Element Quantification of Water Reference Materials with N_2 MICAP MS

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The nitrogen sustained high-power microwave inductively coupled atmospheric pressure plasma (N_2 MICAP)[1] has gained increasing attention in recent years as an alternative ion source for inorganic mass spectrometry (MS) due to its comparable performance to the conventional argon based inductively coupled plasma (Ar ICP).[2,3] In addition to its more cost-effective operation, the nitrogen plasma reduces argon-based plasma species, which enables the analysis of more abundant isotopes of the elements K, Ca, Cr, Fe, and Se in particular. In this study, the N_2 MICAP was combined with a quadrupole mass spectrometer to investigate its quantification capabilities and possible spectral interferences in aqueous solutions with different sample introduction setups.

Two certified water reference materials were analysed with solution nebulization and their main and trace elements were quantified by means of external calibration as well as standard addition. Since wet sample introduction results in a lower plasma temperature due to mass load effects caused by the solvent, additional measurements were made in which a desolvator was used to reduce the water content of the aerosols. With solution nebulization, a high abundance of NO is observed, which is suspected to suppress elements with high ionization energies.[4] Since using desolvation decreases such oxygen-based species, higher sensitivities of these elements are expected. A comparison between quantification using wet and desolvated sample introduction is made in terms of detection limits, trueness and precision of the determined element concentrations as well as possible spectral interferences.

[1] J. Jevtic, A. Menon, V. Pikelja, Patent No.: PCT/US2014/024306, **2014.**
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[3] C. Neff, P. Becker, B. Hattendorf, D. Günther, *J. Anal. At. Spectrom.* **2021**, *36*, 1750-1757.
[4] M. Kuonen, G. Niu, B. Hattendorf, D. Günther, *J. Anal. At. Spectrom* **2023**, Accepted Manuscript