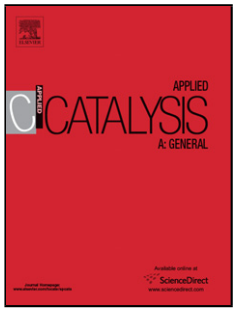

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PII: S0926-860X(18)30372-7
DOI: https://doi.org/10.1016/j.apcata.2018.07.033
Reference: APCATA 16759

To appear in: *Applied Catalysis A: General*

Received date: 15-5-2018
Revised date: 24-7-2018
Accepted date: 25-7-2018

Please cite this article as: Akhmedov V, Aliyev A, Bahmanov M, Ahmadov V, Tagiyev D, Kinetics of phenylacetylene selective hydrogenation to styrene over metal-free polymeric carbon nitrides, *Applied Catalysis A, General* (2018), https://doi.org/10.1016/j.apcata.2018.07.033

Kinetics of phenylacetylene selective hydrogenation to styrene over metal-free polymeric carbon nitrides

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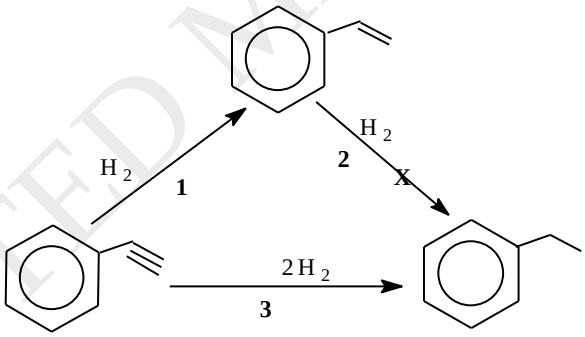
Graphical Abstract:

This article presents the results of the investigation of the catalytic activity of mesoporous carbon nitride in the reaction of partial hydrogenation of phenylacetylene.. A probable mechanism and the kinetic model of the reaction are formulated on the basis of the observed trends in the dependence of the initial rate from the temperature, concentration of phenylacetylene and catalyst mass.



Highlights:

- mpg-C_3N_4 efficiently catalyzes the selective hydrogenation of phenylacetylene to styrene in the range of temperature 150-250°C and atmospheric pressure.
- In contrast to the known metal-containing catalysts, no conversion of pure styrene on mpg-C_3N_4 is observed, providing high selectivity of phenylacetylene hydrogenation to styrene, although small amount of phenylacetylene direct transformation on the catalyst surface into ethylbenzene takes place.
- The mechanism of phenylacetylene hydrogenation reaction on polymeric carbon nitrides is formulated and developed a kinetic model.
- The developed kinetic model of the reaction was subjected to statistical analysis on the basis of kinetic data. The developed kinetic model adequately describes the experimental data.