

Accepted Manuscript

Catalytic Degradation of Chemical Warfare Agents and Their Simulants by Metal-Organic Frameworks

Yangyang Liu, Ashlee J. Howarth, Nicholaas A. Vermeulen, Su-Young Moon, Joseph T. Hupp, Omar K. Farha

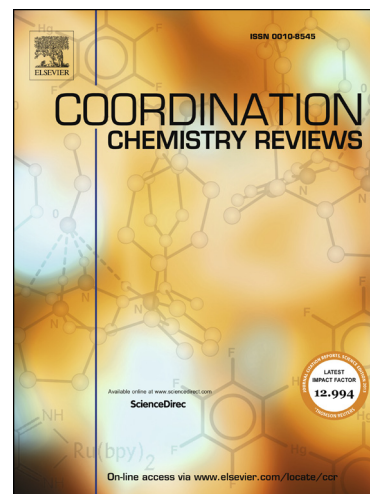
PII: S0010-8545(16)30404-0
DOI: <http://dx.doi.org/10.1016/j.ccr.2016.11.008>
Reference: CCR 112342

To appear in: *Coordination Chemistry Reviews*

Received Date: 30 September 2016
Revised Date: 13 November 2016
Accepted Date: 14 November 2016

Please cite this article as: Y. Liu, A.J. Howarth, N.A. Vermeulen, S-Y. Moon, J.T. Hupp, O.K. Farha, Catalytic Degradation of Chemical Warfare Agents and Their Simulants by Metal-Organic Frameworks, *Coordination Chemistry Reviews* (2016), doi: <http://dx.doi.org/10.1016/j.ccr.2016.11.008>

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.



Catalytic Degradation of Chemical Warfare Agents and Their Simulants by Metal-Organic Frameworks

Yangyang Liu^{a,b}, Ashlee J. Howarth^a, Nicholaas A. Vermeulen^a, Su-Young Moon^a, Joseph T. Hupp^a and Omar K. Farha^{a,c,*}

^a Department of Chemistry, Northwestern University, Evanston, IL, USA

^b Department of Chemistry and Biochemistry, California State University, Los Angeles, CA, USA

^c Department of Chemistry, Faculty of Science, King Abdulaziz University, Jeddah, Saudi Arabia

Abstract: Since sulfur mustard was first used in World War I, significant efforts have been made in materials and methods development for the adsorption and detoxification of different classes of chemical warfare agents (CWAs). Considering the importance of efficiency and safety in this process, catalytic degradation is a viable approach for fast and complete detoxification of CWAs. To date, a variety of catalysts have been discovered to be active for the degradation of nerve agents and sulfur mustard. Among the most promising are a class of porous functional materials named metal-organic frameworks (MOFs). In the past few years, tremendous progress has been made in this field including the discovery of zirconium MOF catalysts for fast nerve agent hydrolysis. In this review, we summarize recent advances in the development of MOF catalysts for the hydrolysis of nerve agents as well as the oxidation of sulfur mustard. Dual function MOF catalysts, *i.e.* catalysts that can detoxify nerve agents and sulfur mustard simultaneously, are also discussed.

Keywords: Metal-organic frameworks; nerve agent; sulfur mustard; detoxification; catalysis; singlet oxygen; dual function

Contents:

1. Introduction
 2. Hydrolysis of nerve agents and simulants
 - 2.1. Zr₆ nodes (12-, 8- and 6-connected)
 - 2.2. UiO-Analogues with functionalized organic linkers
 3. Oxidation of sulfur mustard and simulants
 4. Dual function catalysis
 5. Conclusions and future outlook
- Acknowledgement
References

Download English Version:

<https://daneshyari.com/en/article/5150827>

Download Persian Version:

<https://daneshyari.com/article/5150827>

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