

Preliminary Study of Various Liquid Type Feedstocks and Model Compounds for Hydrogen Production in Supercritical Water Gasification

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Gasification of various feedstock and model compounds was investigated in supercritical water to identify the potential hydrogen yield of each feedstock. Methanol, ethanol, glycerol, glucose, isooctane, and n-decane (10 wt%) were conducted in the similar operating condition (P = 25 MPa, T = 740oC, residence time at 60 s) in continuous tubular reactor system made of Haynes 230 alloy. All feedstocks can achieve complete conversion into gaseous product under those condition, showed by carbon gasification efficiency value > 100%. Methanol, isooctane, and n-decane were further investigated at higher concentration (20 wt%) and lower temperature (T = 650oC) while the other parameters were maintained constant. Methanol reached complete conversion in every condition applied, with hydrogen yield reached equilibrium value. However, hydrogen yield of other feedstocks were still under the equilibrium: 76.14% (ethanol), 95.6% (glycerol), 80.52% (glucose), n-decane (58%). Isooctane and n-decane showed drastically drop (34-72%) in hydrogen yield as the concentration increased and temperature decreased.