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A review of catalytic partial oxidation of fossil fuels and biofuels: recent advances in catalyst development and kinetic modelling

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Highlights

- Partial oxidation of seven fuels are reviewed
- Catalysts for CPOX reactions of each fuel are discussed
- Noble metals more stable than Nickel for all CPOX reactions
- Methods of kinetic modeling are highlighted
- High molecular weight fuels require more rigorous reaction kinetics

Abstract

Synthesis gas production is a technology that dates to the 1950s. Recently, the conversion of hydrocarbons to syngas has played an important role in various applications from gas-to-liquid (GTL) processes to fuel cell applications. However, the current industrial production method is only profitable when large quantities of syngas are produced and generates high amounts of CO₂ as a by-product. With the growing demands for smaller-scale and mobile syngas production technology, the catalytic partial oxidation of hydrocarbons has become a promising alternative to the conventional methane steam reforming technology. With the infrastructure for production and distribution of many commercial fuels already in place, numerous studies have been done on conversion of these fuels into syngas. This paper reviews the research that has been done in the past decade on the catalytic partial oxidation of conventional fuels and biofuels. The challenges

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