

عنوان مقاله:

Mathematical Modeling of Methane Steam Reforming in Fluidized Bed Membrane Reactor Accompanied by Methane Combustion

محل انتشار:

پنجمین کنگره بین المللی مهندسی شیمی (سال: 1386)

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خلاصه مقاله:

The mathematical model of bubbling fluidized bed membrane reactor for steam reforming is investigated on the base of the two phase bubbling bed model with allowance of some gas flow in the dense phase (Catalyst Particles). The permselective Pd membranes remove hydrogen from the reaction system to enhance the membrane conversion. Steam reforming of methane is highly endothermic and the heat of reaction is provided by the combustion of methane, in this case. Temperature of the feed at the inlet of the reactor is sharply decreased due to the high endothermicity and fast kinetics of steam reforming reaction, hence high inlet feed temperature is not a good idea for increasing reaction conversion. We can reach to a better situation with producing heat by combustion of methane. However, since higher oxygen-methane ratios consume more of methane (as the main reactant), an optimum value exists with respect to the favorable production of pure hydrogen from the reactor permeate side. In this research, the effect of operational conditions is investigated by mathematical modeling and the optimum ratio of OMR (oxygen to methane ratio) and SMR (steam to methane ratio) is proposed for these types of processes.

کلمات کلیدی:

Fluidized bed, Membrane reactor, Methane reforming, Oxygen addition

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