A heated sample introduction system increasing sensitivity and robustness in ICPMS

Robert Teuma-Castelletti

Abstract

Heated sample introduction systems have been studied in inductively coupled plasma optical emission spectrometry. These systems increase sample introduction efficiency and improve figures of merit such as sensitivity, detection limit, precision, and robustness. Limited work has been done on heating the sample introduction system of an inductively coupled plasma mass spectrometer (ICPMS). The example cited only heated a portion of the system with convective heating tape. The work presented here involves heating the entire sample introduction system on a Varian 820-MS ICPMS with an infrared heater. This heating improves the sensitivity and detection limits of most tested elements. Sensitivities were increased by a factor of 2 to 16 times for the tested elements. Detection limits were also decreased by a factor of 1.1 to 3.5 times. At the price of increased oxide formation, the formation of doubly charged species was decreased by a factor of 3. Plasma robustness, as indicated by the $^{9}\text{Be}^+ / ^{7}\text{Li}^+$ signal ratio, was increased from .17 to .23. The heated system enabled the accurate analysis of a drinking water certified reference material by simple external calibration.

References


