Green synthesis of stannic oxide nanoparticles for ciprofloxacin degradation: optimization and modelling using a Response Surface Methodology (RSM) based on the box–behnken design

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ABSTRACT

In this work, stannic oxide (SnO2) nanoparticles were biologically synthesized utilizing the polysaccharide extract of gum acacia by performing the calcination of stannous chloride precursors at 450° centigrade. The confirmation of SnO2 nanoparticles was done through various characterizations. Making use of the Scherer formula within the XRD analysis, the dimensions confirmed for the synthesized nanoparticles of SnO2 was obtained to be 4.66 nm. SnO2 NPs are 4.22 nm in size, according to TEM images. ciprofloxacin is a frequently utilized antibiotic as well as exclusive therapy for bacterial infections, and not viral pathogens. In this report, ciprofloxacin photocatalytic degradation in presence of stannic oxide was investigated, which was confirmed by the UV–Vis characterization. The results also optimized using RSM optimization and indicated that the efficiency of ciprofloxacin removal is 99.7% under the optimum conditions of experimental factors (catalyst concentration (R1) in 50 mg/L, ciprofloxacin dose (R2) in 0.5 g/L, and Reaction time (R3) in 120 min). These results suggest that these nanoparticles possess great potential for removing ciprofloxacin from aqueous solutions.

KEYWORDS

Ciprofloxacin; Green synthesis; Stannic oxide; Gum acacia;Nanoparticles;Photocatalytic activity

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