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Dispersive nano solid material-ultrasound assisted microextraction as a novel method for extraction and determination of bendiocarb and promecarb: Response surface methodology

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Abstract

A new extraction method, based on dispersive nano solid material-ultrasound assisted micro-extraction (DNSUAME), was used for the preconcentration of the bendiocarb and promecarb pesticides in the water samples prior to high performance liquid chromatography (HPLC). The properties of NiZnS nanomaterial loaded on activated carbon (NiZnS-AC) are characterized by FT-IR, TEM, and BET. This novel nanomaterial showed great adsorptive ability towards the bendiocarb and promecarb pesticides. The effective variables such as the amount of adsorbent (mg: NiZnS-AC), the pH and ionic strength of sample solution, the vortex and ultrasonic time (min), the ultrasonic temperature (°C), and desorption volume (mL) are investigated by screening 2^{7-4} experiments of Plackett–Burman (PB) design. The important variables optimized by using a central composite design (CCD) were combined by a desirability function (DF). At optimum conditions, the method has linear response over $0.0033\text{-}10\ \mu\text{g mL}^{-1}$ with detection limit between 0.0010 and $0.0015\ \mu\text{g mL}^{-1}$ with relative standard deviations (RSDs) less than 5.5% ($n = 3$). The method has been successfully applied for the determination of the bendiocarb and promecarb pesticides in the water samples.

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