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High sensitive determination of dialkyl-o-phthalates in wines using ultrasonic-assisted microextraction method followed by gas chromatography-mass spectrometry

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Dialkyl o-phthalates are very dangerous compounds. In this study the high sensitive gas chromatographic-mass spectrometric determination of phthalates in low alcoholic beverages (sparkling, red and white wine) coupled ultrasound-assisted emulsification-microextraction was developed. The sources of possible systematic errors were investigated: leaking of o-phthalates from chromatographic septum; contamination of phthalate in solvents; influence of macro components of wines (sugar, alcohol, anthocyanins); the hydrolysis of o-phthalates and others. For the first time it is shown that the impact of these factors can lead to an overestimation or underestimation of the actual concentration of impurities by 1-2 orders of magnitude. The methods of accounting or elimination of systematic errors are proposed. Purification of solvents by Rayleigh distillation method allows to obtain samples with impurity content lower than (1-4)·10-3 mgL^{-1}. Containers for sampling and storage of samples to be analyzed should be made of borosilicate glass or quartz. The limits of detection of esters of o-phthalic acid are at the level of 10-6–10-5 mgL^{-1} and are highly competitive with the best world results. The content of o-phthalates in wines was 0.03 - 1 mgL^{-1}. The relative expanded uncertainty of the determination of toxicants is at the level of 13- 30%.