

发电

铁法链式反应器煤基氢电联产系统性能模拟

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摘要

FeO/Fe₃O₄作载氧体,以链式反应器构建煤气化氢电联产系统,用ASPEN PLUS软件对系统的性能进行了模拟。研究链式反应器温度、水蒸汽转化率对系统性能的影响,并对系统流程进行了火用分析。结果表明,系统生产的H₂的纯度高,可达99.9%,CO₂近零排放;当水蒸汽反应器在815℃、水蒸汽转化率为37%时,系统的净效率达到58.06%;水蒸汽转化率对系统性能影响较大,由28%增加到41%时,系统的效率由53.17%增加到58.33%;系统的火用损主要集中在气化炉和余热锅炉部分。

关键词 [氢电联产](#) [煤气化](#) [化学链原理](#) [CO₂零排放](#)

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Carbon-free Co-production of Hydrogen and Electricity From Coal Using Chemical Looping Reactors

Abstract

Using FeO/Fe₃O₄ as an oxygen carrier, a carbon-free co-production system of hydrogen and electricity with chemical-looping reactors was proposed. The performance of the new system was investigated using ASPEN PLUS software. The influence of chemical-looping reactor's temperature, steam conversion rate on the system performance was simulated and the exergy performance was also discussed. The results show that the purity of H₂ production reaches 99.9% and CO₂ can be separated. The system efficiency is 58.06% assuming steam reactor at 815℃ and the steam conversion rate of 37%. The system efficiency is affected by the steam conversion rate obviously, rising from 53.17% to 58.33% with the increase of steam conversion rate from 28% to 41%. The exergy losses of the whole system are mainly taken place in the process of gasification and heat recovery steam generator (HRSG).

Key words [co-production](#) [coal gasification](#) [chemical-looping](#) [zero CO₂ emission](#)

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