

#### عنوان مقاله:

Application of Palladium Membrane in Methanol Synthesis Process

### محل انتشار:

اولین کنفرانس پتروشیمی ایران (سال: 1387)

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## نویسندگان:

Forghani - M.S students of chemical engineering. Department of Chemical Engineering, School of Engineering, Shiraz University, Shiraz

Barmaki - M.S students of chemical engineering, Department of Chemical Engineering, School of Engineering, Shiraz University, Shiraz

Khosravanipour Mostafazadeh - M.S students of chemical engineering. Department of Chemical Engineering, School of Engineering, Shiraz University, Shiraz

(Rahimpour - Professor of chemical engineering (Corresponding author

### خلاصه مقاله:

Methanol is a primary liquid petrochemical that is produced from synthesis gas that consists of H2, CO2, CO and some inert components like methane and nitrogen in large scale throughout the world. The factors affecting the production rate in industrial methanol reactors are parameters such as thermodynamic equilibrium limitations, catalyst deactivation and variation in stoichiometric number. For reactions, which are thermodynamically limited, selective product removal or reactant addition may be used to increase conversion. One of the most important advantages of membrane reactors is the possibility of overcoming the limitation imposed by thermodynamic equilibrium. In the presence of a perm-selective membrane such as Pd and Pd-Ag (23 wt.% Ag) membranes, hydrogen can penetrate from the feed synthesis gas side into the reaction side due to the hydrogen partial pressure driving force. Hydrogen permeation through the membrane shifts the reaction towards the product side according to the thermodynamic equilibrium and enhances methanol production. This study considering previous investigations and shows that CO conversion can be promoted beyond thermodynamic equilibrium by adding the hydrogen reactant to reaction side. Also the results show that decreasing the flow rate of the feed is the most important variable in increasing methanol production. Also mole fraction of methanol is enhanced by increasing the shell side pressure, decreasing membrane thickness, increasing shell side flow rate. In membrane dual-type reactor, results show a favorable temperature profile of the catalyst along the membrane dual-type reactor system leads to higher activity along the reactor and causes longer catalyst life time. Also a favorable temperature profile of the catalyst along the reactors with a high level of catalyst activity in the gas-cooled reactor of the membrane dual-type system results in a higher production rate in this .system

# كلمات كليدى:

;Membrane reactor; Pd-based membrane; Methanol synthesis; Hydrogen permeation

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