

## Accepted Manuscript

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PII: S0021-9797(17)30046-2  
DOI: <http://dx.doi.org/10.1016/j.jcis.2017.01.039>  
Reference: YJCIS 21945

To appear in: *Journal of Colloid and Interface Science*

Received Date: 12 December 2016  
Revised Date: 9 January 2017  
Accepted Date: 11 January 2017

Please cite this article as: B. Sarmah, B. Satpati, R. Srivastava, Highly efficient and recyclable basic mesoporous zeolite catalyzed condensation, hydroxylation, and cycloaddition reactions, *Journal of Colloid and Interface Science* (2017), doi: <http://dx.doi.org/10.1016/j.jcis.2017.01.039>

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**Highly efficient and recyclable basic mesoporous zeolite catalyzed condensation,  
hydroxylation, and cycloaddition reactions**

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**Abstract**

Crystalline mesoporous ZSM-5 zeolite was prepared in the presence of 1,4-diazabicyclo[2.2.2]octane derived multi-cationic structure directing agent. The calcined form of the mesoporous zeolite was treated with NH<sub>4</sub>OH to obtain basic mesoporous ZSM-5. Catalyst was characterized by the complementary combination of X-ray diffraction, N<sub>2</sub>-adsorption, electron microscopes, and temperature programme desorption techniques. Catalytic activity of the basic mesoporous ZSM-5 was systematically assessed using Knoevenagel condensation reaction for the synthesis of wide range of substituted styrene. Applications of the catalyst were investigated in the benzamide hydroxylation for the synthesis of carbinolamides and one-pot, multi-component condensation reaction for the synthesis of naphthopyrans. Finally, the catalyst was evaluated in the cycloaddition of CO<sub>2</sub> to epoxide for the synthesis of cyclic carbonates. Recycling study shows that no significant decrease in the catalytic activity was observed after five recycles.

**Keywords:** Mesoporous zeolite, base catalyst, condensation reaction, cycloaddition reaction.

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