

REVIEW

of the summary of Mikhail Khodasevich's dissertation on the topic "DEVELOPMENT OF OPTICAL SPECTRAL METHODS FOR DIAGNOSTICS OF MATERIALS AND PROCESSES BASED ON A MULTIVARIATE APPROACH", submitted for the degree of Doctor of Physical and Mathematical Sciences in the specialty 01.04.05 – optics.

Mikhail Khodasevich's dissertation work is devoted to the development and application of chemometric methods for analyzing the results of object research using optical spectroscopy. Currently, chemometric methods are actively used to improve the quality of the results of spectral analysis and optical diagnostics of materials and processes. Chemometric methods are used for forecasting, pattern recognition, classification and solving other formal problems, among which the identification of falsified products is an important task. One of the objects of research to identify adulterated products in the dissertation is linseed oil. To quantify the detection of adulterated linseed oil by UV-Vis-NIR optical density spectra, spectral analysis was used to construct regression models based on chemometric methods and the selection of spectral variables. It was shown that partial least squares regression with an original combination of moving windows is characterized by a lower standard deviation (0.03%) compared to the successive projection algorithm (0.46%) and ranking variables by correlation coefficient (0.50%).

The practical application of the chemometric approach developed in the dissertation can be illustrated by the results of our collaboration (*that was accepted to be published in Journal of Food Science*) on the classification of cane and beet sugars. Spectral signature differences of 25% (w/w) aqueous solutions of cane and beet sugars were observable in UV-Vis region due to impurities in sugar. Linear discriminant analysis after selection of five wavelengths gave 100% correct classification with a simple interpretation. In addition, binary mixtures of the sugar samples were quantitatively analyzed by means of partial least squares regression. The obtained results are promising to distinguish between the two different sources of sucrose using optical spectroscopy and chemometrics.

The dissertation is an actual completed scientific research of high scientific and practical value. Mikhail Khodasevich deserves to receive the degree of Doctor of Physical and Mathematical Sciences in the specialty 01.04.05 – optics.

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