

460b Catalytic Partial Oxidation of Methane on Rh-Ceria Based Catalysts

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The catalytic activity of Rh-doped ceria catalysts for the partial oxidation of methane to synthesis gas was studied. Doped ceria supports were prepared by a hydrothermal synthesis method, calcined at 800 Celsius degrees for four hours to stabilize surface area, and then ball milled to reduce particle size, prior to addition of Rhodium. Catalytic activity tests at 700 Celsius degrees showed that Rh/Ce_{0.50}Zr_{0.50}O₂ was the most active material between the catalysts tested. These results may be directly correlated to the promotion in the reducibility of the Rh-ceria interface by doping CeO₂ with Zr as evidenced by the results of Temperature Programmed Reduction tests. Catalysts were also characterized by XRD. Results showed characteristic peaks of cubic CeO₂, which indicates a single phase. Most catalysts presented these results but Rh/Ce_{0.50}Zr_{0.50}O₂, which showed a peak broadening as well as a shift in the peaks, indicating a cubic phase with a small amount of a tetragonal phase. In the other hand, the amount of carbon generated during the POM on Rh/Gamma-Alumina and Rh/Ce_{0.50}Zr_{0.50}O₂ was studied. The objective was to investigate the effect of oxygen ion conducting (Ce_{0.50}Zr_{0.50}O₂) and non-oxygen ion conducting (Gamma-Alumina) supports on carbon formation. Interestingly, the amount of carbon generated over Rh/Ce_{0.50}Zr_{0.50}O₂ was much lower than over Rh/Gamma-alumina. We can speculate that this result may be due to the higher oxygen mobility on Ce_{0.50}Zr_{0.5}