

## Abstract

Heterogeneous catalysts for Meerwein-Ponndorf-Verley (MPV) reduction of ketones and aldehydes are investigated due to issues connected with water sensitivity and separation problems of homogeneous catalysts. During MPV reduction, a hydrogen atom is transferred from the sacrificial alcohol onto the carbonyl group of the ketone/aldehyde forming corresponding alcohol. Tin and zirconium containing zeolites are active catalysts in this hydrogen transfer reaction. However, when using conventional 3D zeolites in the reduction of bulky molecules, e.g., terpenoid compounds, problems with active site accessibility for these bulky reactants may arise. The use of 2D pillared zeolites may represent a solution to the diffusion problem. Silica metal-oxide pillars increase the distance between individual layers of a 2D (lamellar) zeolite and thus improve the active site accessibility. 2D catalysts were prepared by pillaring a parent lamellar pure-Si MFI with a mixture of tetraethyl orthosilicate and Zr (IV) isopropoxide or Sn (IV) isopropoxide, while conventional 3D zeolites were synthesised hydrothermally. The activity of Sn and Zr containing pillared catalysts was compared with the activity of the 3D MFI and beta zeolites in MPV reduction of furfural and citronellal. The 2D zeolites, however, did not facilitate the reaction as expected. Isopulegol (in case of citronellal reduction) and products of acetalisation (in all cases) were detected when using the pillared catalysts as well as 3D MFI zeolites instead of desired alcohols. The catalyst giving the highest conversion of furfural (42 %) is Zr-BEA, while Zr-PI-MFI-a gave the highest conversion of citronellal (52 %). The highest yield of the desired products (furfuryl alcohol and citronello) was also obtained when using the Zr-BEA as the catalyst (35% for furfuryl alcohol and 28 % for citronello).