

Green Synthesis of Silver Nanoparticles by Olive Leaf Extract: Application in the Colorimetric Detection of Fe³⁺ Ions

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Abstract : Olive leaf (OL) extract as a green reductant agent was utilized for the biogenic synthesis of silver nanoparticles (Ag NPs) for the first time in this study, and then its performance was evaluated for colorimetric detection of Fe³⁺ in different media. Some analytical methods were used to characterize the nanosensor. The effective sensing parameters were optimized by central composite design (CCD) combined with response surface methodology (RSM) application. Then, the prepared material's applicability in antibacterial and optical chemical sensing for naked-eye detection of Fe³⁺ ions in aqueous solutions were evaluated. Furthermore, OL-Ag NPs-loaded paper strips were successfully applied to the colorimetric visualization of Fe³⁺. The colorimetric probe based on OL-AgNPs illustrated excellent selectivity and sensitivity towards Fe³⁺ ions, with LOD and LOQ of 0.81 μ M and 2.7 μ M, respectively. In addition, the developed method was applied to detect Fe³⁺ ions in real water samples and validated with a 95% confidence level against a reference spectroscopic method.

Keywords : Ag NPs, colorimetric detection, Fe(III) ions, green synthesis, olive leaves

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