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Removal of phenol from synthetic wastewater using Ag nanoparticles loaded on Gamboge (*Garcinia Gummi-gutta* L.) based Activated carbon

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In the present study, silver nanoparticles (AgNPs) were successfully synthesized through a green route using an aqueous extract of *Garcinia gummi-gutta* L. in which aqueous extract acts as **a** capping, stabilizing and reducing agent. Activated carbon (AC) was prepared using gamboge and two activating agents: $ZnCl_2$ and H_3PO_4 in order to explore AgNPs loaded onto Gamboge based AC for the removal of phenol from synthetic wastewater. The synthesized AgNPs were characterized using Ultraviolet-visible spectroscopy (UV-Vis) which exhibits a characteristic wavelength at 422 nm. Dynamic light scattering (DLS) analysis showed that AgNP clusters have an average diameter of 104.4 nm. AgNPs loaded onto AC were used to remove phenol from synthetic wastewater through photocatalytic degradation. AgNPs loaded onto AC prepared using $ZnCl_2$ have higher removal efficiency for phenol when compared with AgNPs loaded onto AC prepared using H_3PO_4 at optimized experimental conditions. The highest phenol degradation efficiency, 80.13 % was detected with AgNPs loaded onto AC prepared using $ZnCl_2$ under optimum conditions of pH 7, photocatalyst dosage of 5 g L^{-1} and initial concentration of 100 mg L^{-1} in irradiation time of 6 h. Results of this study suggested that AgNPs loaded onto AC prepared using a low cost biomass, Malabar tamarind (Gamboge), can be efficiently utilized for the removal of phenol from wastewater.

Keywords: *Silver, nanoparticles, Gamboge, activated carbon, phenol*

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