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Copper substituted heteropolyacid catalysts for the selective dehydration of ethanol

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ABSTRACT

The catalytic conversion of ethanol was carried out over $H_3PMo_{12}O_{40} \cdot xH_2O$ (H_3PMo) and its substituted copper ions with formula $Cu_{0.5x}H_{3-x}PMo_{12}O_{40}$ (where $x = 1, 2$ and 3). Pure and Cu-substituted catalyst samples were calcined at $350^\circ C$. The effect of copper ions substitution on the thermal behaviour, structural, acidic, surface and catalytic properties of the investigated samples were studied using TG, DSC, FTIR, pyridine adsorption at $25^\circ C$, N_2 adsorption at $-196^\circ C$. Maximum selectivity of diethyl ether and the second major reaction product ethylene was obtained at $350^\circ C$. The substitution of copper in the H_3PMo resulted in increase of the selectivity towards diethyl formation to attain a maximum value using Cu_2PMo -350 catalyst. Very high diethyl ether over ethylene yield values obtained in this study at $350^\circ C$ are highly promising for the production of petrochemicals from ethanol.

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