

Accepted Manuscript

Monuron photodegradation using peroxymonosulfate activated by non-metal-doped TiO₂ under visible LED and the modeling via a parallel-serial kinetic approach

Amal Abdelhaleem, Wei Chu

PII: S1385-8947(18)30034-2
DOI: <https://doi.org/10.1016/j.cej.2018.01.036>
Reference: CEJ 18356

To appear in: *Chemical Engineering Journal*

Received Date: 16 October 2017
Revised Date: 5 January 2018
Accepted Date: 6 January 2018

Please cite this article as: A. Abdelhaleem, W. Chu, Monuron photodegradation using peroxymonosulfate activated by non-metal-doped TiO₂ under visible LED and the modeling via a parallel-serial kinetic approach, *Chemical Engineering Journal* (2018), doi: <https://doi.org/10.1016/j.cej.2018.01.036>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.



Monuron photodegradation using peroxymonosulfate activated by non-metal-doped TiO₂ under visible LED and the modeling via a parallel-serial kinetic approach

Amal Abdelhaleem, Wei Chu*

Department of Civil and Environmental Engineering, The Hong Kong Polytechnic University, Hung Hom, Kowloon, Hong Kong

* Corresponding author. E-mail address: wei.chu@polyu.edu.hk

ABSTRACT: N-doped TiO₂ (NT) was proven to be efficient for monuron decay via peroxymonosulfate (PMS) activation under visible LED (Vis LED). The activation mechanism revealed that $\cdot\text{OH}$ and $\text{SO}_4^{\cdot-}$ have a critical role in the monuron decay with a ratio of about 3 to 1, respectively; and the holes at the catalyst surface are the main precursors in forming $\text{SO}_4^{\cdot-}$. The NT/PMS/Vis LED hybrid process was found to be an effective approach under a wide solution pH range of 2.5-9.2 (> 80% decay). Interestingly, the highest efficiency was observed at pH 9.2 due to the contribution of PMS/Vis LED process by generating both $\cdot\text{OH}$ and $\text{SO}_4^{\cdot-}$ at alkaline pH. However, the decay rate of monuron was inhibited at pH 11.6 due to the dissociation of $\cdot\text{OH}$ into $\text{O}^{\cdot-}$ and the electrostatic repulsion among reagents. The process was also suitable for ion-rich wastewater since no significant reduction in the performance was induced in the presence of high concentrations of inorganic anions. Furthermore, the process was proven to be a promising approach for mineralization of monuron and its intermediates. Twenty reaction intermediates were detected and five of them are newly reported. A novel mathematical model was established based on reaction intermediates using a parallel-serial-irreversible reaction approach, which is helpful in predicting the detoxification extent of hazardous intermediates.

Keywords: Photodegradation; Herbicides; PMS activation; Mathematical model; visible LED

Download English Version:

<https://daneshyari.com/en/article/6580249>

Download Persian Version:

<https://daneshyari.com/article/6580249>

[Daneshyari.com](https://daneshyari.com)