

Molecularly imprinted polymer for the removal of diclofenac from water: Synthesis and characterization

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ABSTRACT

Contaminants of Emerging Concerns (CECs) have been introduced as one type of recalcitrant pollutant sources in water. In this study, the non-steroidal anti-inflammatory drug diclofenac (DCF) has been removed from water solutions using Molecularly Imprinted Polymer (MIP), synthesized via bulk polymerization with allylthiourea (AT) as the functional monomer and using DCF as template (MIP-DCF). DCF detection has been performed by UV spectrophotometer. From the kinetic study in batch mode, approximately 100% of removal is observed by using 10 mg of MIP-DCF, with an initial concentration of 5 mg/L of DCF at pH 7, within 3 min and agitated at 25 °C. In continuous flow mode study, using a cartridge pre-packed with 10 mg of MIP-DCF, a high adsorption capacity of 160 mg DCF/g MIP was obtained. To study the porosity of MIPs, scanning electron microscopy (SEM) has been used. In order to characterize the chemical interaction between monomer and template, the pre-polymerization mixture for MIP and DCF has also been studied by ¹H NMR. One of the chemical shift observed has been related to the formation of a complex between amineprotons of thiourea group of AT with carboxylic acid on DCF. In conclusion, the developed MIP works as a good adsorbent for DCF removal, and is selective to DCF in the presence of indomethacin and ibuprofen.

KEYWORDS:

Molecularly imprinted polymer; Diclofenac; Contaminant of emerging concerns