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In recent years, research and development of microreactor technology has expanded into many different fields of chemical processes. The reason of this expansion is the possibility of process intensification together with safe operation even for production of hazardous chemicals. Microreactors have a potential for process design with reduction in investment and energy costs and substantial reduction in size of the chemical unit. In the development phase, the heterogeneous catalytic processes which can require high pressures and temperatures places high demands also on the laboratory equipment. The reactor suitable to withstand such conditions has to provide also a precise control of the operating conditions, safe handling and good flexibility.

The study aims to investigate the intrinsic kinetics of hydrogenation of C4 aliphatic alkenes from Light Pyrolysis Gas (LPG). As a model reaction the hydrogenation of gaseous 2-methylpropene (2-MP) was selected in order to develop the methodology for kinetic data collection and evaluation. As a suitable tool the packed bed reactor (up to 600 °C and 100 bars) newly developed by Ehrfeld (BTS, Germany) which fits the micro modular system (MMRS) has been successfully employed.

The reaction hydrogenation experiments are performed in temperature range from 100 to 120 °C and pressure range from 10 to 20 bar over pressure. The 2-methylpropene flow rates were 1.5–247.7 Nml/min; the hydrogen is fed in various molar excess with respect to double bonds. Weight hourly space velocity (WHSV) expressed in terms of gram of 2-methylpropene introduced into the reactor per hour and gram of catalyst ranges from 0.5 to 744 [g(2-MP)/g(cat)/h]. The composition of the product stream at the reactor outlet is analyzed on-line by a gas chromatograph.

The microreactor showed stable, reliable and robust operation during the catalyst reduction in-situ (up to 350 °C , 20 bar H_2) and also during the 2-methylpropene hydrogenation tests which consisted of

several hours of continuous operation each. 2- methylpropene conversion reached usually very high values (> 95 %) even at high space velocities (WHSV = 38). A decrease of the conversion (to 70 %) was observed at extremely high space velocities (WHSV = 744). Development of the methodology for kinetic data collection as well as an assessment of possible mass transfer limitations will be presented.

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