



ABSTRACT

This research encompasses an extensive investigation on innovative, environmental friendly, safer and sustainable and benign methodology to prepare manganese oxide nanoparticles from Basil seed mucilage as bio-template, with a main role in mitigating environmental challenges. Basil seed mucilage is an anionic polysaccharide and possess hydrophilicity, good swelling ability, cheap production, biocompatible film formation, and viscoelastic properties. Different analytical techniques were used for characterization like UV-Visible spectroscopy, Fourier Transform Infrared Spectroscopy, Scanning Electron Microscopy and Energy Dispersive X-ray spectroscopy. Sharp peak at 290 nm (UV-Visible spectroscopy) confirmed the formation of manganese oxide nanoparticles. The FTIR spectra explains existence of various functional groups arrives from hydrogel on the surface of MnO_2 NPs and elemental analysis was done using EDX. Peak of manganese oxide nanoparticles was obtained at 553.23 cm^{-1} in FTIR. SEM imaging describes its morphology, chemical configuration and conformation, crystalline arrangement with the help of a beam of electrons. The highlight of this research, a remarkable photocatalytic dye degradation activity was performed using an organic dye, Methyl orange (MO). Results show 80% Methyl Blue degradation within 100 min of exposure to MnO NPs and 31% Methylene Blue degradation within 80 min of exposure to MnO NPs. Thus these NPs prove beneficial for environmental remediation, principally in the removal of dyes from wastewater.