Rapid detection of lard in chocolate and chocolate - based food products using fourier transform infrared spectroscopy

ABSTRACT

Fourier transform infrared (FTIR) spectroscopy, in combination with attenuated total reflectance (ATR) and partial least square (PLS) regression was used to detect the addition of lard in chocolate formulation. The spectral bands associated with lard, cocoa butter and their blends (ranging from 0 ó 10% of lard in cocoa butter) were recorded, interpreted and identified. A semi-quantitative approach is proposed to measure the percent of lard in blends on the basis of spectral data of the band at the frequency in the region 4000 ó 400 cm-1 using the equation y = 1.0144x ó 0.0644.The coefficient of determination (R^2) was 0.9892 with a standard error of 0.4504. The fingerprints of functional groups in cocoa butter and pure lard enable FTIR spectroscopy to be widely used to authenticate the adulteration in food and pharmaceutical analysis. The results showed that FTIR method is versatile, efficient and accurate, and suitable for routine quality control analysis with the result within 2 minutes using sample of less than 2 ml. In this paper, the potential of FTIR spectroscopy as a rapid analytical tool for the quantitative determination of adulterant especially lard in chocolate is demonstrated.

Keyword: FTIR; PLS; Lard; Chocolate; Cocoa butter