FT-NIR Method to Determine Moisture in Gluten Free Rice-Based Pasta during Drying

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Abstract : Pasta is one of the most widely consumed food products around the world. Rapid determination of the moisture content in pasta will assist food processors to provide online quality control of pasta during large scale production. Rapid Fourier transform near-infrared method (FT-NIR) was developed for determining moisture content in pasta. A calibration set of 150 samples, a validation set of 30 samples and a prediction set of 25 samples of pasta were used. The diffuse reflection spectra of different types of pastas were measured by FT-NIR analyzer in the 4,000-12,000 cm-1 spectral range. Calibration and validation sets were designed for the conception and evaluation of the method adequacy in the range of moisture content 10 to 15 percent (w.b) of the pasta. The prediction models based on partial least squares (PLS) regression, were developed in the near-infrared. Conventional criteria such as the R2, the root mean square errors of cross validation (RMSECV), root mean square errors of estimation (RMSEE) as well as the number of PLS factors were considered for the selection of three pre-processing (vector normalization, minimum-maximum normalization and multiplicative scatter correction) methods. Spectra of pasta sample were treated with different mathematic pre-treatments before being used to build models between the spectral information and moisture content. The moisture content in pasta predicted by FT-NIR methods had very good correlation with their values determined via traditional methods (R2 = 0.983), which clearly indicated that FT-NIR methods could be used as an effective tool for rapid determination of moisture content in pasta. The best calibration model was developed with min-max normalization (MMN) spectral pre-processing (R2 = 0.9775). The MMN pre-processing method was found most suitable and the maximum coefficient of determination (R2) value of 0.9875 was obtained for the calibration model developed.

Keywords : FT-NIR, pasta, moisture determination, food engineering

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