



Measurements of contaminant elements of wines by inductively coupled plasma-mass spectrometry: A comparison of two calibration approaches

Sofia Catarino^{a,b,*}, A.S. Curvelo-Garcia^a, R. Bruno de Sousa^b

^a INIAP, Estação Vitivinícola Nacional, 2565-191 Dois Portos, Portugal

^b Instituto Superior de Agronomia, Departamento de Química Agrícola e Ambiental, Tapada da Ajuda, 1349-017 Lisboa, Portugal

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Abstract

The aim of the present work was to develop and validate an accurate method by ICP-MS focalized to the measurement of contaminant elements in wines, in special those with legal importance. In addition, we intended to evaluate the suitability of ICP-MS semi-quantitative methodology in order to reduce the time and cost of analysis. Twenty-six contaminant elements of wine (Li, Be, Al, V, Cr, Mn, Fe, Co, Ni, Cu, Zn, Ga, As, Se, Rb, Sr, Ag, Cd, In, Cs, Ba, Hg, Tl, Pb, Bi and U) were measured using quantitative and semi-quantitative calibration approaches, in diluted white and red wines. In an early step potential interferences caused by Cl and Ca species were evaluated, in order to establish suitable mathematical corrections. For validation of ICP-MS procedures a few elements were determined by flame and electrothermal AAS. Reference wines from 1992 year, with provisional values, were analyzed and the results showed satisfactory agreement. The semi-quantitative calibration provided slightly higher limits of detection than those obtained by the quantitative calibration, and always lower than $0.1 \mu\text{g l}^{-1}$, except for Fe and Zn. For most elements the recovery percentages (between 90 and 100%) and precision of the results (R.S.D. (%) < 4) were similar for both modes. Differences lower than 20% of concentration was obtained for most elements. Both methodologies offer valuable alternatives to wine characterization and comparison purposes. For legal requirements control purposes, with reference to the importance of accurate results, quantitative approach is the most suitable alternative.

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* Corresponding author. Tel.: +351 261 712106; fax: +351 261 712426.

E-mail address: sofia_catarino@clix.pt (S. Catarino).