Effect Of Eie Addition On The Argon Dc Arc Plasma Parameters Relevant For Analyte Atom Excitation

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Argon stabilized U-shaped direct current arc with continual aerosol flow is a spectrochemical source suitable for trace metal analysis [1]. The detection limits of this source are comparable with the detection limits obtained for inductively coupled plasma. An important characteristic of the argon dc arc is a large influence of easily ionized elements (EIE) on analyte emission [2]: addition of even small amounts of EIE brings a large enhancement of emission intensity and thus increases the sensitivity of analyte determination. The aim of this work was to study the influence of EIE on radial distribution of plasma parameters that are important for the analyte excitation: electron number densities and temperatures were measured with and without the addition of EIE (different concentrations of KCl). Electron number densities were evaluated from the measured Hβ line profiles and the temperatures were evaluated from: a) absolute emissivity of ArI 430.01 nm line and b) from the intensity ratio of iron lines. It was shown that the addition of 0.5% KCl reduces the electron number density in the arc core for approximately 30% (the original value for the arc current of 7 A being 1.45-10²¹ m⁻³). On the other hand, the presence of EIE reduces the excitation temperature in a much lesser extent, Fig. 1. For instance, at the arc axis, addition of 0.5% KCl reduces the temperature from 7950 K to 7800 K. The influence of EIE addition on excitation temperature depends on the arc current: for higher currents the influence is smaller. It may be concluded that the principal influence of EIE addition is the change of electron number density distribution, while the excitation temperature change is much smaller.

![Figure 1](https://example.com/figure1.png)

**Figure 1.** The influence of KCl addition on the excitation temperature. The arc current 7 A.

References