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PHOTOCATALYTIC ACTIVITY OF Ag/TiO₂-P25 MODIFIED CEMENT: OPTIMIZATION USING TAGUCHI APPROACH

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Abstract

In this study, Ag/TiO₂-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 N₂ physisorption techniques. The cements modified with TiO₂-P25 and Ag/TiO₂-P25 nanoparticles were immobilized on tile plates, and their photocatalytic activity was evaluated versus the removal of Erioglucine as the model organic pollutant. The Ag/TiO₂-P25 modified cement showed the highest photocatalytic activity compared to TiO₂-P25 modified cement due to the positive effect of silver in trapping photogenerated electrons at conduction band of TiO₂. Also, the effect of operational variables such as initial Erioglucine concentration, irradiation time, and UV-light intensity on the photocatalytic activity of Ag/TiO₂-P25 modified cement was investigated and optimized using the Taguchi approach. The optimum operational conditions were found to be: initial Erioglucine concentration of 5 mg L⁻¹, irradiation time of 90 min and UV-light intensity of 55.9 W m⁻².

Key words: Ag/TiO₂-P25, fixed-bed system, modified cement, photocatalytic removal, Taguchi approach

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