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A Novel Procedure for Green Synthesis of Silver Nanoparticles on Activated Carbon

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Activated carbon (AC) is the most efficient adsorbent used for pollutant removal due to its large surface area, well-developed pore structure, high-speed adsorption and thermal and chemical stability [1]. Silver nanoparticles (AgNPs) have attracted significant attention due to their remarkable properties and diverse applications. They are important antibacterial materials as an effect of their larger surface areas in comparison to the bulk material. Researches have shown that silver nanoparticles, silver ions, and nano silver-containing complexes have antimicrobial behavior with a high ability to inactivate bacteria and viruses [2, 3]. However, conventional synthesis methods often involve the use of toxic chemicals and generate environmental concerns. This work investigates the preparation and characterization of activated carbon from semecarpus anacardium nutshell by KOH activation. In this study also, we present a green synthesis approach for fabricating Ag Nano particles on ACs using starch and glucose as novel materials for stabilizing and reducing agents, respectively. Transmission Electron Microscopes (TEMs) images confirm the particle size distribution of the silver nanoparticles mainly in the range of 1–5 nm.

The synthesized AgNPs were characterized for their physicochemical properties, including morphology, particle size distribution, and surface chemistry. The environmentally friendly synthesis method demonstrated the potential for large-scale production of silver nanoparticles with enhanced stability and reduced environmental impact. The study also highlights the diverse applications of green-synthesized AgNPs in various fields.

Keywords: Green synthesis, Silver nanoparticles, Activated carbon, Physicochemical characterization, Environmental impact, Applications.

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