Optimization of residual hexane in edible oils analysis using static headspace gas chromatography

ABSTRACT

This study aims to determine the residual hexane in four edible oils in Malaysia using a simple, rapid, and automated method in order to improve the efficiency and productivity of the analysis. Gas chromatography (GC/FID) equipped with a headspace autosampler (HS-20) was used to perform the analysis. Incubation time for each injection was successfully optimized from one hour to 30 minutes (50% reduction) compared to the official AOCS method Ca 3b-87. Out of the four tested edible oils, only the hexane residues detected in sunflower oil exceeded the maximum residue limit (MRL) set by the European Union regulation. Significant difference of the results obtained between large calibration range (0–938 mg kg−1) and small calibration range (0–68 mg kg−1) suggests that there is a need to use a lower standard calibration concentration to avoid misinterpretation of analysis results. Method validation applies to the technical hexane; 2-methylpentane, 3-methylpentane, cyclohexane, and methylcyclopentane, the signal-to-noise (S/N), as well as the limit of quantification (LoQ) values was found to be 218.20, 221.45, 746.37, 97.37 and 0.85, 0.84, 0.25, 1.93 mg kg−1, respectively. Good linearity, repeatability, and low carryover of this method have provided an alternative way to analyze the content of the residual hexane in edible oils in a more efficient manner. Current study might provide a fundamental reference for the improvement of the AOCS official Ca 3b-87 method for determination of hexane residues in fats and oils analysis in the future.