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RESEARCH

Nano based nickel catalyst doped with promoters for renewable hydrogen production via steam reforming of glycerol

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Abstract
Tremendous use of fossil fuels has raised a major concern of their depletion and various environmental issues hence research for its alternative came into the picture. Bio-diesel is one of the alternatives of fossil fuel and it is produced from vegetable feed-stock. The properties of the bio-diesel are similar to that of conventional fuel and thus it's widely used nowadays. Production of 100 kg bio-diesel generates 10 kg of glycerol as byproduct. Thus, to make the process more sustainable it's necessary to convert glycerol into useful product hydrogen. Steam reforming process is very efficient process in converting glycerol into renewable hydrogen since it is highly endothermic process and carried out at atmospheric pressure. The present work focuses on preparation of nickel-based catalysts using wet impregnation and co-precipitation methods and doping with promoters like zinc, magnesium on alumina support. Different techniques were employed for the characterization of synthesized catalysts, like XRD, SEM to know the physio-chemical properties of catalysts. 10% Ni/3% Zn/2% Mg/Al_2O_3 exhibited better results, 86% conversion of glycerol with hydrogen yield 78% at optimum conditions W/F = 15 kgcat s mole-1, T = 800°C, S/G = 9:1 ratio and at atmospheric pressure compared with 10% Ni/2% Mg/Al_2O_3

Keywords Biodiesel · Glycerol · Nickel catalyst · Renewable hydrogen · Wet-impregnation

1 Introduction

One of the biggest challenges that modern society is currently facing is the growing demand of global energy and the limited availability of fossil fuel reserves. The rapid depletion of

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