

Synthesis and Modification of Azadirachta indica (Neem Leaf) with Nimbidin: Bioadsorptive Remediation

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Abstract : Globally, Metal ion, particularly those generated from oil and gas effluents, form environmental pollution, particularly in developing regions like Nigeria, where waterborne disease is fatal. This is clear evidence for metal ion contamination within the environment. Ecofriendly and cost effective biomaterials are the best ways of reducing metal ion contamination, thus reducing the need for chemical treatment of oil and gas effluent. Despite this, research efforts to understand the mechanism of adsorption and possible bio-adsorptive remediation interventions are limited. The study combined biomaterial and adsorption techniques: A. Indica, UV-Visible spectroscopy, SEM, FTIR in a progressive manner to provide insight. The biosorption efficiency of Azadirachta Indica silver nanoparticles - AI-AgNPs was within the range of 63-95%. The study demonstrates that AI-AgNPs can be a promising agent, cheap, efficient, and biodegradable bio-sorbent for lowering oil and gas effluents. This is one of the studies to show that Azadirachta Indica is just one of the many biomaterials to synthesize silver nanoparticles through the reduction of active constituents (Nimbidin) present in them to ensure stability and surface properties, which are critical for their performance in effluent treatment. Therefore, leveraging the knowledge from this study to raise awareness through public health initiatives and community engagement will help. The prevalence of metal ions observed in the visible region in the study indicates the need for bio-adsorptive remediation interventions, not only in social settings but also in the immediate environment. There is, thus, an urgent need for targeted interventions in vulnerable communities.

Keywords : Azadirachta indica, bioadsorption, biosynthesis, effluent, nimbidin, silver nanoparticle

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