical University, Nanjing, Jiangsu, 210000, China. I have accomplished my degree at the age of 27 years old in June 2018. In the past four years and have actively worked to build a good experience in the area of drug delivery system and multifunctional hybrid materials and their application in pharmaceutical analysis. In addition, I am working now in the University of Khemis Miliana (Algeria) as Assistant professor in the department of material science from November 2018.

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