

## Asymmetric Reactions of $\alpha,\beta$ -Unsaturated Carbonyl Compounds with Malononitrile on Chiral Met-Cs- $\beta$ Zeolite

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Earlier we have shown that basic Cs- $\beta$  zeolite is an effective catalyst in reactions of a number of terpenoids containing an  $\alpha,\beta$ -unsaturated carbonyl group with malononitrile leading to products of either Michael or Knoevenagel reactions or tandem transformations [<sup>1</sup>]. The structure of the product depends on steric crowdedness of both the  $\beta$ -position of the olefinic bond lying near the carbonyl group and of the carbonyl group itself.

To obtain optically active products of Michael reaction *via* the reaction of  $\alpha,\beta$ -unsaturated carbonyl compounds with malononitrile, we have synthesized the basic chiral catalyst Met-Cs- $\beta$  on the basis of Cs- $\beta$  zeolite.

In the present paper we have shown that prochiral 4-phenylbut-3-en-2-on, 5,5,8-trimethylnona-3,7-dien-2-on and damascone react with malononitrile in the presence of Met-Cs- $\beta$  to form optically active compounds that are products of Michael reaction or of tandem transformations.

The application of catalyst Met-Cs- $\beta$  instead of zeolite Cs- $\beta$  in the reaction of pinocarvone with malononitrile has made it possible to increase the diastereoselectivity of the reaction.

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<sup>1</sup> K.P. Volcho, S.Yu. Kurbakova, E. V. Suslov, D.V. Korchagina, N.F. Salakhutdinov, A.V. Toktarev, G.V. Echevskii, V.A. Barkhash, *J. Mol. Cat. A: Chemical*, 2003, Vol. 195, N 1-2, pp. 263-274.