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Exploiting the bead injection LOV approach to carry out spectrophotometric assays in wine: application to the iron determination

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Abstract

Iron is one of the major metallic constituents in wine. Concentrations higher than 5 ppm can cause several changes on the stability of the product and can promote oxidation and wine aging. The official method recommended for the determination of iron in food samples by OIV and AOAC is based on atomic absorption spectrometry (AAS). It is the most widely used method for this determination as the application of molecular absorption spectrometric methods to wine analysis is limited by the high background sample absorption, especially in red wines. To minimise this limitation, we propose a sequential injection lab-on-valve (SI-LOV) method, based on the bead injection approach to separate the analyte from the matrix. NTA Superflow resin was used as the bead material where the iron (III) is retained and subsequently reacts with SCN⁻ to produce an intense red colour. The absorbance change was monitored on the bead surface at 480 nm. It was possible to achieve a linear range up to 5.0 mg/L of iron, with low sample and reagent consumption: 500 µL of sample, 15 µmol of SCN⁻, and 9 µmol of H₂O₂, per assay. The proposed method was successfully applied to the determination of iron in red and white table wines and also to port wine.

Keywords: Sequential injection lab-on-valve; Bead injection; Spectrophotometry; Wine; Iron; NTA Superflow

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