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EFFICIENT DEGRADATION OF CLOFIBRIC ACID BY HETEROGENEOUS PHOTOCATALYTIC OXIDATION PROCESS

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Abstract

Emerging pollutants such as pharmaceutical active compounds were detected worldwide in different environmental compartments. Nowadays, multiple studies are focused on the investigation of their environmental fate, as well as to find new, efficient and sustainable removal technologies. Several studies demonstrated that heterogeneous photocatalysis is one of the most promising techniques used for water purification. Thus, the aim of our work was to evaluate the photodegradation efficiency of a refractory emergent compound, named clofibric acid, under UV light in aqueous solution. We report that photodegradation and mineralization efficiency are strongly dependent of the catalyst used. Results showed that the photodegradation was enhanced in the presence of TiO₂ Aeroxide. The complete elimination was achieved for an initial pollutant concentration of 1.5 mg/L after 30 min of irradiation, the degradation rate following the pseudo-first order kinetics. It was also observed that the rate constant for the photodegradation process is affected by the concentration of catalyst. Process efficiency is enhanced by increasing the light intensity. The simultaneous reduction of pollutant concentration and dissolved organic carbon demonstrates the mineralization of the target molecule. Furthermore, it was demonstrated that the addition of nitrate to the system increases the pollutant degradation rate, while the carbonate reduces its removal, suggesting that this last ion can act as a hydroxyl scavenger. Preliminary phytotoxicity tests were also carried out and showed the capacity of the heterogeneous photocatalysis to reduce the toxicity of reaction intermediates generated during the photocatalytic reaction.

Key words: degradation, kinetics, mineralization, nanosized catalysts, persistent micropollutant, photocatalysis

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