

Green Synthesis of Titanium Dioxide Nanoparticles using Gum Arabic as Biotemplate: Evaluation of its Efficiency in Organic Dye Removal

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In the present study we report a green and eco-friendly method for the synthesis of titanium dioxide (TiO₂) nanoparticles (NPs) from titanium oxysulfate solution using Gum Arabic (*Acacia senegal*), as reductive and NPs formation agent. The synthesized TiO₂ NPs were characterized by various techniques such as XRD, FT-IR, Raman spectroscopy, SEM-EDX, TEM, HR-TEM and UV-visible spectroscopy. The average particle size was calculated as 9nm from TEM data and the synthesized NPs were found to be spherical in shape. XRD analysis confirmed the formation of TiO₂ NPs in the anatase phase with high crystal purity. Furthermore, the activities of TiO₂ NPs were evaluated with regard to their ability to remove organic dyes (Coomassie Brilliant Blue G-250). The nanoparticles exhibited excellent efficiency in dye removal i.e., about 99.3% removal efficiency was observed. And the results of this study suggests that nano biogenic titanium dioxide material acts as a good implantable material for environmental remediation.

Key words: Titanium dioxide nanoparticles, hydrocolloid, Gum Arabic, dye removal, green synthesis.