

عنوان مقاله:

Investigation of palladium membrane reactor performance during cyclohexane dehydrogenation using CFD method

محل انتشار:

دومین کنفرانس بین المللی یافته های نوین پژوهشی در شیمی و مهندسی شیمی (سال: 1395)

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خلاصه مقاله:

The main purpose of this study is the analysis of dense palladium membrane reactor (MR) performance during cyclohexane dehydrogenation reaction using computational fluid dynamic (CFD). To this aim, a two-dimensional isothermal CFD model was developed. In this work, the CFD model was presented by Comsol-Multiphysics software version 5.1. After the modeling, the effect of the some important operating parameters (temperature) on the performance of palladium MR was studied in terms of cyclohexane conversion and hydrogen recovery. The CFD model presented velocity and pressure profiles in both side of MR and also molar fraction hydrogen in permeate and retentate streams. The simulation results illustrated that the palladium MR presents comparable performance with respect to traditional reactor (TR) in terms of the cyclohexane conversion, especially, at lower temperatures and higher pressures. In fact, CFD results indicated that palladium MR performance was improved by increasing the reaction pressure, while this parameter had negative effect on the TR performance. This result related to enhancement of hydrogen permeance through the palladium membrane by increasing the pressure gradient. Indeed, this shift effect can provide a higher cyclohexane conversion in lower temperatures in the Pd-Ag MR. In particular, 80% cyclohexane conversion and 0.7 hydrogen recovery was achieved at 573K and 1 atm.

کلمات کلیدی:

Hydrogen production, CFD, Modeling, cyclohexane dehydrogenation, Benzene production

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