

Photocatalytic Degradation of Aqueous Organic Pollutant under UV Light Irradiation

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Abstract : In the setting of the waters purification, some molecules appear recalcitrant to the traditional treatments. The exploitation of the properties of some catalysts permits to amplify the oxidization performances with ultraviolet radiance and to remove this pollution by a non biological way. This study was conducted to investigate the effect of a photocatalysis oxidation system for organic pollutants treatment using a new reactor design and ZnO/TiO₂ as a catalyst under UV light. Oxidative degradation of tylosin by hydroxyl radicals (OH[•]) was studied in aqueous medium using suspended forms of ZnO and TiO₂. The results improve that the treatment was affected by many factors such as flow-rate of solution, initial pollutant concentration and catalyst concentration. The rate equation for the tylosin degradation followed first order kinetics and the rate-constants were determined. The reaction rate fitted well with Langmuir-Hinshelwood model and the removed ratio of tylosin was 97 % in less than 60 minutes. To determine the optimum catalyst loading, a series of experiments were carried out by varying the amount of catalyst from 0.05 to 0.5 g/L. The results demonstrate that the rate of photodegradation is optimum with catalyst loading of 0.1 g/L, reaction flow rate of 3.79 mL/s and solution natural pH. The rate was found to increase with the decrease in tylosin concentration from 30 to 5 mg/L. Therefore, this simple photoreactor design for the removal of organic pollutants has the potential to be used in wastewater treatment.

Keywords : advanced oxidation, photocatalysis, TiO₂, ZnO, UV light, pharmaceuticals pollutants, Spiramycin, tylosin, wastewater treatment

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