Preparation of silica nanoparticles/polydimethylsiloxane 96-thin film solid-phase microextraction for extraction of herbicides

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Abstract: Solid phase microextraction (SPME) is a simple and equilibrium-based sample preparation method which integrates sampling and sample preparation in a single step. The amount of analyte extracted by SPME is proportional to the volume of the extraction phase and utilization of thin-film geometry provides a larger volume of the extraction phase and leads to improvements in the analytical sensitivity. In this work, the silica nanoparticles/polydimethylsiloxane (PDMS) composite was used as SPME coating. A stainless steel blade was coated with the mixture of silica nanoparticles and PDMS. The coated blade was cured immediately in an oven at 180 °C for two minutes. The coating step was repeated for five times. The extraction efficiency of the silica nanoparticles/PDMS 96-blade SPME was evaluated with ametryn and prometryn herbicides in aqueous samples and analysis by high performance liquid chromatography with diode array detection. The absolute recoveries of ametryn and prometryn were 63 and 67% with relative standard deviation (RSD) ranging from 1 and 3%, respectively.

Keywords: Solid-phase microextraction; Silica nanoparticles; Polydimethylsiloxane; Herbicide