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

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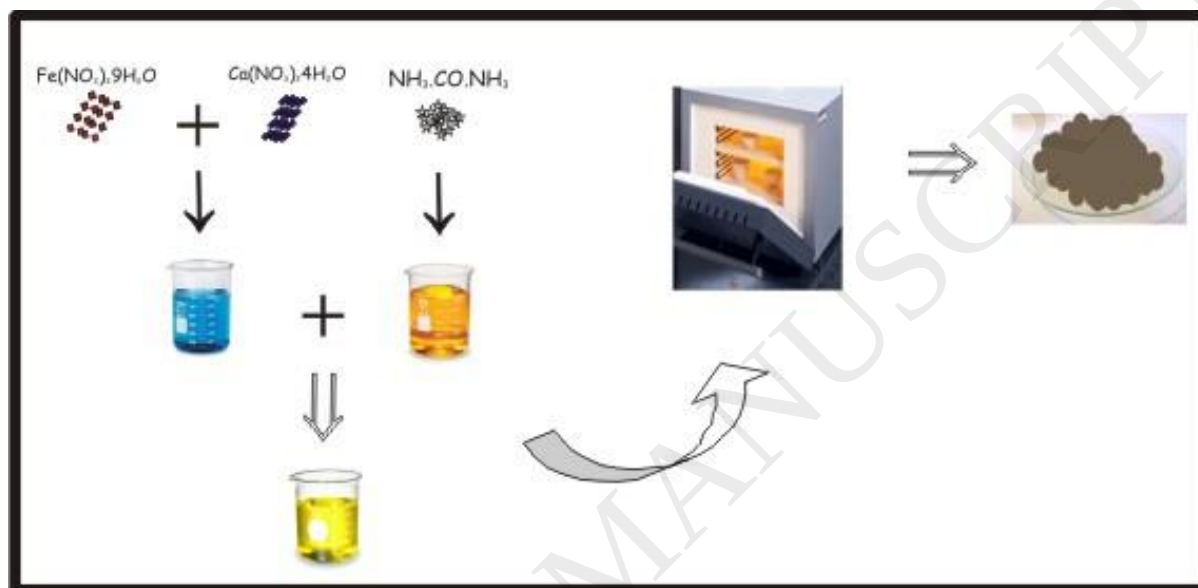
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Graphical Abstract



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.

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