# Catalyst and Process Development for Methanol Conversion to Hydrocarbons

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Methanol is a main platform compound for producing liquid fuels and chemicals from coal, natural gas and biomass via syngas. The key of methanol selective conversion to low carbon olefins (MTO/MTP), gasoline(MTG) and aromatic hydrocarbons(MTA) is to achieve targeted catalytic conversion on suitable catalysts with coordinated process conditions.
Through in-depth understanding and rational control on acid sites distribution and grain size of zeolite catalyst, MTP catalysts with high propylene selectivity (37~45%), high stability were developed for fixed bed, fluidized bed and moving bed processes.
Feasibility test of two-stage MTA technique has been performed at 100 t/a pilot plant, obtaining yield of $C_5^+$ + LPG >38 wt%, and aromatics selectivity > 85%. The pilot test confirmed that the two-stage MTA technique has the advantageous in increasing selectivity to aromatics (71 Cmol%) and depressing by-products at broad applicable temperature range.
Polyoxymethylene dimethyl ethers (PODE, or $DMM_{3\text{-}8}$) with high oxygen content and cetane number, has been suggested to be an ideal additive to diesel oil to remarkably improve the combustibility of diesel, enhance the efficiency of engine, and reduce the release of $NO_x$ and powder pollutants. A zeolite catalyst and slurry bed reactor were developed for the synthesis of $DMM_{3\text{-}8}$ from methanol derivatives at moderate conditions (60~90 $^oC$, 0.5MPa) with high selectivity to $DMM_{3\text{-}8}$ ( > 95%) and high stability (> 800 h).

References

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