

Gasification of Glycerol in Supercritical Water

의인구*

한국에너지기술연구원

(samwe04@kier.re.kr*)

Recently, biodiesel has received worldwide attention as a renewable transportation fuel. Biodiesel is generally produced by transesterification reaction of vegetable oils with alcohols under catalytic conditions. Biodiesel production processes also generate glycerol as a byproduct which is about 10 wt% of biodiesel product. However the glycerol byproduct contains significant amounts of other materials such as unreacted oils, water, or catalysts. Because of these contaminants and increasing generation rate annually, the cost of glycerol byproduct has been continuously decreased. In this work, supercritical water gasification technology was applied to recover the energy value of the waste glycerol from biodiesel factories. Glycerol in water as a model for the glycerol byproduct was used as a reactant. The effect of reaction conditions such as temperature, catalyst, reactant concentration, and total operating time on gas production rate, product distribution, and gasification efficiency was investigated using a continuous flow reactor. The gas production rates more than 1,000 L/h/L with hydrogen contents of 50–60 mol% was obtained by the gasification of 1.2 M glycerol over Ni-Y/activated charcoal catalyst in supercritical water operated at 650 °C, 28 MPa.