

Indirect Spectrophotometric Determination of Cr(VI) with Optical Probe

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A new rapid method of indirect spectrophotometric determination of Cr(VI) based on oxidation of iodide by dichromate ions in acidic media with further determination of forming triiodide ions with starch solution by optical probe ($\lambda_{max}=605$ nm) has been developed. The influence of different factors on spectrophotometric determination of Cr(VI) has been studied. The limit of detection of Cr(VI) in $0.2 \text{ mol}\cdot\text{L}^{-1} \text{ H}_2\text{SO}_4$, $0.01 \text{ mol}\cdot\text{L}^{-1} \text{ KI}$ and 0.08% starch is $0.035 \mu\text{g}\cdot\text{L}^{-1}$, a linear dynamic range is $0.116 - 4.0 \mu\text{g}\cdot\text{L}^{-1}$, with correlation coefficient of 0.9977 . Next components of matrix are not interfere with the determination: 1000-fold excess of HCO_3^- , CH_3COO^- , HPO_4^{2-} , SO_4^{2-} , Cl^- ; 100-fold excess of $\text{C}_2\text{O}_4^{2-}$, NO_3^- and ClO_3^- ; 20-fold excess of Cr(III) and 10-fold excess of Fe(II, III) and Cu(II). It is demonstrated that tartrates can mask up to 100-fold excess of Cr(III), Fe(II, III), Cu(II). The method has been tested on natural and drinking water samples. The procedure was verified by parallel analysis with 1,5-diphenylcarbazide. The relative standard deviation by proposed method was determined as $0.023-0.047$ ($n=6$) for Cr(VI) concentration $1.17-5.06 \mu\text{g}\cdot\text{L}^{-1}$ with recovery range $98.7-102.6\%$.

Keywords: chromium(VI), UV-Vis spectrophotometry, optical probe, water samples
