

DEVELOPMENT OF METHOD OF ISOLATION AND DETERMINATION OF  
HYDROXYMETHYLFURFURAL  
AND ITS FURAN DERIVATIVES IN HONEY WITH SPE/LC AND  
QuEChERS/LC

Renata Gadzała-Kopciuch<sup>a,b</sup>, Martyna Pajewska<sup>a,b</sup>, Agata Przeperska<sup>a,b</sup>,  
Magdalena Ligor<sup>b</sup>, Bogusław Buszewski<sup>a,b</sup>

<sup>a</sup> Department of Environmental Chemistry and Bioanalytics, Faculty of Chemistry,  
Nicolaus Copernicus University in Toruń, 7 Gagarin St., 87-100 Toruń, Poland

<sup>b</sup> Interdisciplinary Centre for Modern Technologies, Nicolaus Copernicus University,  
4 Wileńska St, PL-87100 Toruń, Poland  
rgadz@umk.pl

Honey is a valuable natural product and an element of numerous food products constituting an excellent energy source. Due to its antibacterial properties, it is used in medicine and in cosmetology as a moisturizing component of cold creams. However, during processing honey needs to be heated in order to decrease its viscosity and to prevent crystallization and fermentation. Unfortunately, heating honey also leads to the creation of undesirable furan compounds such as hydroxymethylfurfural (HMF), 3-furaldehyde (3-F), 2-furoic acid (2-FA), 5-methylfurfural (5-MF) and methyl anthranilate (MA), which are considered harmful to a human organism [1]. Nowadays, when consumer protection and quality control have become so important, the presence of potentially toxic substances (such as furan aldehydes) in food draws more and more attention. The main product of conversion of sugars is hydroxymethylfurfural, considered to be potentially carcinogenic. In fresh honey it should be absent or in trace amounts. According to the EU directive, the content of HMF in honey must not exceed 40 mg/kg [2].

This text describes research on determining the conversion of simple sugars to furan derivatives in the process of the aging of honey. To this aim, a study was undertaken on the effects of temperature and storage conditions (influence of light) on the content of hydroxymethylfurfural and its derivatives in different varieties of bee honey. It was necessary to develop a method of isolating HMF, 3-F, 2-FA, 5-MF and MA with solid phase extraction using polymer packings and the QuEChERS technique. The volumes of solvents and the amounts of sorbents and solvent for desorption were optimized. The obtained extracts were analyzed with liquid chromatography using gradient elution with acetonitrile/water/1 M sulfuric acid(VI) and the Gemini NX C18 column (150 x 4.6 mm; 5 µm). The wavelength to identify the selected compounds was chosen in advance. The developed analytical procedure was validated. The results of statistical analysis confirmed the correctness of the obtained results, which made it possible to carry out quantitative analysis of HMF and the products of its degradation with the help of HPLC-DAD.

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[1] N. Spano, M. Ciulu, I. Floris, A. Panzanelli, M.I. Pilo, P.C. Piu, S. Salis, G. Sanna. A direct RP-HPLC method for the determination of furanic aldehydes and acids in honey. *Talanta*, 78 (2009) 310-314

[2] Council Directive 2001/110/EC of 20 December 2001 relating to honey, Official Journal L 010, 12/01/2002 P. 0047 - 0052