

Pitiporn Ritthiruangdej 2006: Evaluation of Thai Fish Sauce Qualities by Near-Infrared Spectroscopy. Doctor of Philosophy (Agro-Industrial Product Development), Major Field: Agro-Industrial Product Development, Department of Product Development. Thesis Advisor: Assistant Professor Thongchai Suwonsichon, Ph.D. 182 pages.

Application of near-infrared (NIR) spectroscopy for both quantitative and qualitative analyses of the commercial Thai fish sauces was investigated. The NIR transmittance spectra in the region of 1100-2500 nm were measured. Subsequently, two wavelength interval selection methods named moving window partial least squares regression (MWPLSR) and searching combination moving window partial least squares (SCMWPLS) were applied to find out the suitable input wavelength variables of each chemical, physical and sensory properties. For quantitative analysis, the predictive models were developed by using the partial least squares (PLS) regression. Results showed that the PLS developed models for the chemical and physical properties yielded the best prediction results with the lowest root mean square error of prediction (RMSEP). The lowest RMSEP for the total nitrogen content, sodium chloride, pH, reducing sugar, density, baume, total soluble solid, refractive index, color L*, color a*, and color b* were 0.100 %w/v, 0.647 %w/v, 0.155, 0.407 mg/mL, 0.007 g/cm³, 0.118 °Baume, 0.435 °Brix, 0.00079, 2.914, 1.023, and 4.803, respectively. While the PLS models for the sensory properties was compared in terms of the range error ratio (RER) of prediction. Results showed that the PLS models for sensory attributes which were fishy aromatic, salty flavor and fishy flavor obtained good RER values in the range of 5.85 - 7.96. For qualitative analysis, Thai fish sauce samples were divided into three groups based on their total nitrogen content (TN). These groups were i) standard pure fish sauce (TN \geq 0.9 %w/v), ii) standard mixed fish sauce (TN \geq 0.4 %w/v) and out of standard fish sauce (TN < 0.4 %w/v). The classification methods used for developing the models were Linear Discriminant Analysis (LDA), Factor Analysis-Linear Discriminant Analysis (FA-LDA), Soft Independent Modeling of Class Analog (SIMCA), K Nearest Neighbors (KNN), and Artificial Neural Networks (ANNs). All methods were analyzed the optimized informative regions of NIR spectra based on the total nitrogen content. Results showed that all methods were potentially used the NIR spectra to classify the fish sauce samples with the corrective classification rate of more than 82%. Moreover, the ANNs classified model provided the best corrective classification rate (100%).

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