

CAPABILITIES OF PLASMA PENCIL IN ANALYSIS OF TAP WATER

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Plasma pencil is a capacitively coupled rf jet discharge operated in argon, helium or gas mixtures at the atmospheric pressure. It was originally designed for surface modifications of cultural heritage objects. It has been also tested in analytical spectrochemistry [1, 2] as an alternative excitation source. Due to lower excitation temperatures of about 2700-4000 K it exhibits matrix interferences by easily ionisable elements (EIE) [3] and also some effects from anions were observed.

To find out if the plasma pencil can be employed as an alternative excitation source five samples of tap water were analyzed. To achieve the most accurate results of tap water analysis, several calibration dependences from single element and multiple element (mixed) standards were used. The standards are nitrate salts of four elements which are usually most abundant in tap water: Ca, Mg, Na, K, all of them are EIE. Based on the previous studies it was supposed that these elements could influence each other. However, this is a different situation from that when the influence of EIE on Zn and Cu emission was investigated. The experimental range of salts concentration was 0.05-4.0 g l⁻¹ [3]. In this case the stock solution was always Astasol (Analytika Praha, CZ) with the original concentration of 1.0 or 0.1 g l⁻¹. It was further diluted to the range of about 1-10 mg l⁻¹ for classical calibration dependences which corresponded to the expected range of the elements in the samples. This study should contribute to the development of a method of water analysis. To validate the yielded results inductively coupled plasma optical emission spectrometry (ICP-OES) was also employed for the same experiments. From the data evaluation it can be said that the results of these two techniques do not differ significantly.

References:

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