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Development of a novel method for oxygen quantification in new coffee packaging

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The quality of coffee is affected by the amount of oxygen present in the packaging. A maximum oxygen content is authorized to avoid oxidation of coffee during the shelf life, which would lead to off-taste in coffee cup. Oxygen content in the packaging can be measured by Fluorescent Decay, as described in ASTM F2714-08 (2021). However, this is only possible for transparent packaging. If it is not the case, direct sampling in the packaging is necessary. This requires a minimum amount of headspace in the pack. This minimum amount is defined by the oxygen sensor technology. In the case of limited headspace, gas chromatography is one of the promising options because of the limited amount of gas sample required but also because of the high accuracy and good precision of the tool.

Development of any alternative packaging goes along with oxygen barrier measurement. At the production level, oxygen barrier properties might also need to be monitored for quality purposes.

In this contribution, we propose to discuss a novel method for the determination of oxygen content in new coffee packaging by considering the challenges of new materials and measurements in production environment (at-line tool) i.e. robustness of the material, time of the analysis and cost, repeatability of the measurement…Our contribution proposes a new way of sampling from the packaging when direct sampling gives unsatisfying results especially when low amount of oxygen needs to be measured in classical ambient environment. Together with a micro-GC, a sampling station connected to vacuum and a home-made hermetic chamber to isolate the sample from the environment. The sampling process is in two steps. Gas sampling being destructive, special care has been given to improve trueness and robustness of the measurement. Moreover, the proposed solution is a plug and play on actual set-up and does not require modification of existing set-ups.

Finally, the measurement uncertainty has been evaluated based on the different components of the measurement chain. The results demonstrated that the proposed method was reliable and accurate with a detection limit of 0.1% oxygen. Furthermore, the method was found to be highly reproducible and showed excellent stability over time.

Keywords: Oxygen, Quantitative Analysis, Novel packaging, Coffee

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