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An approach for identifying and correcting for isobaric interferences in LA-ICP-MS: application to Sc measurements in mafic materials.

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Polyatomic interferences are often considered to be less of an issue during LA-ICP-MS trace element analyses than conventional solution-based analyses, due to lower production rates of oxides. The use of matrix-matched reference materials for calibration can further mitigate the effect of polyatomic interferences on concentration data, as calibrants and samples will be affected similarly by these interferences. However, there remain element-mineral pairs which are severely affected by polyatomic interferences, and for which matrix matched standards are not available. Here, we use the example of ^{45}Sc, a monoisotopic element with a major isobaric interference from $^{29}Si^{16}O$, to demonstrate a general approach for identifying and correcting for polyatomic interferences in samples for which matrix matched standards are not widely available.

For reference materials with different Si and Sc concentrations, correlations between Si^{29}/Al^{27} and [(Sc/Al)observed]/[(Sc/Al)expected] were observed when using Al as an internal standard, due to variable SiO interference contributions on Sc. Regressions were established using standard bracketing with the reference materials with different Sc/Si, to estimate block-specific bias parameters. These regression coefficients were used to calculate corrected Sc/Al ratios and derive block-corrected Sc concentrations for unknowns. To account for temporal variations in instrumental behavior during the analytical session, splines were fitted to the regression coefficients across blocks, providing time-dependent estimates of both slope and intercept. This methodological approach significantly improves both precision and accuracy. In addition to correcting underestimated raw concentrations, especially for mafic materials, the method also compensates for time-dependent drift in oxide interference production. While not a replacement for matrix-matched calibration, this approach provides a practical alternative in situations where matrix-matched standards are scarce or unavailable, especially for in-situ analyses of ferromagnesian minerals.