Production of gasoline range hydrocarbons from catalytic reaction of methane in the presence of ethylene over W/HZSM-5

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Abstract

The catalytic conversion of a methane and ethylene mixture to gasoline range hydrocarbons has been studied over W /HZSM-5 catalyst. The effect of process variables such as temperature, % vol. of ethylene in the methane stream, and catalyst loading on the distribution of hydrocarbons was studied. The reaction was conducted in a fixed-bed quartz - micro reactor in the temperature range of 300 to 500 °C using % vol. of ethylene in methane stream between 25 – 75 % and catalyst loading of 0.2 – 0.4 gram. The catalyst showed good catalytic performance yielding hydrocarbons consisting of gaseous products along with gasoline range liquid products. The mixed feed stream can be converted to higher hydrocarbons containing a high liquid gasoline product selectivity (>42%). Non-aromatics C_5 - C_{10} hydrocarbons selectivity in the range of 12 – 53% was observed at the operating conditions studied. Design of experiment was employed to determine the optimum conditions for maximum liquid hydrocarbon products. The distribution of the gasoline range hydrocarbons (C_5-C_{10} non-aromatics and aromatics hydrocarbons) was also determined for the optimum conditions.

Keywords: *gasoline range hydrocarbons; catalytic conversion; methane and ethylene mixture; design of experiment; optimum condition*

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