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LYSINE-MODIFIED Fe_3O_4/CARBON DOTS NANOCOMPOSITE AS AN EFFICIENT ADSORBENT IN MAGNETIC SOLID PHASE EXTRACTION AND ITS APPLICATION TO DETERMINE CODEINE IN REAL SAMPLES

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Codeine, (3-methyl morphine) is one of the most important constituents of opium and can be created by morphine using methylation. Its phosphate form (COP) is usually applied to treat mild and moderate degrees of pain. Recently, impressive numbers of studies have concentrated on adsorption and separation using magnetic materials, which is called magnetic solid-phase extraction (MSPE). This technique is based on the combination of a non-magnetic adsorbent material and a magnetic inorganic material. Taking into account the advantages of both the materials, the MSPE technology exhibits excellent adsorption efficiency and rapid separation from the matrix by an external magnetic field. Moreover, the large contact area between the sorbent and analyte can lead to rapid mass transfer, which is beneficial for rapid equilibrium. The adsorbent material is considered as the important component of MSPE that determines the sensitivity and selectivity of the method. This study presents the synthesis, characterization and application of Lysine-modified Fe_3O_4/Carbon Dots (Fe_3O_4/CDs/Lys) nanocomposite as a novel adsorbent in magnetic solid phase extraction (MSPE). To synthesis Fe_3O_4/CDs/Lys nanocomposite, firstly, Fe_3O_4/CDs nanocomposite was created by an easy hydrothermal method and then conjugation of 3-aminopropyltriethoxysilan (APTES) was performed for adding NH_2 terminal in order to Lys coating. The Fe_3O_4/CDs/Lys nanocomposite was characterized by X-ray diffraction (XRD), vibrating sample magnetometer (VSM), transmission electron microscopy (TEM) and Fourier-transform infrared spectroscopy (FT-IR). The prepared nanocomposite was used in pre-concentrating and determining codeine phosphate (COP) in blood serum and pharmaceutical samples using spectrofluorometric method. Effective factors on the efficiency of COP extraction have been optimized. The results indicated that using the proposed method, the COP can be determined spectrofluorometrically in the linear concentration range of 2.0-120.0 ng mL^{-1} with a detection limit of 1.3 ng mL^{-1}. The real sample analysis results showed that the method is a powerful tool for the COP determination.

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