

Quantitative Determination of ethanol in “Alcohol-Free” beverages, energy drinks and fruit juices by Gas Chromatography

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A simple, sensitive, and direct method to decide if “alcohol-free” beverages, energy drinks and fruit juices could result in positive “alcohol alerts” based on the use of the gas chromatography with a flame ionization detector (GC–FID) has been developed. The chromatographic conditions such as injection volume and split ratios were optimized in order to increase the sample throughput and sensitivity. Unlike other conventional methods which also employ laborious sample preparations; this method analyzes samples directly without any prior treatment and thus cutting down the sample treatment time, as well as reducing the analysis cost per sample. Additionally, low ethanol concentrations as low as 6 mg/L were detected and quantified; making this method an appropriate technique for routine alcohols analysis in beverages. Optimization of chromatographic conditions gave recoveries in the range of 83.00% to 112.8% with relative standard deviations lower than 9%. The calibration curves were linear over the range from 6.250-200.0 mg/L for methanol and ethanol. The correlation coefficients (r^2) were higher than 0.9997. The limits of quantifications (LOQ) are 4.48 mg/L for ethanol and 5.74 mg/L for methanol. A total of 100 domestic and imported labeled “alcohol-free” in Jordan were analyzed for their alcohol content. Concentrations ranged from non-detectable to 14.9 mg/L for ethanol and from nondetectable to 9.38 mg/L for methanol were found in energy drinks. On the other hand, non-quantifiable amounts of alcohols were found in malt beverage as well as fruit juices

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