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Discrimination of Lard in Extracted Ink of Printed Packaging of Foodstuff using Fourier Transform Infrared Spectroscopy and Multivariate Analysis

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ABSTRACT

The presence of lard in extracted ink of printed-packaging of foodstuff was discriminated using Fourier transform infrared (FTIR) spectroscopy in combination with the chemometrics tool by means of multivariate analysis. The spectra for lard, commercial gravure ink, and the blends of both ranging from 0.1%-20% of lard in gravure ink were acquired and analysed to characterise the peaks of interest. The inks from plastic food packaging were extracted in a process called deinking. The resulting ink extracts were also tested on FTIR. Several spectral regions of lard, commercial gravure ink, and the blends of both were selected and subjected for the partial least square (PLS) regression calibration. The calibration revealed that the 3020-2630cm-1 region was well-suited for correlating the predicted and actual value of lard. The coefficient of determination (R^2) obtained using the optimized spectral treatments was higher than 0.99, while the root mean standard error of calibration (RMSEC) value was 0.007. The score plot from the principal component analysis (PCA) of the calibration set discriminated the lard, gravure ink and the blends into their respective groups. Soft independent modelling class analogy (SIMCA) was employed as the method of discriminant analysis (DA) to classify the samples into their specific groups based on the result of PCA. The plots showed that the lard and gravure ink are well separated and located at their axis, indicated that the discriminant analysis utilised was able to classify the samples into groups based on the presence of lard. These results demonstrated that FTIR spectroscopy, when combined with multivariate analysis, can provide a rapid method with no excessive sample preparation to discriminate the presence of lard in ink of foodstuff packaging.

Keywords:*Fourier transform infrared, lard, ink, multivariate analysis*