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Rapid fraud detection of cocoa powder with carob flour using near infrared spectroscopy

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Abstract

Cocoa powder is a highly valuable global product that can be adulterated with low-cost raw materials like carob flour as small amounts of this flour would not change the color, aroma and taste characteristics of the final product. Rapid methods, like NIR technology combined with multivariate analysis, are interesting for such detection. In this work, unaltered cocoa powders with different alkalization levels, carob flours with three different roasting degrees, and adulterated samples, prepared by blending cocoa powders with carob flour at several proportions, were analyzed. The diffuse reflectance spectra of the samples of 1100 - 2500 nm were acquired in a Foss NIR spectrophotometer. A qualitative and a quantitative analysis were done. For the qualitative analysis, a principal component analysis (PCA) and a partial least squares discriminant analysis (PLS-DA) were performed. Good results (100% classification

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