Enhanced degradation efficiency of mixed industrial effluent by modified nanocomposite photocatalyst under UVLED irradiation

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Abstract:

The aim of this study is to investigate the enhancement of photocatalytic degradation capacity of mixed industrial effluent using a modified activated charcoal/TiO2 nanocomposite catalyst. These nanocomposite catalysts are synthesized by the sol–gel method. The synthesized nanocomposite materials were characterized to confirmed material morphology and size by DLS, FTIR, crystallographic phase analysis (XRD), SEM, UV–Vis spectra, TGA and BET. This modified AC/TiO2 nanocatalyst removal efficiency is evaluated by photocatalytic degradation of mixed industrial effluent under UVLED light irradiation in different time intervals. The results demonstrate that the COD and BOD show 97% and 94% removal, respectively, at 90 min after that the degradation value becomes constant. Photocatalytic degradation of industrial effluent using AC/TiO2 followed pseudo-first-order reaction kinetics, and reaction rate constant was $1 \times 10{-2}$. Therefore, the performed experiment concludes that removal efficiency enhances to increase reaction time under UVLED irradiation.

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