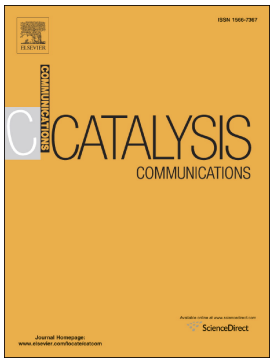

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Venkata Ramesh Babu Gurram, Siva Sankar Enumula, Kumara Swamy Koppadi, Raji Reddy Chada, David Raju Burri, Seetha Rama Rao Kamaraju

PII: S1566-7367(18)30449-7
DOI: doi:10.1016/j.catcom.2018.09.001
Reference: CATCOM 5492

To appear in: *Catalysis Communications*

Received date: 12 May 2018
Revised date: 31 August 2018
Accepted date: 8 September 2018

Please cite this article as: Venkata Ramesh Babu Gurram, Siva Sankar Enumula, Kumara Swamy Koppadi, Raji Reddy Chada, David Raju Burri, Seetha Rama Rao Kamaraju , Role of the Fe oxidation states on the catalytic oxy-dehydrogenation of ethylbenzene using CO2 as a soft oxidant over FeOx/carbon-alumina. Catcom (2018), doi:10.1016/j.catcom.2018.09.001

Role of the Fe oxidation states on the catalytic oxy-dehydrogenation of ethylbenzene using CO_2 as a soft oxidant over FeO_x/carbon-alumina

Venkata Ramesh Babu Gurram,[a, b, *] Siva Sankar Enumula,[b] Kumara Swamy Koppadi,[b] Raji Reddy Chada,[b] David Raju Burri, [a, b] Seetha Rama Rao Kamaraju [a, b, *]

[a]CSIR-Academy of Scientific and Innovative Research (CSIR-AcSIR), New Delhi, India

[b]Catalysis & Fine Chemicals Division, CSIR-Indian Institute of Chemical Technology, Hyderabad - 500007, India.

***** Corresponding Author; Phone: +91-40-27191711.

Email: SRRK: ksramaraoiict@gmail.com, VRBG: gvrbchem@gmail.com

Abstract

Iron oxide (FeO_x) supported on 1:3 carbon-alumina (ICA) was prepared by wet impregnation method. Oxidized and reduced forms of Fe in ICA catalyst were achieved by diluted H_2O_2 and hydrazine hydrate treatments, respectively. Three different oxidation states of Fe present in magnetite (Fe^{2+} and Fe^{3+}), hematite (Fe^{3+}) and wüstite (Fe^{2+}) were confirmed by XPS, powder-XRD, H_2-TPR, TGA, NH_3-TPD and N_2-physisorption analysis. Among the synthesized catalysts, in comparison with hematite and wüstite phases, magnetite phase offered high catalytic activity in ethylbenzene dehydrogenation reaction. The presence of CO_2 in the reaction mixture was found to leave intact the activated carbon support structure.

Keywords: Carbon dioxide; Ethylbenzene dehydrogenation; Fe_2O_3; Fe_3O_4; FeO; Styrene.