

عنوان مقاله:

Comparison of Two Different Hydrogen Redistribution Strategies along an Auto-thermal Double-membrane Reactor on Co-production of Pure Hydrogen and Methanol

محل انتشار:

اولین همایش ملی کاتالیستهای صنعتی (سال: 1391)

تعداد صفحات اصل مقاله: 6

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خلاصه مقاله:

In this study, the effect of two different hydrogen redistribution strategies along a recuperative double-membrane reactor has been considered. The simulation carried out on simultaneous pure hydrogen and methanol production via auto-thermal methanol synthesis process. The simulated thermally coupled reactor consists of two Pd/Ag membranes; one for separation of pure hydrogen from endothermic side and the other for permeation of hydrogen from recycle side (inner tube) into exothermic side. In the first strategy (co-current configuration), effluent stream of exothermic side is entered into the inner tube in co-current mode with the reacting gas stream in the exothermic side while in the counter-current mode the gas streams are in the opposite direction. A steady-state one-dimensional heterogeneous model is developed to analyze and compare two strategies applied in the operation of the auto-thermal methanol synthesis. The simulation results show that a more favourable temperature profile along the reactor is achieved in counter-current configuration due to effective heat transfer. Although the counter-current mode does not operate with longer catalyst life than membrane reactor operated in co-current mode, the first case gives higher products yield and feedstock conversion. It is always possible to extract more hydrogen from the reaction zone. The results suggest that utilizing of this configuration for pure hydrogen and methanol production could be feasible and beneficial.

کلمات کلیدی:

Pure hydrogen production, Methanol synthesis, Auto-thermal double-membrane reactor, Steady-state heterogeneous model, Operation mode

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