

عنوان مقاله:

Rapid Screening of Adulteration in Premature infant formula powders by Attenuated Total Reflectance- Fourier Transform Infrared (ATR-FTIR) Spectroscopy and Chemometrics

محل انتشار:

هفتمین کنگره ملی شیمی و مهندسی شیمی با تاکید بر فناوری های بومی ایران (سال: 1399)

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خلاصه مقاله:

Adulteration has been one of the most significant global concerns in the field of infant formula quality control. Proteins and long-chain polyunsaturated fatty acids (LCPUFA) are the most important nutrients in the premature infant formula powder (PIFP), so that insufficient amounts of them may restrict proper growth and development. Rice flour (RF) and soybean powder (SP) are two inexpensive and harmful adulterants that can be added to PIFP as fat and protein, respectively. Spectroscopy is a fast, simple, cheap, and non-destructive measurement tool to analyze variant constituents of chemical systems and identify adulterants in the food industry. The present study implemented the combinatorial method of Attenuated Total Reflectance-Fourier transform infrared (ATR-FTIR) spectroscopy with chemometrics to identify and classify PIFP samples contaminated with RF and SP. Soft independent modeling of class analogy (SIMCA), partial least squares discriminant analysis (PLS-DA), and support vector machine (SVM) were used as chemometric techniques to identify and categorize FT-IR data. The efficiency of such chemometrics techniques was evaluated in terms of sensitivity, specificity, and correct-prediction percent. Based on the results, ATR-FTIR spectroscopy coupled with chemometrics techniques can be used as a fast, inexpensive, and robust method to specify RF and SP in PIFP. Classification results obtained based on the specificity and sensitivity of SIMCA, PLS-DA, and SVM methods on PIFP samples in the test group were 91, 88; 96, 91; and 79, 80%, respectively.

کلمات کلیدی:

Premature infant formula powder, Attenuated total reflection- Fourier transform Infrared Adulteration, Rice flour, Soybean powder, Chemometrics

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