

Near Infrared Spectrometry to Determine the Quality of Milk, Experimental Design Setup and Chemometrics: Review

Authors : Meghana Shankara, Priyadarshini Natarajan

Abstract : Infrared (IR) spectroscopy has revolutionized the way we look at materials around us. Unraveling the pattern in the molecular spectra of materials to analyze the composition and properties of it has been one of the most interesting challenges in modern science. Applications of the IR spectrometry are numerous in the field's pharmaceuticals, health, food and nutrition, oils, agriculture, construction, polymers, beverage, fabrics and much more limited only by the curiosity of the people. Near Infrared (NIR) spectrometry is applied robustly in analyzing the solids and liquid substances because of its non-destructive analysis method. In this paper, we have reviewed the application of NIR spectrometry in milk quality analysis and have presented the modes of measurement applied in NIRS measurement setup, Design of Experiment (DoE), classification/quantification algorithms used in the case of milk composition prediction like Fat%, Protein%, Lactose%, Solids Not Fat (SNF%) along with different approaches for adulterant identification. We have also discussed the important NIR ranges for the chosen milk parameters. The performance metrics used in the comparison of the various Chemometric approaches include Root Mean Square Error (RMSE), R^2 , slope, offset, sensitivity, specificity and accuracy

Keywords : chemometrics, design of experiment, milk quality analysis, NIRS measurement modes

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