Abstract

An aqueous extract of the leaves of Alhagi Maurorum was used in this research project to carry out an environmentally friendly synthesis of Ag–Fe bimetallic nanoparticles with use of Fe^{+3} and Ag^{+} Salts. Poor antibiotic use and infection control have led to drug-resistant bacteria. Metallo-pharmaceutics and metallic nanoparticles are broad-spectrum antibacterial alternatives. Recent research shows that transition metal compounds may have synergistic antibacterial effects. The characterization of the nanoparticles showed absorption band at 3323cm^{-1} showed phenolic acids and flavonoids presence in the leaf extract, acting as stabilizing agents, and reducing agents for metal ion groups. SEM examination was used to verify the morphology of the synthesized NPs. The data obtained clearly demonstrate sphere, triangle, tetragon, pentagon, and hexagonal formations up to 45nm in size. The production of nanoparticles was verified by composite EDX analysis. Ag, Fe, and O quality were each 51.14, 15.45, and 10.37 grams by weight, respectively. In spectrum 2, the values were (67.56, 9.75 and 0.71 measured in atomic percent for Ag, Fe and O respectively). The characteristic color of solution is due to the synthesis of nanoparticles showing peak around 290 nm in the UV/VIS spectrum, and Antimicrobial capabilities were tested against six distinct therapeutically relevant strains of multidrug-resistant microbes in order to determine their effectiveness. The Ag/Fe BNPs displayed a synergistic impact between the silver and Iron, which resulted in an antibacterial effect with good diameter of zone of inhibition of BNPs with bacterial stains when compared with values of positive control, small values of MIC and minimal bacterial concentration with NPs as compared to leaf extract. The results provide fresh clues for designing antimicrobials with greater efficacy and practical uses in treating illnesses caused by drug-resistant bacteria in both industry and medicine. These nanoparticles will be designed and synthesized using green chemistry methodologies.