Raw material quality assessment approaches comparison in pectin production

This article explores different opportunities to evaluate quality variation in raw materials from biological origin. Assessment of raw materials attributes is an important step in a bio-based production since fluctuations in quality are a major source of process disturbance. This can be due to a variety of biological, seasonal and supply scarcity reasons. The final properties of a product are invariably linked with the initial properties of the raw material. Thus, the operational conditions of a process can be tuned to drive the product to the required specification based on the quality assessment of the raw material being processed. Process analytical technology (PAT) tools which enable this assessment in a far more informative and rapid manner than current industrial practices that rely on rule-of-thumb decisions are assessed. An example with citrus peels is used to demonstrate the conceptual and performance differences of distinct quality assessment approaches. The analysis demonstrates the advantage of characterization through multivariate data analysis coupled with a complementary spectroscopic technique, near-infrared spectroscopy. The quantitative comparative analysis of three different approaches, discriminant classification based on expert-knowledge, unsupervised classification, and spectroscopic correlation with reference physicochemical variables, is performed in the same dataset context.

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