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Photodegradation of Rhodamine 6G and phenol red by nanosized TiO₂ under solar irradiation

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Abstract Titanium dioxide nanoparticles are used in various applications, including environmental photocatalysis, solar cells and memory devices. In this study, we present the photodegradation of Rhodamine 6G and phenol red, employing heterogeneous photocatalytic process under solar irradiation. The experiments were carried out to study the effects of various parameters (i.e. the effect of the anchoring groups on the catalyst, concentration of the *n*-TiO₂ semiconductor). The *n*-TiO₂ was synthesized by a sol–gel process and characterized by SEM. When samples of *n*-TiO₂ of different sizes were encapsulated with eriochromycine dye the quantum size effect is observed in the visible region of the spectrum. The rate of degradation was estimated from the residual concentration spectrophotometrically. Phenol red showed higher degradation than Rhodamine 6G which can be attributed to its sulfonic and hydroxyl anchoring groups. The photodegradation showed pseudo-first-order kinetics.

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