

Poster Presentation

Purification of Agricultural Soil from Organic Contaminants by Solar-Driven Photo- degradation with ZnO Nanoparticles: Laboratory and Pilot-Plant Scale Study

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Abstract

Purification of the agricultural soil from toxic organic contaminants using solar-driven photo-degradation was studied in the present research. This type of degradation was based on the availability of sunlight as a major source of power, low cost catalyst and possible photochemical degradation processes. The aim of this research is to find an effective and a low cost method for mineralization of chlorinated hydrocarbons contaminating agricultural soils, specifically 3-chlorophenol (3-cp). This is a hazardous compound that results from pesticides use, certain factories residues and domestic detergents, and pollutes the soil. The present study involved two types of experiments: The laboratory scale study and the pilot-plant scale study. Two forms of catalysts were used: the lab-prepared ZnO and the commercial ZnO. The effect of certain factors such as, concentration of the contaminant, irradiation time, pH value, catalyst loading and application method on the contaminant degradation had been studied. The results showed an increase in the % photo- degradation when the amount of catalyst and irradiation time were increased. % photo-degradation was influenced by the concentration of contaminant as it showed a decrease. Acidic medium was found to be more suitable for the contaminant degradation than the basic medium. There were no significant differences between the powder form and spray form of the catalyst. Pilot-plant scale results were consistent with the lab-scale results, as the % photo-degradation increased with the increase of time overall 4 days of irradiation.