

In the present work, microwave-assisted method is used to synthesize TiO<sub>2</sub> nanoparticles from *Wrightia tinctoria* leaf extract. Furthermore, 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 TiO<sub>2</sub> 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 (TiO<sub>2</sub> nanoparticles). The UV-Vis (Tauc plot) spectrum (2.52 eV) of the prepared TiO<sub>2</sub> nanoparticles suggest that intrinsic band gap absorption of TiO<sub>2</sub> and electron transition is from the valence band to conduction band. In addition, the synthesized TiO<sub>2</sub> nanoparticles were tested at various concentrations and these results revealed potential antibacterial activities.