Accepted Manuscript

Analytical Methods

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PII: S0308-8146(13)01093-5
DOI: http://dx.doi.org/10.1016/j.foodchem.2013.08.024
Reference: FOCH 14509

To appear in: *Food Chemistry*

Received Date: 23 November 2012
Revised Date: 2 August 2013
Accepted Date: 6 August 2013

Please cite this article as: Sereshti, H., Heidari, R., Samadi, S., Determination of volatile components of saffron by optimized ultrasound-assisted extraction in tandem with dispersive liquid-liquid microextraction followed by gas chromatography-mass spectrometry, *Food Chemistry* (2013), doi: http://dx.doi.org/10.1016/j.foodchem.2013.08.024

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Determination of volatile components of saffron by optimized ultrasound-assisted extraction in tandem with dispersive liquid-liquid microextraction followed by gas chromatography-mass spectrometry

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Abstract

In the present research, a combined extraction method of ultrasound-assisted extraction (UAE) in conjunction with dispersive liquid-liquid microextraction (DLLME) was applied to isolation and enrichment of saffron volatiles. The extracted components of the saffron were separated and determined by gas chromatography-mass spectrometry (GC-MS) technique. The mixture of methanol/acetonitrile was chosen for the extraction of the compounds and chloroform was used at the preconcentration stage. The important parameters, such as composition of extraction solvent, volume of preconcentration solvent, ultrasonic applying time, and salt concentration were optimized by using a half-fraction factorial central composite design (CCD). Under the optimal conditions, the linear dynamic ranges (LDRs) were 10-10000 mg L^{-1}. The determination coefficients (R^2) were from 0.9990 to 0.9997. The limits of detection (LODs) and limits of quantification (LOQs) for the extracted compounds were 6-123 mg L^{-1} and 20-406 mg L^{-1}, respectively. The relative standard deviations (RSDs) were 2.48 to 9.82% (n=3). The enhancement factors (EFs) were 3.6-41.3.

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