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Green synthesis of TiO_2 using *Ocimum basilicum* leaf extract and its application in photocatalytic degradation of amoxicillin residues from aqueous solution

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ABSTRACT

Much research has been triggered by interest in green synthesis because it is low in toxicity and high in reproducibility, as well as pollution-free and cost-effective. The aim of this study is the production of titanium dioxide nanoparticles using basil leaf (B-TiO_2). The formation, size, and shape of the B-TiO_2 particles were confirmed via spectroscopy and microscopy using the X-ray diffraction, Fourier-transform infrared spectroscopy, and scanning electron microscopy techniques to investigate the B-TiO_2 synthesized. The photocatalytic effectiveness of the B-TiO_2 nanoparticles was examined by degrading the amoxicillin (AMOX) residue from an aqueous solution using solar irradiation. From the findings the B-TiO_2 was proven to be highly capable of treating AMOX-contaminated water and showed maximum removal efficiency, achieving 91.36% under the best operational conditions of pH 5, and specific concentrations of B-TiO_2 (25 mg/L), H_2O_2 (500 mg/L) and AMOX (10 mg/L). Besides, the results showed that during the decomposition process the elimination of total organic carbon achieved 86.24% and intermediate compounds were generated when GC-Mass testing was done. In the present study, it was confirmed that during the degradation of AMOX the green synthesis of the B-TiO_2 photocatalyst nanocomposite, in a solar–photocatalytic reactor, at optimum operating conditions, revealed acceptable efficiency.

Keywords: Synthesis; TiO_2; Basil leaves; Amoxicillin residues; Advanced oxidation processes; Solar irradiation

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