Synthesis and characterization of bioactive composite material comprising silver nanoparticles and activated carbon to produce bacteria free potable water.

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Abstract:

Composite material of silver nano-particles (SNPs) and activated carbon was synthesized by wet chemical method. Morphology and particle size of SNPs were investigated by Scanning Electron Microscopy (SEM), Transmission Electron Microscopy (TEM) and X-ray powder diffraction (XRD). Particle size obtained from XRD data analysis using Debye Scherer formula comes out around 14nm while crystalline structure of SNPs was investigated as face centered cubic (fcc). Morphology of SNPs in activated carbon was studied using SEM. It shows well distributed, circular shaped SNPs and their agglomerates in pores of activated carbon. Presence of silver in the nano-composite was confirmed through Energy Dispersive X-ray (EDX) analysis. TEM shows majority of nanoparticles lying in the range between 10 to 20 nm while presence of metallic phase (fcc) of silver was further confirmed through electron diffraction studies. Microbiological activity of composite as antibacterial was examined through flow method, using open source water infected by Gram-negative (E. coli). One (1) gm. of nano-composite was found effective in sterilizing up to 55L of infected water. Antibacterial efficacy of the nano-composite was further verified against B. Subtilis and E. coli using disk diffusion method. Overall results show that composite material is a promising candidate for purification of open source water.

Biography:

Muhammad Aslam Tahir working at Allama Iqbal Open University Islamabad Pakistan

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