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Hydrophilic-Lipophilic Balanced magnetic nanoparticles: preparation and application in magnetic solid-phase extraction of organochlorine pesticides and triazine herbicides in environmental water samples

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Abstract

In this study, a novel hydrophilic-lipophilic balanced magnetic nanoparticle, magnetic poly(divinylbenzene-co-N-vinylpyrrolidone)(HLB-MPNPs) was successfully synthesized and applied for the extraction and determination of triazine and organochlorine pesticides in environmental water samples. The specific ratio of two monomers, hydrophilic N-vinylpyrrolidone and lipophilic divinylbenzene endowed the magnetic nanoparticles with hydrophilic-lipophilic balanced character, which made it capable of extracting both polar and nonpolar analytes. The experimental parameters affecting extraction efficiency, including desorption conditions, sample pH, sample volume and extraction time were investigated and optimized. Under the optimum conditions, good linearity was obtained in the range of 0.20-10 $\mu\text{g L}^{-1}$ for triazine herbicides and 5.0-100 ng L^{-1} for organochlorine pesticides, with correlation coefficients ranging from 0.994 to 0.999. The limits of determination were between 0.048 - 0.081 $\mu\text{g L}^{-1}$ for triazine herbicides and 0.39-3.26 ng L^{-1} for organochlorine pesticides. The

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