



A magnetic adsorbent of octadecyl/silica/magnetite nanoparticles for the extraction of tetracyclines from water samples

Watchara Kaewsuwan^{1,2}, Proespichaya Kanatharana^{1,2}, Opas Bunkoed^{1,2*}

¹*Trace Analysis and Biosensor Research Center, Faculty of Science, Prince of Songkla University, Hat Yai, Songkhla 90112, Thailand*

²*Center of Excellence for Innovation in Chemistry, Department of Chemistry, Faculty of Science, Prince of Songkla University, Hat Yai, Songkhla 90112, Thailand*

*e-mail: opas.b@psu.ac.th

A magnetic solid phase extraction sorbent of octadecyl/silica coated on magnetite nanoparticles (C₁₈/SiO₂/Fe₃O₄ NPs) was successfully synthesized and applied for the extraction and preconcentration of tetracyclines from water samples. The magnetite nanoparticles facilitated a simple and fast separation of the adsorbent from water sample using an external magnet, the silica layer increased the surface area that helped to increase the octadecyl and the octadecyl helped to improve the extraction efficiency due to hydrophobic interaction between octadecyl and tetracyclines. The properties of C₁₈/SiO₂/Fe₃O₄ NPs were characterized by FT-IR, SEM and VSM techniques. Various experimental parameters that affecting the extraction efficiencies, i.e., amount of adsorbent, sample pH, extraction and desorption conditions were investigated. Under the optimum conditions, the recoveries were obtained in the range of 82.2 to 87.7% with the RSDs less than 6%. The method was linear over the range of 0.002 to 1.0 µg mL⁻¹ for oxytetracycline and 0.01 to 1.0 µg mL⁻¹ for tetracycline and chlortetracycline. The limit of detection was 0.002 µg mL⁻¹ for oxytetracycline and 0.010 µg mL⁻¹ for tetracycline and chlortetracycline. This simple, rapid and cost-effective method was successfully applied for the extraction of tetracyclines from water samples.

Keywords silica, octadecyl; magnetic solid phase extraction; tetracyclines