

Butachlor and Diazinon Elimination from Aqueous Solution using TiO₂/ZnO nano-photocatalysts

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Abstract

This experimental investigation was conducted under UV radiation and the effects of parameters such as pH (3-11), adsorbent quantity (2-4 g/L), contact time (0-60 min), the initial concentration of pesticides (1-100 ppm), and the luminescence of (6 and 18 watts) were investigated on the removal efficiency.

The optimal pH value for Butachlor with both catalysts was achieved at 9. It was equaled to 5 for Diazinon with TiO₂ and 7 with ZnO. The best contact time for kinds of contaminants was achieved at 5 min with TiO₂ and 15 min with ZnO. The Optimum value of ZnO was obtained at 0.2 g/L with Butachlor or Diazinon. It was 1 g/L for TiO₂ with Diazinon and 1.4 g/L for TiO₂ with Butachlor. The optimal initial concentration of Diazinon and Butachlor by both catalysts were 5 and 10 mg/L. In an 18W ultraviolet radiation, the removal efficiency of Diazinon and Butachlor with ZnO was 55.1% and 97.6%, and with TiO₂ was 45.6% and 100% respectively.

The results unveiled that the photocatalytic process of ZnO nanoparticle had a higher efficiency in the degradation of Butachlor. In contrast, the photocatalytic process of TiO₂ nanoparticle had a higher performance in the removal of Diazinon.

Keywords: Photocatalyst, Titanium Dioxide, Zinc Oxide, Butachlor, Diazinon