

Application of FT-NIR Spectroscopy and Electronic Nose in On-line Monitoring of Dough Proofing

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Abstract : FT-NIR spectroscopy and electronic nose was used to study the kinetics of dough proofing. Spectroscopy was conducted with an optic probe in the diffuse reflectance mode. The dough leavening was carried out at different temperatures (25 and 35°C) and constant RH (80%). Spectra were collected in the range of wave numbers from 12,000 to 4,000 cm⁻¹ directly on the samples, every 5 min during proofing, up to 2 hours. NIR spectra were corrected for scatter effect and second order derivatization was done to transform the spectra. Principal component analysis (PCA) was applied for the leavening process and process kinetics was calculated. PCA was performed on data set and loadings were calculated. For leavening, four absorption zones (8,950-8,850, 7,200-6,800, 5,250-5,150 and 4,700-4,250 cm⁻¹) were involved in describing the process. Simultaneously electronic nose was also used for understanding the development of odour compounds during fermentation. The electronic nose was able to differential the sample on the basis of aroma generation at different time during fermentation. In order to rapidly differentiate samples based on odor, a Principal component analysis is performed and successfully demonstrated in this study. The result suggests that electronic nose and FT-NIR spectroscopy can be utilized for the online quality control of the fermentation process during leavening of bread dough.

Keywords : FT-NIR, dough, e-nose, proofing, principal component analysis

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