Study on the Optimum Photoreactor Design for the Treatment of Organic Compounds in Aqueous Solutions by aLaminar-Falling

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ABSTRACT

The purpose of this study was to develope the design equation of a laminar-falling-film-slurry-type (LFFS) photoreactor for the treatment of organic wastewaters(Acid Red 4 and Isopropyl Alcohol) by VUV related pocess. The photoreactor design equations were established by combining with the chemical kinetics of the photocatalytic system, light absorption model within the photoreactor, and was used to predict the decomposition of IPA and Acid Red 4 in aqueous solutions in the photoreactors of different geometries at various operating conditions (solution pH values, UV light intensities , reactor diameter, flow rate) to verify its rationality and feasibility. By the treatment of the LFFS-VUV only process, it was found that the decoloration rates of dye and IPA in aqueous solutions increased with the increasing of VUV light intensity , dosage of TiO2, dosage of H2O2 , and decreased with the increaing diameter of tube of the photoreactor. The photoreactor design equation developed can reasonablely to predict reaction behaviors of dyes and IPA at various operating conditions and distribution profiles of dyes and IPA .The results of this research can be the useful bases for the future application of the heterogeneous VUV-based advanced oxidation processes.

Keywords : Acid Red 4 , IPA laminar-falling-film-slurry-type (LFFS) reactor , photocatalysis , VUV , AOPs

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