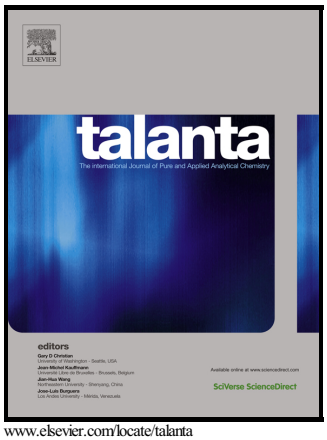
Magnetic graphene solid-phase extraction for the determination of carbamate pesticides in tomatoes coupled with High performance liquid chromatography

Na Li, Juan Chen, Yan-Ping Shi



www.elsevier.com/locate/talanta

PII: S0039-9140(15)00256-8
DOI: http://dx.doi.org/10.1016/j.talanta.2015.04.018
Reference: TAL15518

To appear in: *Talanta*

Received date: 16 January 2015
Revised date: 27 March 2015
Accepted date: 5 April 2015

Cite this article as: Na Li, Juan Chen and Yan-Ping Shi, Magnetic graphene solid-phase extraction for the determination of carbamate pesticides in tomatoes coupled with High performance liquid chromatography, *Talanta,* http://dx.doi.org/10.1016/j.talanta.2015.04.018

Magnetic graphene solid-phase extraction for the determination of carbamate pesticides in tomatoes coupled with high performance liquid chromatography

Na Li[1, 2], Juan Chen[1*], Yan-Ping Shi[1*]

[1] Key Laboratory of Chemistry of Northwestern Plant Resources of the CAS and Key Laboratory for Natural Medicine of Gansu Province, Lanzhou Institute of Chemical Physics, Chinese Academy of Sciences, Lanzhou 730000, People's Republic of China

[2] University of Chinese Academy of Sciences, Beijing 100039, P. R. China

Abstract

Graphene-based magnetic nanoparticles, comprising zero-valent iron, iron oxide-oxyhydroxide and graphene, were prepared through a simple one-step synthesis method, and subsequently applied to magnetic solid-phase extraction for the determination of trace carbamate pesticides in tomatoes coupled with high performance liquid chromatography. The properties of the nanocomposites were confirmed by using Fourier transform infrared spectroscopy, X-ray photoelectron spectroscopy, and vibrating sample magnetometer. The components within the nanocomposites endowed the material with high extraction performance and manipulative convenience. Compared with reduced graphene oxide, the as-prepared G-MNPs showed the better extraction efficiencies for the carbamate pesticides thanks to the contribution of the iron-containing magnetic nanoparticles to the adsorption capacity of the nanocomposites. Various experimental parameters affecting the extraction efficiency had been investigated in detail. Under the optimal conditions, the method provided high enrichment factors ranging from 364 to 434, good linearities ranging from 5 to 200 ng g^{-1} for metolcarb, baygon and methiocarb and 10 to 200 ng g^{-1} for carbofuran and isoprocarb, low limits of detection ranging from 0.58 to 2.06 ng g^{-1}, and satisfactory spiked recoveries (between 90.34% and 101.98% with the relative standard deviation values from 1.21% to 5.93%). It was confirmed that this novel method was an efficient pretreatment and enrichment procedure and could be successfully applied for extraction and determination of trace carbamate pesticides in

*Correspondence: Juan Chen, and Yan-Ping Shi; Tel.: 86-931-4968208; fax: 86-931-4968094; E-mail: chenjuan@licp.cas.cn (J. Chen), shiyp@licp.cas.cn (Y. -P. Shi).