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An optical sensor with specific binding sites for the detection of thioridazine hydrochloride based on ZnO-QDs coated with molecularly imprinted polymer

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Abstract

Here, an optical sensor with specific binding sites for sensitive and selective detection of thioridazine hydrochloride (THZ) was prepared. The optosensor was developed based on ZnO quantum dots (QDs) coated with molecularly imprinted polymers (MIPs). Initially, ZnO quantum dots (QDs) were synthesized by precipitation from $Zn(CH_3COO)_2$ and NaOH then, reverse microemulsion method was applied for fixing the MIPs layer on the surface of QDs. It was perceived that the fluorescence intensity of the QDs-MIPs quenched with increasing THZ concentration. Several parameters affect the optical sensor response were studied and optimized. Under the optimal conditions, THZ could be determined with a linear dynamic range of 4-120 nmol L^{-1} and with a low detection limit of 0.43 nmol L^{-1}. The relative standard deviations for 25 and 60 nmol L^{-1} of THZ were obtained as 4.9% and 3.1%, respectively (three times measurement). High selectivity, simplicity, and cost-efficient for THZ measurement are the most important advantages of the fluorimetric sensor.

Keywords: Thioridazine hydrochloride; Molecularly imprinted polymers; ZnO quantum dots; Fluorimetric sensor.

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