Dispersive liquid-liquid microextraction assisted by modified Vanadium(II) nanoparticles for quantitative analysis of ofloxacin

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Abstract

A practical and simple modified Vanadium(II) nanoparticle-disepersive liquid-liquid microextraction (MVNps-DLLME) has been successfully applied as electrostatic affinity probes to the microextraction and preconcentration of ofloxacin prior to spectrofluorimetry analysis. This technique is based on a ternary system of solvents, where appropriate amount of microextraction containing tetraalkylammonium bromide coated Vanadium(II) nanoparticles (VNps), and disperser solvents are directly injected into an aqueous solution containing ofloxacin. A cloudy mixture is formed, and ofloxacin in the aqueous matrix is extracted into the fine droplets of microextraction solvent containing VNps. The settled phase is collected and transferred into a micro-cell of fluorimeter for the determination of ofloxacin at excitation/emission wavelengths of 335/375 nm. The obtained results demonstrated that electrostatic attraction forces caused by VNps were much stronger than the hydrophobic attraction forces. Various factors influencing microextraction efficiency were studied and optimized. Under the optimum conditions, the method provided a relatively broad linear dynamic range of 0.1 to 150 ng mL^{-1}, a detection limit of 0.02 ng mL^{-1} and a relative standard deviation of 2.1%. Finally, the method was successfully applied to ofloxacin determination in actual pharmaceutical formulations and human urine sample.

Keywords: Vanadium(II) nanoparticles, Ofloxacin, Spectrofluorimetry, Dispersive liquid-liquid microextraction