

عنوان مقاله:

Silica membrane performance for hydrogen separation from methanol steam reforming products: Assessment of different multistage membrane schemes

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خلاصه مقاله:

The aim of this work is a theoretical study of multistage silica membrane configurations for hydrogen purification by methanol steam reforming (MSR) products. Four membrane schemes including single permeator, CMC (continuous membrane column), ISMC (in series membrane cascade), and CRC (countercurrent recycle membrane cascade) were considered for this purpose. The modeling results showed that silica membranes have a high potential for high purity (more than 99.9%) hydrogen production. The lowest amounts of compressor duty and the required total membrane area were considered as the objective functions to select the optimal design and amount of hydrogen purification. A comparison of our simulation results of the different multistage membrane schemes showed the CRC configuration was more efficient than the other configurations. The modeling results show that increasing the retentate side pressure from 2 to 5 bar reduced the total silica membrane area for the CRC scheme by almost 13 times (30.67 and 2.37 cm² silica membrane area for a retentate side pressure of 2 and 5 bar, respectively).

کلمات کلیدی:

Silica membrane, Hydrogen Separation, Modeling, multistage membrane schemes

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