

In the present work, microwave-assisted method is used to synthesize TiO₂ nanoparticles from *Wrightia tinctoria* leaf extract. Further more, photocatalytic degradation of organic dyes (methyl blue and methyl orange) was studied under sunlight irradiation using synthesized nanoparticles. The synthesized nanoparticles were characterized by X-ray diffraction (XRD), high-resolution transmission electron microscopy (HR-TEM), DLS, ZE, FT-IR, Raman, PL and ultraviolet (UV)-visible studies. The XRD analysis confirmed that the catalyst is composed of anatase tetragonal TiO₂ phase with crystallite size of 9.93 nm. The HR-TEM results show that the particles are in spherical shape with particle size of * 22 nm (TiO₂ nanoparticles). The UV-Vis (Tauc plot) spectrum (2.52 eV) of the prepared TiO₂ nanoparticles suggest that intrinsic band gap absorption of TiO₂ and electron transition is from the valence band to conduction band. In addition, the synthesized TiO₂ nanoparticles were tested at various concentrations .and these results revealed potential antibacterial activities