Sugar-Reduced Gelatin-Capped Silver Nanoparticles with High Selectivity for Colorimetric Sensing of Hg^{2+} and Fe^{2+} Ions in the Midst of Other Metal Ions in Aqueous Solutions.

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Green synthesized dextrose and maltose-reduced silver nanoparticles (Ag-NPs) were investigated for colorimetric sensing of metal ions at different concentrations and reaction time. The synthesized Ag-NPs were characterized using UV-Visible spectroscopy (UV-Vis), Fourier transform Infra-red spectroscopy (FTIR), transmission electron microscopy (TEM) and dynamic light scattering (DLS). Both maltose and dextrose-reduced Ag-NPs were highly sensitive and selective to Hg^{2+} and Fe^{2+} ions over other metal ions at higher metal ion concentration. This was accompanied with a colour change from yellowish solution to colourless for Hg^{2+} ions and from yellowish solution to greenish for Fe^{2+} ions. Our findings also showed that dextrose-reduced Ag-NPs resulted in better colorimetric sensing of metal ions than maltose-reduced Ag-NPs. Both Ag-NPs solutions were highly sensitive and selective towards Hg^{2+} ions at lower concentration up to 10^{-12} M with a linear regression coefficient value (R^2) of 0.9792 and 0.9740 for maltose and dextrose reduced Ag-NPs respectively. The study on variation of reaction time showed that the sensing reaction can be carried out within a short reaction time of 30 s.

Keywords: Green synthesis; silver nanoparticles; maltose; dextrose; metal ion; colorimetric sensor

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