

Hydrogen Production from Glycerol: A Review

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Abstract : The development of alternative sources of energy is becoming important in this era of diminishing petroleum reserves and increased environmental awareness. Hydrogen production from biomass has attracted great interest because of the potential application in fuel cells. Significant amount of glycerol is produced as a by-product during bio-diesel production by transesterification of vegetable oils, which are available at low cost in large supply from renewable raw materials. With increased production of biodiesel, a glut of glycerol (C₃H₈O₃) is expected in the world market, and therefore it is essential to find useful applications for glycerol. Finding alternative uses for glycerol is important. Using glycerol as a source of producing hydrogen is a good possibility. Steam reforming is a promising way to utilize the diluted glycerol aqueous solution to produce hydrogen. Glycerin is a potential feed stock than ethanol for hydrogen production because one mole of glycerin can produce up to four moles of hydrogen. An attempt is made to identify new catalyst with high selectivity towards hydrogen and sufficient reaction rate at mild conditions. The catalysts used in other processes are studied and their effects on temperature, contact time, and water to glycerol ratio, metal loading on hydrogen yield are investigated. Other considerations such as catalyst activity, catalyst lifetime and operating conditions are estimated for over all process economics. Thus, the paper covers the selection of process and catalyst, process parameters, catalyst properties and economics related to it.

Keywords : Hydrogen production, biomass, transesterification, steam reforming, catalyst activity, catalyst properties, economics.