World Academy of Science, Engineering and Technology
International Journal of Chemical and Materials Engineering
Vol:11, No:03, 2017

A Simple Colorimetric Assay for Paraquat Detection Using Negatively Charged Silver Nanopaticles

Authors : Weena Siangphro, Orawon Chailapakul, Kriangsak Songsrirote

Abstract : A simple, rapid, sensitive, and economical method based on colorimetry for the determination of paraquat, a widely used herbicide, was developed. Citrate-coated silver nanoparticles (AgNPs) were synthesized as colorimetric probe. The mechanism of the assay is related to aggregation of negatively charged AgNPs induced by positively-charged paraquat resulting from coulombic attraction which causes the color change from deep greenish yellow to pale yellow upon the concentrations of paraquat. Silica gel was exploited as paraquat adsorbent for purification and pre-concentration prior to the direct determination with negatively charged AgNPs without elution step required. The validity of the proposed approach was evaluated by spiking standard paraquat in water and plant samples. Recoveries of paraquat in water samples were 93.6-95.4%, while those in plant samples were 86.6-89.5% by using the optimized extraction procedure. The absorbance of AgNPs at 400 nm was linearly related to the concentration of paraquat over the range of 0.05-50 mg/L with detection limits of 0.05 ppm for water samples, and 0.10 ppm for plant samples.

Keywords : colorimetric assay, paraquat, silica gel, silver nanoparticles
Conference Title : ICC 2017 : International Conference on Chemistry
Conference Location : Osaka, Japan
Conference Dates : March 30-31, 2017