World Academy of Science, Engineering and Technology
International Journal of Chemical and Materials Engineering
Vol:11, No:08, 2017

Green Synthesis of Magnetic, Silica Nanocomposite and Its Adsorptive Performance against Organochlorine Pesticides

Authors : Waleed A. El-Said, Dina M. Fouad, Mohamed H. Aly, Mohamed A. El-Gahami

Abstract : Green synthesis of nanomaterials has received increasing attention as an eco-friendly technology in materials science. Here, we have used two types of extractions from green tea leaf (i.e. total extraction and tannin extraction) as reducing agents for a rapid, simple and one step synthesis method of mesoporous silica nanoparticles (MSNPs)/iron oxide (Fe3O4) nanocomposite based on deposition of Fe3O4 onto MSNPs. MSNPs/Fe3O4 nanocomposite were characterized by X-ray diffraction, Fourier transform infrared spectroscopy, scanning electron microscopy, energy dispersive X-ray, vibrating sample magnetometer, N2 adsorption, and high-resolution transmission electron microscopy. The average mesoporous silica particle diameter was found to be around 30 nm with high surface area (818 m2/gm). MSNPs/Fe3O4 nanocomposite was used for removing lindane pesticide (an environmental hazard material) from aqueous solutions. Fourier transform infrared, UV-vis, High-performance liquid chromatography and gas chromatography techniques were used to confirm the high ability of MSNPs/Fe3O4 nanocomposite for sensing and capture of lindane molecules with high sorption capacity (more than 89%) that could develop a new eco-friendly strategy for detection and removing of pesticide and as a promising material for water treatment application.

Keywords : green synthesis, mesoporous silica, magnetic iron oxide NPs, adsorption Lindane
Conference Title : ICCS 2017 : International Conference on Chemical Sensors
Conference Location : Barcelona, Spain
Conference Dates : August 17-18, 2017