

## Synthesis and characterization of nanostarch based polymeric composite for selective removal of lead from aqueous medium

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### Abstract

Heavy metal removal is a significant process in water treatment due to their health hazards. Exposure to heavy metals has carcinogenic and neurotoxic impact on the human body. In the present study, a nano-based composite was synthesized for multi-metal sorption. The composite comprises of starch and poly (acrylic acid) (PAA) with numerous functional groups on the polymer chain acting as sorption sites. Nano-form of starch provides high surface area that enhances adsorption and smaller particle size raises the possibility for use as filler by forming cross-links with PAA. The composite was synthesized using different acid hydrolysis and ultra-sonication based protocols. The synthesized composites were characterized by FESEM and FTIR to study the structural changes. The operating parameters for batch adsorption were optimized to attain maximum removal of 99% for lead that followed pseudo-second-order kinetic model, whereas, Langmuir isotherm was found to be a better fit showing the efficiency of 166.67 mg g<sup>-1</sup> for lead. The self-assembled nanoparticles acted as fillers to improve holding capacity and strength of a super absorbing PAA hydrogel. The synthesized poly (acrylic acid) nanostarch composite (PANSC) hydrogel was found selective for lead removal. The selectivity of adsorbent was checked through multi-sorption analysis. The PANSC could be reused up to 3 regeneration cycles with >80% efficiency in the last cycle. Chemisorption was found to be the major phenomenon involved and was also accompanied by a few physical forces. Overall, the study was successful in achieving high adsorption using nanoparticles of starch to form novel PANS composite.

### Biography

Mayuri Bhatia has completed her PhD in 2019 from Department of Biotechnology, National Institute of Technology, and Warangal, India. She is working as a Project Manager at Indian Institute of Technology, Hyderabad, India. She has been cited over 150 times, and her publication H- index is 8 and has been serving as reviewer to journals from reputed publishing groups including Springer, Elsevier and Taylor and Francis.



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