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Microchemical Journal

journal homepage: www.elsevier.com/locate/microc



Experimental and theoretical investigation for the spectrophotometric determination of thiabendazole in fruit samples

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ARTICLE INFO

Keywords:

Zwitterionic deep eutectic solvent
Spectrophotometer
Theoretical investigation
Thiabendazole
Fruit samples

ABSTRACT

A simple, green, and effective vortex-assisted dispersive liquid–liquid microextraction method was developed for separation, preconcentration and spectrophotometric determination of thiabendazole in fruit samples. This method is based on zwitterionic deep eutectic solvent. Four different deep eutectic solvents were prepared by mixing betaine with 2-furoic acid, phenylacetic acid, mandelic acid, and glycolic acid at different molar ratio. Then these solvents were used for the extraction of thiabendazole. The interaction of acid-betaine complexes with TBZ molecule have been supported by theoretical investigation. Various analytical parameters such as pH, type and volume of deep eutectic solvent, dispersing solvent type, vortex time, and sample volume were studied and optimized. Tolerance limits of foreign species were also measured. The presented method provided a good linearity in the range of 0.4–150 $\mu\text{g L}^{-1}$, low limit of detection (0.1 $\mu\text{g L}^{-1}$), high preconcentration factor (150) and low relative standard deviation (below 2.5%). Presented method was successfully applied for extraction and determination of thiabendazole in fruit samples. The accuracy of method was confirmed by comparison with the standard addition method applied to the same fruit samples.