KINETIC STUDY OF PHOTOCATALYTIC OXIDATION OF METHYLENE BLUE USING CATALYST SEMICONDUCTOR TiO$_2$

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Abstract

Photocatalytic degradation of methylene blue has been done on this research. This study aimed to determine the kinetics of degradation of methylene blue which include reaction rate, order, and reaction rate constant in photocatalytic oxidation using TiO$_2$ semiconductor catalyst and O$_2$/UV. The activity of photocatalytic oxidation of methylene blue was observed at $\lambda = 665$ nm with different degradation time for 150 minutes and 6 watt UV light irradiation. The initial concentration 1 mg/L showed maximum degradation percentage for 64,33%. The degree of acidity (pH) of the initial solution 7 gave the highest influence on the degradation percentage for 82,86% when the concentration of solution is 1 mg/L. Kinetics of photocatalytic oxidation of methylene blue followed pseudo 1,073 order with reaction rate constant is 0,002 minute$^{-1}$. Reaction rate of degradation of methylene blue respectively are 5,463 x 10$^{-3}$ mg/L·minute, 15,956 x 10$^{-3}$ mg/L·minute, dan 19,617 x 10$^{-3}$ mg/L·minute for initial concentration 1, 3, and 5 mg/L when pH solution is 7.

Key Words : methylene blue, kinetic study, degradation of photocatalytic oxidation, TiO$_2$, O$_2$/UV