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PHOTOCATALYTIC ACTIVITY OF Ag/TiO_2–P25-MODIFIED CEMENT: OPTIMIZATION USING TAGUCHI APPROACH

Mohammad A. Behnajady[1*], Sara Bimeghdar[1], Hamed Eskandarloo[2]

[1]*Department of Chemistry, College of Science, Tabriz Branch, Islamic Azad University, Tabriz, Iran*
[2]*School of Chemistry, College of Science, University of Tehran, Tehran, Iran*

Abstract

In this study, Ag/TiO_2–P25 nanoparticles prepared via photodeposition method and its textural properties were characterized using X–ray diffraction (XRD), transmission electron microscopy (TEM), UV–vis diffuse reflectance spectroscopy (DRS), and N_2 physisorption techniques. The cements modified with TiO_2–P25 and Ag/TiO_2–P25 nanoparticles were immobilized on tile plates, and their photocatalytic activity was evaluated versus the removal of Erioglaucine as the model organic pollutant. The Ag/TiO_2–P25-modified cement showed the highest photocatalytic activity compared to TiO_2–P25 modified cement due to the positive effect of silver in trapping photogenerated electrons at conduction band of TiO_2. Also, the effect of operational variables such as initial Erioglaucine concentration, irradiation time, and UV–light intensity on the photocatalytic activity of Ag/TiO_2–P25-modified cement was investigated and optimized using the Taguchi approach. The optimum operational conditions were found to be: initial Erioglaucine concentration of 5 mg L^{-1}, irradiation time of 90 min and UV–light intensity of 55.9 W m^{-2}.

Key words: Ag/TiO_2–P25, fixed–bed system, modified cement, photocatalytic removal, taguchi approach

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[*]Author to whom all correspondence should be addressed: e-mail: behnajady@gmail.com, behnajady@iaut.ac.ir; Phone: +98–411–3396136; Fax: +98–411–3333458