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ACCEPTED MANUSCRIPT

Determination of pyrophosphate and sulfate using polyhexamethylene guanidine hydrochloride-stabilized silver nanoparticles

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ABSTRACT

Positively charged polyhexamethylene guanidine hydrochloride-stabilized silver nanoparticles (PHMG-AgNPs) were prepared and applied as a colorimetric probe for single-step determination of pyrophosphate and sulfate. The approach is based on the nanoparticles aggregation leading to change in their absorption spectra and color of the solution. Due to both electrostatic and steric stabilization these nanoparticles show decreased sensitivity relatively to many common anions, which allows for simple and rapid direct single-step determination of pyrophosphate and sulfate. Effects of different factors (time of interaction, pH, concentrations of anions and the nanoparticles) on aggregation of PHMG-AgNPs and analytical performance of the procedure were investigated. The method allows for the determination of pyrophosphate and sulfate in the range of $0.16 - 2 \mu\text{g}\cdot\text{mL}^{-1}$ and $20 - 80 \mu\text{g}\cdot\text{mL}^{-1}$ with RSD of 2 – 5%, respectively. The analysis can be performed using either spectrophotometry or naked-eye detection. Practical application of

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