عنوان مقاله:
Modeling and simulation of methane autothermal reforming

محل انتشار:
پنجمین کنگره بین المللی مهندسی شیمی (سال: 1386)

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خلاصه مقاله:
This paper concerns the kinetic and thermodynamic modeling of a methane autothermal reformer (ATR) in tended for synthesis gas or syngas (H2+CO) production. Essentially autothermal reforming is the combination of partial oxidation and adiabatic-steam reforming. Thermodynamic analysis of ATR is based on Gibbs free energy minimization. In this analysis, effect of steam, carbon dioxide and oxygen in feed concentration on the H2 to CO ratio and mole fraction of components have been studied. Effect of temperature and pressure on the product syngas composition and probability of soot formation have been investigated. The results of thermodynamic model were compared with reported data in open literatures. For the kinetic modeling of ATR process, two distinct models for each of the sections of reactor were used. In the partial oxidation section model, a comprehensive kinetic mechanism in presence of 28 species in 108 simultaneous elementary reactions was considered. A two-dimensional kinetic model was developed to simulate the catalytic bed. The model covers all aspects of major chemical kinetics and heat and mass transfer phenomena. The predicted temperature and composition by the proposed model have been verified with published pilot plant scale data.

کلمات کلیدی:
Autothermal reforming; Kinetic modeling; Thermodynamic modeling; Syngas

لینک ثابت مقاله در پایگاه سیویلیکا: