

Vanadium speciation by chromatographic separation of V(IV) and V(V) in acidic solution followed by ICP-OES determination

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Abstract

A new method for vanadium speciation has been developed. The method is based on chromatographic separation of vanadium(IV) and vanadium(V) in acidic medium followed by the determination with ICP-OES. Vanadium species exist in acidic solution ($\text{pH} < 3$) as VO^{2+} for vanadium(IV) and VO_2^+ for vanadium(V). The two vanadium species were chromatographically separated using a cation exchange column, Dionex IonPack CG10, and eluant ($120 \text{ mmol/l H}_2\text{SO}_4$) at a flow rate of 1.5 ml/min . The detection limits for vanadium(IV) and vanadium(V) are $40 \text{ }\mu\text{g/l}$ and $30 \text{ }\mu\text{g/l}$, respectively. Among common anions, only nitrite, NO_2^- which may act as oxidant for vanadium(IV) and reductant for vanadium(V) can cause interference. Interference from common cations has not been observed for concentration levels not exceeding 40 mg/l . The developed method has been successfully applied to the determination of vanadium(IV) and vanadium(V) in synthetic and minerals processing samples.

Keywords: vanadium speciation, chromatography, ICP-OES, cation exchange