以連續迴流式紫外線/過氧化氫程序處理含染料及異丙醇廢水之光反應器設計研究

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ABSTRACT

The purpose of this study is to develop the design equations of a continuous annular photoreactor for the treatment of organic wastewaters by a homogeneous phase AOP (presented as a recycled-type UV/H2O2 process). The research scope is to treat organic (dyes and lsopropylalcohol) wastewaters by a recycled-type UV/H2O2 process to investigate the removal characteristics of pollutants and evaluate the treatment efficiencies based on my relative works of previous two years. It is intended to recycle the excessive H2O2 to obtain optimum utilization of the oxidant under various operation conditions (e.g. reflux ratios). The specific design equations of the photoreactor for the photooxidation systems will be developed and assessed for various types of pollutants. A Fluent 5.0 software of the computational fluid dynamics (CFD) is used to describe the steady state distribution of the fluid fields within the photoreactor to correlate the treatment efficiency of pollutants. The photoreactor design equation was established by combining with the chemical kinetics of the photooxidation systems, empirical rate expression of oxidants and dye pollutants, and UV light distribution model in the photoreactor, and was used to predict the decomposition of pollutants (Reactive Red 141 and IPA) within photoreactor of geometries at various operating conditions (hydraulic retention times, solution pH values, UV light intensities, initial concentrations of dyes, and dosages of oxidants) to verify its rationality and feasibility. The photoreactor design equation developed was found reasonablely to predict reaction behaviors of dyes at various operating conditions and distribution profile within photoreactor. The results of this research can be as useful bases of the future application of the UV-based advanced oxidation processes. Keywords: advanced oxidation processes (AOPs), design equation of photoreactor, recycled reactor, UV/H2O2 process, computational fluid dynamics (CFD), dye wastewater, IPA

Keywords : advanced oxidation processes (AOPs) ; design equation of photoreactor ; recycled reactor ; UV/H2O2 process ; computational fluid dynamics (CFD) ; dye wastewater ; IPA

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