World Academy of Science, Engineering and Technology
International Journal of Physical and Mathematical Sciences
Vol:14, No:05, 2020

Effect of Alkalinity of Water on the Aggregation of Colloidal Silver Nanoparticles

Authors : Fedda Y. Alzoubi, Ihsan A. Aljarrah

Abstract : Silver nanoparticles (AgNPs) are one of the most vital and fascinating nanomaterials among several metallic nanoparticles that are involved in different applications, especially in biomedical applications. Samples of different alkaline water were prepared in order to study the effect of alkalinity of water on the optical properties, size, and morphology of colloidal AgNPs prepared according to the chemical reduction method using the prepared water samples. Ultraviolet-Visible spectrophotometer, Zeta-sizer, and Scanning electron microscope (SEM) have been utilized to carry out this study. Absorption spectra AgNPs in different alkaline water show a surface Plasmon resonance (SPR) peak at the wavelength of 420 nm. The position of this peak is sensitive to the shape of the particles, and in our case, it indicates that the particles are spherical. As the alkalinity increases, the intensity of the SPR peak decreases, indicating the aggregation of particles. Zeta-sizer measurements show that the average diameter for AgNPs in pure water is found to be 53.51 nm, and this value increases as the alkalinity increases. Zeta potential values of samples show that the negatively coated particles are stable in the solution. SEM images insure the spherical shape of the prepared nanoparticles and show that as the alkalinity increases the particles aggregate into larger particles.

Keywords : aggregation, alkalinity, colloid, nanoparticle
Conference Title : ICPTT 2020 : International Conference on Physics, Theory and Technologies
Conference Location : Dublin, Ireland
Conference Dates : May 07-08, 2020