

Adsorption and Kinetic Studies on Removal of NH₃-N from Wastewater onto 2 Different Nanoparticles Loaded Coconut Coir

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Abstract : The status of wastewater treatment needs a novel and quick method for treating the wastewater containing ammoniacal nitrogen. Adsorption behavior of ammoniacal nitrogen from wastewater using the nanoparticles loaded coconut coir was investigated in the present work. Manganese Oxide (MnO₂) and Zinc Oxide (ZnO) nanoparticles were prepared and used for the further adsorption study. Manganese nanoparticles loaded coconut coir (MNLCC) and Zinc nanoparticles loaded coconut coir (ZNLCC) were prepared via a simple method and was fully characterized. The properties of both MNLCC and ZNLCC were characterized by Scanning electron microscopy, Fourier Transform Infrared Spectroscopy and X-ray diffraction. Adsorption characteristics were studied using batch technique considering various parameters like pH, adsorbent dosage, time, temperature and agitation time. The NH₃-N adsorption process for MNLCC and ZNLCC was thoroughly studied from both kinetic and equilibrium isotherm view-points. The results indicated that the adsorption efficiency of ZNLCC was better when compared to MNLCC. The adsorption kinetics at different experimental conditions showed that second order kinetic model best fits ensuring the monovalent binding sites existing in the present experimental system. The outcome of the entire study suggests that the ZNLCC can be a smart option for the treatment of the ammoniacal nitrogen containing wastewater.

Keywords : ammoniacal nitrogen, MnO₂, Nanoparticles, ZnO

Conference Title : ICNST 2016 : International Conference on Nano Science and Technology

Conference Location : Kuala Lumpur, Malaysia

Conference Dates : February 11-12, 2016