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## A Feasibility Study for Acrylamide Quantification in Biscuits Using VNIR Spectroscopy

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### Abstract.

Acrylamide, a carcinogenic compound formed during high-temperature processing of foods containing asparagine and reducing sugars, poses significant public health concerns. Since its detection in food in 2002, extensive research has aimed to mitigate its presence, resulting in regulatory measures such as the European Commission's Regulation (EU) 2017/2158 and the FoodDrinkEurope "Acrylamide Toolbox." These frameworks emphasize the monitoring and reduction of acrylamide levels in food products with high-frequency intake, including cereal-based items, potato products, and coffee. Despite these efforts, recent EFSA assessments indicate inconsistent reductions in acrylamide levels, underscoring the need for innovative and reliable tools to improve compliance and quality control in food production.

This study investigates the feasibility of using visible and near-infrared (VNIR) spectroscopy and near-infrared (NIR) spectral imaging as rapid, non-destructive tools for acrylamide evaluation in biscuits, with the goal of developing a robust Process Analytical Technology (PAT) solution. Samples were collected directly from the production line after the cooking phase. A Design of Experiment (DoE) approach considering seven production factors was implemented.

Overall, results demonstrated promising performances for an initial massive screening of the production trend (Accuracy=91%).

**Keywords:** Acrylamide, PAT, Food quality, VNIR Spectroscopy, Bakery