Application of high-resolution 40.68 MHz radial-viewing inductively coupled plasma optical emission spectrometry in rhenium determination

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The possibilities of 40.68 MHz radial-viewing inductively coupled plasma optical emission spectrometry equipped with a high-resolution spectrometer (spectral bandwidth = 5 pm) (HR-ICP-OES) were studied in the determination of rhenium in molybdenum and copper concentrates. By using equipment with a high spectral resolution, a hyperfine structure (HFS) of the most prominent lines of rhenium (*i.e.*, Re II 197.248 nm, Re II 221.426 nm and Re II 227.525 nm) were registered. The HFS components, under high-resolution conditions, were used as separate prominent lines in order to circumvent spectral interferences in the presence of complex matrix containing Mo, Al, Ti, Fe, Mg, Ca and Cu. The Q-concept was applied for quantification of the spectral interferences and optimum line selection. Microwave acid digestion method was used as a sample dissolution procedure. The feasibility, accuracy and precision of the analytical results were experimentally demonstrated by certified reference materials from molybdenum and copper concentrates. Comparative data for true detection limits by using HR-ICP-OES 40.68 MHz ICP and Slurry sampling total reflection X-RAY fluorescence were presented in the determination of rhenium in CRM Molybdenum concentrate "CGL-202".

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