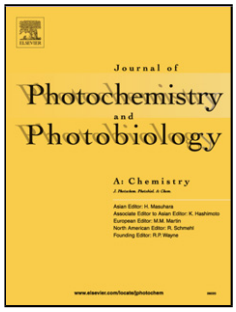


Title: Self-propagation combustion method for the synthesis of solar active Nano Ferrite for Cr(VI) reduction in aqua system

Authors: N.A. Oladoja, E.T. Anthony, I.A. Ololade, T.D. Saliu, G. ABello

PII: S1010-6030(17)30569-5
DOI: https://doi.org/10.1016/j.jphotochem.2017.11.026
Reference: JPC 11010

To appear in: *Journal of Photochemistry and Photobiology A: Chemistry*

Received date: 25-4-2017
Revised date: 1-11-2017
Accepted date: 16-11-2017

Please cite this article as: N.A.Oladoja, E.T.Anthony, I.A.Ololade, T.D.Saliu, G.ABello, Self-propagation combustion method for the synthesis of solar active Nano Ferrite for Cr(VI) reduction in aqua system, Journal of Photochemistry and Photobiology A: Chemistry https://doi.org/10.1016/j.jphotochem.2017.11.026

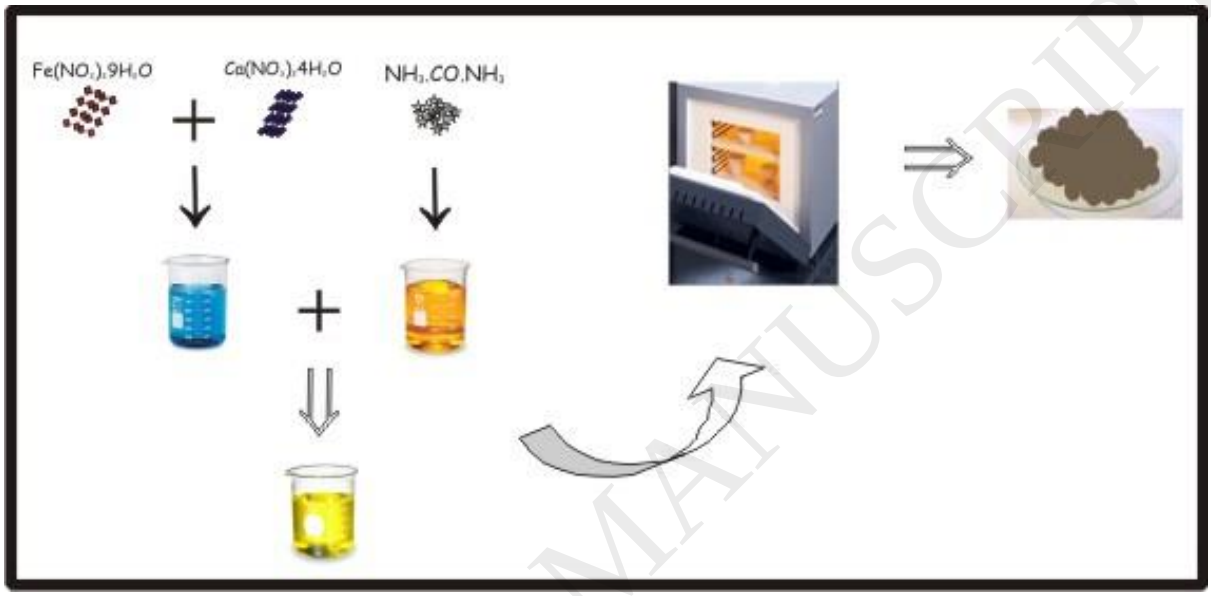
Self-propagation combustion method for the synthesis of solar active Nano Ferrite for Cr(VI) reduction in aqua system

Oladoja* N.A. Anthony E.T. Ololade I.A. Saliu T.D. Bello G.A.

Hydrochemistry Research Laboratory, Department of Chemical Sciences, Adekunle Ajasin University, Akungba Akoko, Nigeria

***Corresponding Author E-mail**: bioladoja@yahoo.com; nurudeen.oladoja@aaua.edu.ng
***Phone No.:** +2348055438642

Graphical Abstract



Preparation of Ferrite using the self-propagation combustion method

Highlights

- Self-propagation combustion method is a facile route to ferrite (FSP) synthesis
- Photocatalytic reduction of Cr(VI) to Cr(III) was achieved using the FSP
- The rate and half-life of photoreduction depends on the initial Cr(VI) concentration
- Carbonate reduced PE of FSP and hyperchromic shift in absorbance of treated water
- Cr(III)-oxalato complex is formed at a certain minimum photoreduction time

Abstract

The study aimed at the development of a facile route to the synthesis of a solar active nano ferrite via the self-propagation combustion protocol. The solar activity of the synthesised ferrite sample (FSP) was determined using the reduction of Cr(VI) to Cr(III) as a case study, in the presence of oxalic acid, as the hole scavenger. The analysis of the time-concentration profile data of the photoreduction reaction with the pseudo first order kinetic equation showed that the rate and half-life ($t_{1/2}$) of photoreduction of Cr(VI) to Cr(III) is dependent on the initial Cr(VI) concentration. The photoreduction efficiency (PE) (%) of the FSP is a function of the initial FSP dosage and the hole scavenger. The determination of the influence of hydrochemistry on the PE (%) showed that Cr(VI) solution pH and ionic strength had no visible negative impact. Aside the presence of carbonate in the Cr(VI) solution, other anionic interfering species (i.e.