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Czech J. Food Sci.

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Determination of free and bound 3-chloropropane-1,2-diol by gas chromatography with mass spectrometric detection using deuterated 3-chloropropane-1,2-diol as internal standard

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An improved routine, simple and sensitive method is presented for the determination of free and bound 3-chloropropane-1,2-diol (3-MCPD) in different foods using capillary gas chromatography with mass spectrometric detection and deuterated 3-MCPD as internal standard. The optimised method was linear within the working calibration standard concentrations in the range of 0.009 – 1.3

mg 3-MCPD per 1 kg of sample. The LOD and LOQ were 0.003 µg/kg and 0.009 µg/kg, respectively. Validation of the method was carried out by analysing standards of
3-MCPD, acid-HVP, roasted coffee samples, and the same samples spiked with 3-MCPD. Repeatability (expressed as RSD) of the method was in the range 1.0 – 4.2%, the average spike recoveries were 99.1 – 99.5% (RSD = 0.8 – 1.4%), respectively. 3-MCPD bound in esters with higher fatty acids was isolated as fat, the isolated fat was subjected to methanolysis and 3-MCPD generated was quantified using the same method. The LOD and LOQ were determined to be 1.1 mg/kg of lipids and 3.3 mg/kg of lipids, respectively. Using the optimised method, 20 samples of retail food products were analysed for their free and bound 3-MCPD. All samples contained free 3-MCPD at 9.6 – 83 µg/kg (RSD = 0.4 – 7.0%). The level of the bound 3-MCPD varied between the LOD and 2.4 mg/kg with RSD = 0.3 – 2.4%.

Keywords:

3-chloropropane-1,2-diol (3-MCPD); chloropropanediols; 3-MCPD esters; phenylboronic acid; food analysis

[fulltext]