Analysis of chicken fat as adulterant in cod liver oil using Fourier transform infrared (FTIR) spectroscopy and chemometrics

ABSTRACT

Among three animal fats evaluated, chicken fat (CF) has close similarity in fatty acid profiles with cod liver oil (CLO), compared with mutton fat and beef fat; therefore, CF can be one of the potential adulterants in CLO. Fourier transform infrared (FTIR) spectra of CLO, CF, and their mixtures were measured on direct contact with horizontal attenuated total reflectance (HATR) in mid infrared region (4000-650 cm-1) at 32 scanning and 4 cm71 resolution. The chemometrics of partial least square (PLS) and discriminant analysis (DA) were chosen for the quantification and classification of oil adulterant in CLO. The results showed that FTIR spectroscopy coupled with PLS calibration can predict the level of CF in CLO with coefficient of determination (R^2) for the relationship between actual and FTIR predicted value of CF in CLO is 0.996. The root means square errors of calibration (RMSEC) and prediction (RMSEP) obtained using seven principal components (PCs) are 0.346 and 0.513, respectively. DA using the Coomanss plot can classify pure CLO and that adulterated with CF accurately. Besides, DA using 10 PCs can be successfully exploited for the classification of CLO and CLO adulterated with the mixture of animal fats.

Keyword: Cod liver oil; Chicken fat; FTIR spectroscopy; Partial least square; Discriminant analysis