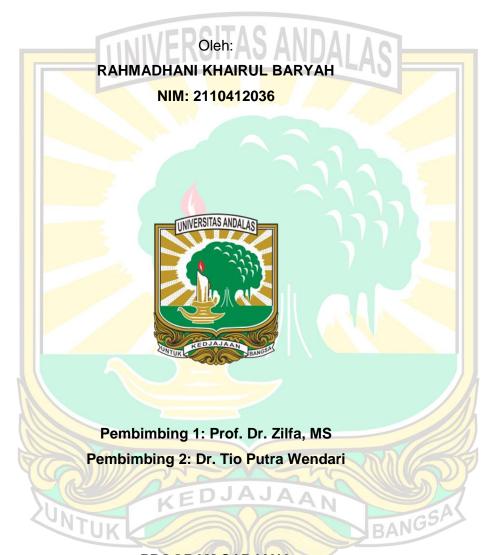
DEGRADASI RESIDU PESTISIDA KLORPIRIFOS PADA BUNCIS MENGGUNAKAN KATALIS TIO2/ZEOLIT SECARA FOTOLISIS

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ABSTRACT

PHOTOLYTIC DEGRADATION OF CHLORPYRIFOS PESTICIDE RESIDUES IN GREEN BEANS USING A TIO₂/ZEOLIT CATALYST

by:

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Pesticide residues such as chlorpyrifos in agricultural products are toxic to both human health and the environment. Titanium dioxide (TiO₂) is a widely used photocatalyst for pollutant removal; however, its efficiency is limited due to its relatively low surface area. To enhance its photocatalytic performance, natural zeolit was employed to improve the effectiveness of TiO₂. Zeolit has a high surface area and strong adsorpti<mark>on capacity, and w</mark>he<mark>n com</mark>bined with a photocatal<mark>yst, it</mark> can improve pollutant degradation efficiency through simultaneous adsorption and photocatalysis. This study aims to degrade chlorpyrifos pesticide residue on green beans using TiO₂ supported by zeolit through a photolysis process. The TiO₂/zeolit catalyst was synthesized through activation and saturation of zeolit, followed by combination <mark>with TiO₂. Chlor</mark>pyrifos residues on green bean samples were analy<mark>zed using</mark> a UV-Vis spectrophotometer, while catalyst characterization was conducted using FTIR and XRD. The study also looked at the effects of photolysis time and catalyst dosage on degradation efficiency. The results showed that the degradation percentage of chlorpyrifos under UV light reached 72.88% with TiO₂ and 30.17% with z<mark>eolit. The TiO₂/zeolit composite exhibited a significant improveme<mark>nt in</mark> degradation</mark> efficiency, reac<mark>hing 98.82%, indicating an effective synergy between photolysis and adsorpti</mark>on. In the absence of UV irradiation, degradation was only 44.45%, confirming the essential role of UV light in activating TiO₂ as a photocatalyst and en<mark>ha</mark>ncing the degradation of chlorpyrifos. The de<mark>gr</mark>adation of chlorpyrifos using TiO₂/zeolit followed first-order kinetics, where the reaction rate is directly proportional to the remaining chlorpyrifos concentration. FTIR analysis of the samples indicated successful degradation through the reduction of characteristic peak intensities. Furthermore, FTIR and XRD characterizations of the catalyst showed that the TiO₂/zeolit catalyst maintained its structural stability after the degradation process, allowing for potential reuse. This study shows that TiO₂/zeolit is effective for photocatalytic pesticide removal and may be applied in agricultural waste treatment.

Keywords: Photolysis, TiO₂/zeolit, chlorpyrifos, degradation, green beans