

Heterogeneous Photocatalytic Degradation Kinetic of Gaseous Ammonia Over Nano-TiO₂ Supported on Latex Paint Film¹

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Objective To investigate the photocatalytic degradation of gaseous ammonia in static state by using nano-TiO₂ as photocatalyst supported on latex paint film under UV-irradiation. **Methods** Experiments were conducted to study the relationship between the initial concentration of ammonia and the degradation products competing to be adsorbed on catalyst surface. Degradation of ammonia and its products were detected by spectrophotometry and catalytic kinetic spectrophotometry, respectively. **Results** On the one hand, TiO₂ catalyst was excellent for degradation of ammonia, and the crystal phase of TiO₂, anatase or rutile, had little effect on degradation of ammonia, but the conversion of ammonia grew with the increase of catalyst content. On the other hand, apparent rate constant and conversion of ammonia decreased with the increase of initial concentration of ammonia, and the photocatalytic degradation reaction followed a pseudo-first-order expression due to the evidence of linear correlation between $-\ln C/C_0$ vs. irradiation time t , but the relationship between initial concentration and the degradation products was not linear in low initial concentration. **Conclusion** Whether the photocatalytic degradation of ammonia in static state follows a first-order reaction depends on the initial ammonia concentration due to competition in adsorption between reactant and the degradation products.

Key words: TiO₂; Gaseous ammonia; Latex paint; Photocatalytic degradation; Kinetic in static state

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