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Photocatalytic Degradation of Amoxicillin and Cephalexin from Aqueous Solution by ZnO and TiO2

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Abstract

Not undestanding and recognizing the factors affecting waters containing pharmaceutical compounds accurately will result in irrecoverable damages. For case in a point, the development of antibiotic resistance in bacteria affect the denitrification process and weaken methane-producing bacteria. To perform this investigation, after library studies and collecting the required information, for the feasibility study of degrading pharmaceutical compounds, advanced oxidation process by titanium dioxide and zinc oxide nanoparticles from synthetic solutions was used.

The optimal values of pH were obtained at 5 and 7 for Amoxicillin and Cephalexin, while the desired value of titanium dioxide and zinc oxide nanoparticles was obtained as 2 g/L. The best contact time for Amoxicillin and Cephalexin by both nanoparticles was achieved at 15 and 45 min and the optimum initial concentration of Amoxicillin and Cephalexin was obtained as 15 and 5 mg/L, respectively. In 18 W radiation of ultraviolet, the removal efficiency of Amoxicillin and Cephalexin with zinc oxide was obtained as 48.6% and 81.8%, and with titanium dioxide was 27.6% and 63.5%, respectively.

The results unveiled that the photocatalytic process of zinc oxide nanoparticles has a higher efficiency compared to titanium dioxide nanoparticles.

Keywords: Photocatalyst, Titanium Dioxide, Zinc Oxide, Amoxicillin, Cephalexin