

The optimization of FTIR spectroscopy combined with partial least square for analysis of animal fats in quaternary mixtures.

ABSTRACT

Four types of animal fats, namely lard (LD) and body fats of lamb (LBF), cow (Cow-BF) and chicken (Ch-BF), in quaternary mixtures were quantitatively analyzed using FTIR spectroscopy in combination with multivariate calibration of partial least square (PLS). The animal fats, either individual or in quaternary mixtures, were subjected to horizontal total attenuated total reflectance (HATR) as sample handling technique and scanned at mid-infrared region (4000-650 cm^{-1}) with resolution of 4 cm^{-1} and with 32 interferograms. PLS calibration revealed that the first derivative FTIR spectrum was well suited for the correlation between actual value of LD and FTIR calculated value. The other animal fats (LBF, Cow-BF and Ch-BF) were better determined using normal FTIR spectra. The coefficient of determination (R^2) obtained using the optimized spectral treatments was higher than 0.99. The root mean standard error of calibration (RMSEC) values obtained were in the range of 0.773-1.55. Analysis of animal fats using FTIR spectroscopy allows rapid, no excessive sample preparation, and can be regarded as "green analytical technique" due to the absence of solvent and chemical reagent used during the analysis.

Keyword: Analysis; Animal fats; FTIR spectroscopy; Partial least square; Quaternary systems.