



Modified magnetite nanoparticles for selective trace determination of diphenylamine

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Diphenylamine (DPA) is one of the most used pesticides worldwide. It is used as a pre- or postharvest scald inhibitor for some fruits include apples and pears. Its anti-scald activity is the result of its antioxidant properties, which protect the fruit skin from the oxidation products of alpha-farnesene during storage. Therefore, residues of DPA are often found in agricultural crops. However, the presence of pesticide residues in foods can be considered as a hazard to human health [1]. Therefore, qualitative and quantitative determination of DPA in materials is of biological and environmental importance.

In this work, a new preconcentration method has been developed for trace determination of diphenylamine. A N-Lauryl sarcosine sodium salt modified magnetite nanoparticles adsorbent was prepared in-situ as an extractant. Diphenylamine was coupled with 3-methyl-2-benzothiazolinone hydrazone in the presence of Fe(III) as an oxidant. The produced blue derivative of diphenylamine then was extracted by the magnetite based adsorbent, then was eluted by 0.6 mL of ethanol and determined by spectrophotometry. The condition of reaction, extraction and elution were optimized, and the important analytical characteristics were investigated. Beer's law was obeyed in the ranges of 0.2-150.0 ng mL⁻¹ of diphenylamine. The relative standard deviation and recovery as percent for 5.0 ng mL⁻¹ diphenylamine were 3.3 and 98.3, respectively. The limit of detection was 0.02 ng mL⁻¹. The selectivity of the method was evaluated and the method was successfully applied to the determination of diphenylamine in various environmental samples.

[1] A. Farokhchah, N. Alizadeh, LWT - Food Sci. Technol. 54 (2013) 6.