



## Catalytic Dehydrogenation of Propane to Propylene over Gallium Loaded HZSM-5

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The 3 wt.% gallium loaded HZSM-5 zeolite ([Ga]/HZSM-5 (x)) catalysts, where x is a Si/Al ratio (28 and 140), were prepared by wet-impregnation method. The Ga/Al mole ratio of [Ga]/HZSM-5 (28) and [Ga]/HZSM-5 (140) were 0.75 and 3.64, respectively. These catalysts were used to catalyze propane dehydrogenation to propylene. The effect of reaction temperature on the propane dehydrogenation was studied over [Ga]/HZSM-5 (28). The propane conversion is increased with reaction temperature. The propane conversion was 0.75, 5.50, 17.00, and 35.80% at 400, 450, 500, and 550 °C, respectively. However, C<sub>5</sub><sup>+</sup> hydrocarbons were obtained as a major product at high temperature. In addition, acidity of HZSM-5 zeolite also significantly affected the conversion and product selectivity. [Ga]/HZSM-5 (140), that possesses low acidity, provided high propylene selectivity, but only 4.00% conversion was obtained at 500 °C. It was suggested that, after calcination, GaO<sup>+</sup> is present in HZSM-5. After treating with H<sub>2</sub> at 600 °C, GaO<sup>+</sup> is reduced, forming GaH<sub>2</sub><sup>+</sup> complex that is the active species for propane dehydrogenation.

**Keywords:** Dehydrogenation; Gallium; HZSM-5; Propane; Propylene