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Flow-Injection Determination of Vanadium in Seawater Samples with Acidic Potassium Permanganate Chemiluminescence

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Chemiluminescence from the vanadium and potassium permanganate reaction was studied under acidic conditions to develop a sensitive method for vanadium determination using the formaldehyde enhancement effect. The method was successfully applied to the determination of vanadium in seawater. Experimental parameters were optimized, including acid concentration, potassium permanganate and formaldehyde concentration. A linear calibration graph was obtained in the concentration range of $2.0 \times 10^{-9} - 5 \times 10^{-6}$ M with relative standard deviations ($n = 4$) in the range of 1.8 − 3.1%. The detection limit (3σ blank) was 8.0×10^{-10} mol L^{-1} with a sample throughput of 100 h^{-1}. The effect of salinity and various interfering cations and anions were studied. The method was applied to determine total dissolved vanadium in seawater samples and certified reference materials after online reduction with amalgamated zinc column.

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