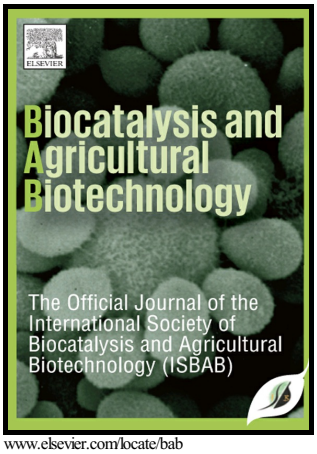

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PII: S1878-8181(18)30099-9
DOI: https://doi.org/10.1016/j.bcab.2018.07.023
Reference: BCAB821

To appear in: *Biocatalysis and Agricultural Biotechnology*

Received date: 30 January 2018
Revised date: 8 June 2018
Accepted date: 14 July 2018

Cite this article as: Sathish Sundararaman, V. Kavitha, Achu Joby Mathew and Sreya Mariya Seby, PERFORMANCE ANALYSIS OF HETEROGENOUS CATALYST SUPPORT FOR THE DECOLOURISATION OF AZO DYE (CONGO RED) BY ADVANCED OXIDATION PROCESS, *Biocatalysis and Agricultural Biotechnology,* https://doi.org/10.1016/j.bcab.2018.07.023

PERFORMANCE ANALYSIS OF HETEROGENOUS CATALYST SUPPORT FOR THE DECOLOURISATION OF AZO DYE (CONGO RED) BY ADVANCED OXIDATION PROCESS

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ABSTRACT:

The decolourization efficiency of azo dye, Congo red was examined by heterogeneous Fenton reaction using different support like zeolite, activated carbon and fly ash. The iron catalyst was coated into the support by wet impregnation method. Among different support system, zeolite supported iron catalyst (Fe-Z) exhibited maximum decolourization which was used for further studies. The prepared catalyst (Fe-Z) was characterized by scanning electron microscope integrated with energy dispersive x-ray spectroscopy. Experiments were conducted in a batch reactor to examine the effect of operating variables like pH, peroxide concentration [H_2O_2] and ferrous dosage [Fe^{2+}] in zeolite governing the process. The optimum reaction conditions were found to be [H_2O_2] = 4 mM, [Fe-Z] =0.4 mM for 0.861mM of Congo red at pH 3.0 ± 0.2. The process follows a pseudo first order kinetics with a rate constant of 0.012 min^{-1} ($R^2 > 0.9$). The oxidation products of the heterogeneous system were identified by gas chromatography integrated with mass spectrometry (GC-MS) and the plausible mechanistic pathway was proposed. The results prove that the Fe-Z could be a effective catalyst in decolourizing the Congo red at room conditions.

Keywords:

Fe-Z catalyst, Fenton, decolourization, optimization, Congo red

1.0 INTRODUCTION

Water has traditionally been our most available resource; the treatment of wastewater is becoming a major area of attention (Bautista et al., 2008, Kos and Perkowski, 2003)). Wastewater from printing and dyeing units is often rich in colour, containing residues of dyes