

Direct methanol synthesis by partial oxidation of methane over Mo-Bi-V-Al mixed oxides catalysts

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Methanol was directly produced by the partial oxidation of methane with Mo-Bi-V-Al mixed oxides catalysts. The catalysts were prepared by the sol-gel method, in which hydrolysis ratio is an important factor in determining the properties of the catalysts. Therefore, the catalysts were prepared with changing the hydrolysis ratio such as 1.5/1, 5/1, and 9.5/1. The catalysts were also prepared by the co-precipitation method to compare their activity with the catalysts prepared by the sol-gel method. All the prepared catalysts were calcined at 500°C for 5 h. With increasing hydrolysis ratio, the particle size decreased and the surface area increased. Methanol selectivity decreased with increasing the hydrolysis ratio. The catalysts prepared by the sol-gel method showed larger surface areas than those prepared by the co-precipitation method. The highest methanol selectivity with co-precipitated catalysts was 10.8 % at 450°C, whereas the highest methanol selectivity with sol-gel catalysts was 15.6 % at 420°C. This shows that the catalysts prepared by the sol-gel method show higher catalytic activity than the catalysts prepared by the co-precipitation method. The prepared catalysts were characterized by XRD, BET, TPD, XPS, and SEM analyzers.