PHOTOCATALYTIC ACTIVITY OF Ag/TiO$_2$–P25-MODIFIED CEMENT: OPTIMIZATION USING TAGUCHI APPROACH

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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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