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STUDY OF APPLICATION OF TITANIA CATALYSTS ON SOLAR PHOTOCATALYSIS: INFLUENCE OF TYPE OF POLLUTANTS AND WATER MATRICES

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ABSTRACT

A comparative analysis of photocatalytic efficiency has been carried out with both TiO_2 P25 and a home-made catalyst at a solar radiation pilot plant constituted by Compound Parabolic Collector (CPC) systems. The effect of the chemical nature of three different substrates (phenol, dichloroacetic acid and pyrimethanil) and the impact of inorganic ions in natural waters, on their final photo-efficiencies was also analyzed. Subsequently, this solar photocatalytic process was applied to the photodegradation of a mixture of emerging contaminants considering the separation and recovery of catalysts by sedimentation. Although TiO_2 P25 showed better results during phenol and dichloroacetic acid photodegradation, both photocatalysts presented similar photo-efficiencies in pyrimethanil mineralization and, specially, in the treatment of emerging pollutants. The presence of high concentrations of inorganic ions in natural waters constitutes a limiting factor for solar photocatalytic activity, but this process successfully photodegraded the mixture of micropollutants (carbamazepine, ibuprofen, sulfamethoxazole, ofloxacin, flumequine) in natural water matrix using both TiO_2 catalysts, at very short irradiation times (t_{30w} < 35 min). Therefore, solar assisted heterogeneous photocatalysis represents a very efficient, promising and competitive AOP to remove emerging contaminants like the pharmaceutical micropollutants studied here and frequently detected in Municipal Wastewater Treatment Plants.

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