



Comparative study on photocatalytic treatment of diclofenac: slurry vs. immobilized processes

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ABSTRACT

The applicability of different photocatalytic systems for the treatment of pharmaceuticals in water was investigated. Slurry (UV-A/TiO₂(s) and UV-A/TiO₂(s)/H₂O₂) and immobilized (UV-A/TiO₂(i)/H₂O₂) processes were compared regarding the removal of diclofenac (DCF) and total organic content, as well as the improvements in biodegradability and toxicity. The applied response surface modeling revealed the significance of TiO₂ dosage and concentration of H₂O₂, while pH was less influential within the studied range. Although UV-A/TiO₂(i)/H₂O₂ was somewhat less effective in comparison with UV-A/TiO₂(s)/H₂O₂ process (88.8% and 99.1% of DCF removal, respectively), the immobilized system enabled photocatalyst reuse. In comparison with air dried and thermally reactivated, chemically reactivated photocatalyst provided better performance through four consecutive runs.

Keywords: TiO₂ photocatalysis; Pharmaceuticals; Slurry process; Immobilized photocatalyst; Reactivation

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