Accepted Manuscript

A new nanocluster polyoxomolybdate $[Mo_{36}O_{110}(NO)_4(H_2O)_{14}]\bullet 52H_2O$: Synthesis, characterization and application in oxidative degradation of common organic dyes

Mojtaba Amini, Mostafa Khaksar, Arkady Ellern, L. Keith Woo

PII: S1004-9541(17)30063-0
DOI: doi:10.1016/j.cjche.2017.03.031
Reference: CJCHE 796

To appear in:

Received date: 13 January 2017
Revised date: 5 March 2017
Accepted date: 9 March 2017

Please cite this article as: Mojtaba Amini, Mostafa Khaksar, Arkady Ellern, L. Keith Woo, A new nanocluster polyoxomolybdate $[Mo_{36}O_{110}(NO)_4(H_2O)_{14}]\bullet 52H_2O$: Synthesis, characterization and application in oxidative degradation of common organic dyes, (2017), doi:10.1016/j.cjche.2017.03.031

A new nanocluster polyoxomolybdate $[Mo_{36}O_{110}(NO)_4(H_2O)_{14}]\cdot 52H_2O$: synthesis, characterization and application in oxidative degradation of common organic dyes

Mojtaba Amini,[*a] Mostafa Khaksar,[a] Arkady Ellern[b] and L. Keith Woo[b]

[a] *Department of Chemistry, Faculty of Science, University of Maragheh, Maragheh, Iran.*

[b] *Chemistry Department, Iowa State University, Ames, Iowa 50011-3111, USA.*

Abstract

Polyoxomolybdate $[Mo_{36}O_{110}(NO)_4(H_2O)_{14}]\cdot 52H_2O$ was synthesized by a simple one-pot procedure through reducing an acidified mixture of $Na_2MoO_4\cdot 2H_2O$ and $NH_2OH\cdot HCl$. In order to create a heterogeneous catalyst system, the polyoxomolybdate was pillared with MgAl-LDH-NO_3 by direct ion exchange. These novel materials were carefully analyzed by various chemico-physical methods. The catalytic degradation of methylene blue (MB) and rhodamine B (RB) as common dyes in the presence of MgAl-LDH-**1** nanoparticles with aqueous hydrogen peroxide, H_2O_2, as an oxidizing agent was studied in aqueous solution at room temperature. More importantly, the catalyst can be recovered and reused efficiently up to five consecutive cycles with negligible loss of catalytic activity.

Keywords: *Nanocluster; Polyoxomolybdate; LDH; Methylene blue; Rhodamine B*

Introduction

Recently, oxidative degradation of methylene blue (MB) and rhodamine B (RB) has attracted significant attention due to its promising application in the decrease of environmental pollutants.[1–6] Up to now, a variety of methods, including adsorption, photocatalytic degradation, ozone oxidation, electrocatalytic oxidation, oxidative degradation, etc., have been developed and extensively studied.[7-13] However, exploring simpler, effective, lower cost and safer methods is still needed for practical applications.

* Corresponding authors. Tel.: +98 41 37278900; Fax: +98 41 37276066; *E-mail address*: *mamini@maragheh.ac.ir* (M.A.)