

ESTIMATION OF SUGAR AND REDUCING SUGAR IN MOLASSES USING NEAR INFRARED REFLECTANCE SPECTROSCOPY

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Estimation of sugar and reducing sugar content in molasses is very important task in sugar refineries. Conventional methods of determination of sugar content in molasses samples are highly time consuming and employ hazardous chemicals. Due to the physical properties of molasses, probability of error in conventional analytical techniques is high. These methods have proven to be inefficient for a process control in any sugar industry. Hence development of a rapid, inexpensive, physical and also accurate method for sugar determination in molasses will be highly useful.

Near Infrared spectroscopy is being widely used worldwide as an analytical technique in food industry. The technique offers the advantage of being non-destructive and rapid. The present paper highlights the potential of near infrared reflectance spectroscopy as a rapid and automated analytical technique for determination of sugar and reducing sugar content in molasses. A number of molasses samples were collected during and after the sugar season from Mawana Sugar Industry, Mawana. The samples were chosen so as to obtain a wide range of concentration of sugar and reducing sugars. This was done in order to achieve a good calibration curve with widely spread data points. These samples were scanned in the region of 1100 - 2500 nm in diffuse reflectance mode. An indigenous ELICO NIR spectrophotometer, modified according to the requirements of sugar industry was used for this purpose. Each sample was also analyzed simultaneously by standard chemical methods. Chemical values were taken as reference for near infrared analysis. In order to obtain the most accurate calibration for the set of samples, various mathematical treatments were employed. Partial Least Square method was found to be most suitable for the analysis. A comparison is made between the actual values (chemical values) and the predicted values (NIR values). The actual values agree very well with the predicted values showing the accuracy of the technique. The validity of the technique is checked by predicting the concentration of sugar in unknown molasses samples using the calibration curve. The present investigation assesses the feasibility of the technique for on-line monitoring of sugars present in molasses in sugar industries.