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# Conversion of ethers of light alcohols into hydrocarbons over ZSM-5 zeolite catalysts

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## Abstract

Light alcohols such as methanol can be converted into hydrocarbons over ZSM-5 zeolite catalysts. The role of the dialkyl ether as the product of alcohol dehydration on the zeolite acid sites has not been thoroughly investigated yet. In the Thermo-Catalytic Steam Cracking (TCsC) process for the production of light olefins from petroleum naphtha or gas oil, methanol when blended in limited proportion into these conventional feedstocks, does not significantly change the yields of light olefins and, very importantly, the product yield ratio "propylene/ethylene" remains almost unchanged (much higher than 1.0). In the direct catalytic liquefaction of lignocellulosic biomass (AC3B), diethyl ether formed by acid-promoted dehydration of ethanol in the main conversion step, when subsequently sent over a ZSM-5 zeolite catalyst, alone or blended to some oxygenates obtained from such main step, is completely converted into hydrocarbons, namely aromatics-rich gasoline and $C_2$-$C_4$ olefins and paraffins. These examples taken from two different catalytic processes suggest that there is, as common reaction intermediate, a trialkyl oxonium ion generated by an initially adsorbed dialkyl ether on the strong acidic sites of the zeolite. This organic ion intermediate is capable of reacting with other molecules in the feed to generate hydrocarbons. As a practical consequence, these trialkyl oxonium ions are capable of deoxygenating some oxygenates without the need of a hydrogen-donating solvent or an external supply of hydrogen.

## Biography

Prof. Raymond Le Van Mao received his PhD in 1974 from the University of Lyon (France). After post-doctoral studies in Paris and Milan (Italy), he worked until 1981 at Basic Petrochemical Research Centre, Montedison Corp. (Italy). In 1982, he became Associate Professor of Chemistry at Concordia University (Montreal, Canada). He is now Professor Emeritus. He holds 40 patents and is author/coauthor of more than 200 papers and technical reports in Heterogeneous Catalysis, Zeolites, Petroleum Chemistry and Biomass conversion.