

Pattaraporn Srichumni 2007: Degradation of Dissolved Pesticides by Photocatalysis Process Using Titanium Dioxide Catalysts. Master of Engineering (Environmental Engineering), Major Field: Environmental Engineering, Department of Environmental Engineering. Thesis Advisor: Assistant Professor Monthon Thanuttamavong, Ph.D. 99 pages.

The experiment is researched on the degradation of water soluble-pesticide which contains Propanil, Fenitrothion, Thiobencarb and 2,4-D by photocatalysis in single and mixed solutions. Titanium dioxide concentration of 500 mg/L used as a catalyst will react with UV light irradiation in a wavelength of 253.7 nm, which is applied from 24 watt UV tube with a 63.7 lux illumination. This experiment control pH at  $6.5 \pm 0.5$  and temperature at  $29.0 \pm 1$  °C.

The experimental result indicated that the photocatalysis process will archive higher efficiency than the adsorption process. For 180 minute-experiment, 2,4-D is the redundancy degraded substance; Thiobencarb and Fenitrothion are degraded less than 2,4-D; Propanil is the lowest degraded substance. Treatment efficiencies in single solutions are 56.74% removal of Propanil, 62.09% removal of Fenitrothion, 65.39% removal of Thiobencarb, and 69.54% removal of 2,4-D. For treatment efficiencies in a mixed solution is 16.95% removal of Propanil, 34.01% removal of Fenitrothion, 50.48% removal of Thiobencarb, and 57.23% removal of 2,4-D. Treatment efficiencies will be increased when pesticide adsorbs stable onto the Titanium dioxide surface or the increasing of illumination from UV light irradiation of the photocatalysis process.

In this experiment, Langmuir-Hinshelwood equation is used to describe the kinetics of the photocatalysis process; found four types of pesticides much stable in adsorption process than reaction rate. The adsorption constant ( $K_{LH}$ ) in single solutions of Propanil, Fenitrothion, Thiobencarb and 2,4-D are 0.35752, 0.35563, 0.12857, and 0.14326 L/mg and a mixed solution the adsorption constants are 0.13539, 0.29586, 0.38420 and 0.55672 L/mg respectively. The reaction rate constant ( $k_{LH}$ ) in single solutions of Propanil, Fenitrothion, Thiobencarb and 2,4-D are 0.04274, 0.04484, 0.09692, and 0.09375 mg/L-min and a mixed solution the reaction rate constants are 0.00202, 0.00456, 0.00864, and 0.00857 mg/L-min respectively. The reaction rate constant will be increased when the increasing of illumination from UV light irradiation. Likewise, the adsorption constant in single solutions of Propanil and Fenitrothion are increased, Thiobencarb and 2,4-D are decreased. In a mixed solution the adsorption constants of four types of pesticides are decreased.

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