



## Photocatalytic decoloration of three commercial dyes in aqueous phase and industrial effluents using TiO<sub>2</sub> nanoparticles

Hiral Soni<sup>a,\*</sup>, J.I. Nirmal Kumar<sup>a</sup>, Khushal Patel<sup>b</sup>, Rita N. Kumar<sup>c</sup>

<sup>a</sup>Department of Environment Science and Technology (DEST), Institute of Science and Technology for Advanced Studies and Research (ISTAR), Vallabh Vidyanagar 388120, Gujarat, India, Tel. +91 9978033036; email: [hiralsoni@ymail.com](mailto:hiralsoni@ymail.com) (H. Soni), Tel. +91 9825968242; email: [nirmalkji@gmail.com](mailto:nirmalkji@gmail.com) (J.I.N. Kumar)

<sup>b</sup>Department of Bioscience, Ashok and Rita Patel Institute of Integrated Study and Research in Biotechnology and Allied Sciences, New Vallabh Vidyanagar 3888121, Gujarat, India, Tel. +91 9978365630; email: [khushalbiotechstudent@yahoo.co.in](mailto:khushalbiotechstudent@yahoo.co.in)

<sup>c</sup>Department of Bioscience & Environment Science, N.V. Patel College of Pure and Applied Sciences, Vallabh Vidyanagar 388120, Gujarat, India, Tel. +91 9825924687; email: [ritankumar@yahoo.co.in](mailto:ritankumar@yahoo.co.in)

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### ABSTRACT

TiO<sub>2</sub> sol was synthesized under mild conditions (25 ± 1°C and ambient pressure) by hydrolysis of titanium isopropoxide in aqueous solution and subsequent reflux to enhance crystallization. The material was characterized by X-ray diffraction, transmission electron microscopy, and Fourier transform infrared. The synthesized sample presented a pure phase anatase with nanometric particle size. The photodegradation of reactive dyes (malachite green, methylene blue, and rhodamine B) and industrial effluents was elucidated in aqueous suspension containing titania nanoparticles under UV irradiation. Also, the effect of pH in nanoparticle synthesis and role of catalyst dose and dye concentration were evaluated. The experimental result showed that particles synthesized by sol–gel method are of 20–40 nm anatase form with cuboidal structure and OH<sup>−</sup> as a major functional group. These particles showed efficiency to degrade dyes up to 98% and industry (paint and textile) effluents can be decolorized in the TiO<sub>2</sub>/UV system.

*Keywords:* Methylene Blue; Malachite Green; Rhodamine B; Industrial effluents; TiO<sub>2</sub> adsorbent; Photocatalysis

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\*Corresponding author.