

过程与工艺

Preparation of Hydrogen through Catalytic Steam Reforming of Bio-oil

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收稿日期 修回日期 网络版发布日期 接受日期

摘要 Hydrogen was prepared via catalytic steam reforming of bio-oil which was obtained from fast pyrolysis of biomass in a fluidized bed reactor. Influential factors including temperature, weight hourly space velocity (WHSV) of bio-oil, mass ratio of steam to bio-oil (S/B) as well as catalyst type on hydrogen selectivity and other desirable gas products were investigated. Based on hydrogen in stoichiometric potential and carbon balance in gaseous phase and feed, hydrogen yield and carbon selectivity were examined. The experimental results show that higher temperature favors the hydrogen selectivity by H₂ mole fraction in gaseous products stream and it plays an important role in hydrogen yield and carbon selectivity. Higher hydrogen selectivity and yield, and carbon selectivity were obtained at lower bio-oil WHSV. In catalytic steam reforming system a maximum steam concentration value exists, at which hydrogen selectivity and yield, and carbon selectivity keep constant. Through experiments, preferential operation conditions were obtained as follows: temperature 800~850°C, bio-oil WHSV below 3.0 h⁻¹, and mass ratio of steam to bio-oil 10~12. The performance tests indicate that Ni-based catalysts are optional, especially Ni/a-Al₂O₃ effective in the steam reforming process.

关键词 [fast pyrolysis, bio-oil, hydrogen, steam reforming, Ni-based catalys, carbon selectivity](#)

分类号

DOI:

对应的英文版文章: [207132](#)

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