

عنوان مقاله:

The Kinetics of Methanation on Nickel Catalysts

محل انتشار:

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خلاصه مقاله:

An empirical rate equation was obtained for the methanation kinetics catalyzed by MCR-۲X, a commercial catalyst prepared by Haldor-Topsoe. The studies were carried out in a fixed-bed reactor under differential conditions, and in a gradientless recycle reactor (Berry) over a range of total pressures, reactant concentrations (H_2/CO ratios), and temperatures. The kinetics of methanation were found to be of first order in hydrogen at total gas pressures below ۷ atm, and of half order at higher pressures. With respect to carbon monoxide the reaction order was -۰.۴۶ in the composition range studied. Water vapor, a reaction product, was observed to inhibit the methanation rate. On the other hand, carbon dioxide and methane had no influence on the reaction kinetics. The following rate equation was obtained for the methanation rate with the partial pressure (p) of each component expressed in atmospheres and the rate constant k in $mol.g^{-1} catalyst.s^{-1}$: The catalyst was observed to be susceptible to deactivation by hydrogen sulfide in the feed gas. The rate coefficient for deactivation was determined. Its value for MCR-۲X was comparable to that of other nickelbased catalysts.

کلمات کلیدی:

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