



FOOD CONTROL CONFERENCE 2024 24 - 25 October 2024, Ha Noi – Viet Nam

Advances in Portable Devices for On-Site Quantification of Sulfite Preservatives: Insights from Our Laboratory

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Abstract

Sulfite is a common preservative widely used in various food and beverage products to inhibit oxidative decay and microbial growth. In the frozen food industry, sulfite is added to raw crustaceans such as prawns and shrimps to prevent melanosis (black spots). In wine production, sulfite is deliberately added at several stages, including grape crushing, aging, and bottling. Yeast can also produce sulfite during fermentation, necessitating reliable methods for accurate sulfite measurement to ensure precise additive adjustments. However, sulfite can negatively impact human health, particularly for individuals with asthma, leading to laws and regulations requiring the labeling of sulfite content in food and drink products.

This talk will present portable devices developed in our laboratory for quantifying sulfite in wine, soft drinks, dried fruit, and frozen shrimp. These devices are designed for direct determination of sulfite, preferably without sample pretreatment steps. The method involves in-situ processes of converting sulfite ions into gas, gas volatilization into the headspace, gas absorption by moistened paper, and in-situ gas detection. Unconventional uses of several electrical detectors, such as the capacitively coupled contactless conductivity detector (C4D) and electrochemical sensors, will be discussed. These detectors are used for the detection of gas absorption by moistened paper, showcasing the development of portable devices for the direct analysis of sulfite in complex samples.

Keywords: *on-site quantification, sulfite, portable devices*