| | |
|---|---|
| Thesis Title | Photocatalytic Reactions with Titanium Dioxide as a Catalyst for Ammonia Removal |
| Thesis Credit | 12 |
| Candidate | Mr. Thanormsak Pattanarak |
| Thesis Advisor | Asst. Prof. Dr. Ampai Chanachai |
| Program | Master of Engineering |
| Field of Study | Chemical Engineering |
| Department | Chemical Engineering |
| Faculty | Engineering |
| Academic Year | 2014 |

**Abstract**

Ammonia gas in chicken farms is one of the significant problems affecting the growth of chickens and surrounding environment. Therefore, the aim of this research was to study the elimination of ammonia gas inside the chicken house by using a photocatalytic reactor in which titanium dioxide was used as a catalyst. In this study, the photocatalytic reactor was designed and built. The size of the batch reactor was 25 x 25 x 40 $cm^3$ and the size of the 3 propeller was 8 x 30 $cm^2$. Each propeller was connected to a rotational motor. The effects of 1 and 2 UV – lamps, rotational motor speed in a range of 200 - 400 rpm and 50 – 90% humidity were studied in this research. The results showed that at high concentration of ammonia, luminosity had a small effect on the removal efficiency of ammonia. On the other hand, at low concentration of ammonia, high luminosity could increase the ammonia removal efficiency. In addition, when the rotational motor speed was high, the removal efficiency of ammonia was high also. Moreover, when the humidity was increased, the removal efficiency of ammonia was also increased. Therefore, the optimum condition of the photocatalytic of ammonia was 1 UV-lamp with the ratation speed of 200 rpm and 70 % relative humidity.

A reaction rate equation was determined using the first order reaction rate of the Langmuir-Hinshelwood model. The rate of reaction for ammonia photocatalytic reaction was

$$\text{rate}\left(\frac{\text{ppm}}{\text{h}}\right)=\frac{0.2233C_A}{1+\left(3.083\times10^{-3}\right)C_A}$$

The rate constant of reaction (k) was 72.46 ppm/h and the rate constant of absorption (K) was $3.08\text{x}10^{-3}$ $\text{ppm}^{-1}$

Keywords: Photocatalytic / Titanium dioxide / Ammonia / Langmuir-Hinshelwood.