Advances in Automobile Engineering

Extended Abstract

Design of isooctane fueled plug flow reactor for vehicles with SOFC

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Abstract

Fuel cell vehicles are promising to reduce air pollution. The isooctane can be stored instead of hydrogen in vehicles with solid oxide fuell cell (SOFC). Hydrogen can be produced from fossil fuels through a process of fuel reforming using isooctane. The chemical reaction takes place under non-isothermal conditions in a plug flow reactor. In this study, a plug flow reactor is simulated for isooctane reforming reaction to produce hydrogen gas under both adiabatic and nonadiabatic conditions via a simulation software using finite element analysis. It is observed that the reactor temperature and fuel conversion is a function of the reactor volume for both cases. As the isooctane reforming reaction is endothermic, the temperature profile along the plug flow reactor displays different trends depending on whether the reactor is operated adiabatically or nonadiabatically. The reaction rate, which is also a function of reactor volume, is affected by the reactor temperature change. In addition; the temperature and composition of the feed stream are also investigated. It is found that temperature profile and hydrogen production yield along the reactor changes drastically according to the feed temperature, feed composition and heat exchange.

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