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## A comparative study of the catalytic activity of ZnO nanostructures prepared using microwave and sol-gel method: A green approach

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The present study reports the structural, optical and catalytic studies of green synthesised ZnO nanostructure using microwave and sol-gel method. The materials are characterised using XRD, FTIR, Raman and UV-Vis diffuse reflectance spectroscopic analysis. The XRD analysis reveals the formation of hexagonal wurtzite ZnO with an average crystalline size of 47.2 nm and 32.4 nm, respectively for ZnO prepared using microwave (ZnO-M) and sol-gel method (ZnO-S). The catalytic activity of the nanostructures are analysed with the nitrophenol reduction in the presence of  $\text{NaBH}_4$ , indicating the superior performance of ZnO-M compared to ZnO-S. The optimised nanostructure exhibit a conversion efficiency of 97.3% with a first order rate constant of  $0.44 \text{ min}^{-1}$ . This study highlights the effectiveness of the synthesized ZnO nanostructures in detoxifying 4-nitrophenol from aqueous solutions.

**Keywords:** Green synthesis, Sol-gel, ZnO, Catalysis