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RESEARCH

Synthesis and characterization of nickel based bimetallic nano catalyst for production of clean hydrogen by steam reforming of glycerol

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Abstract
Energy is the driving force of this world. The diminishing reserves of fossil fuels makes alternative and renewable fuel sources an attractive option. Growing energy demands due to dwining fossil fuels has attracted much attention to hydrogen as an energy carrier. The hydrogen fuel shows up as an encouraging path to a more sustainable, cleaner, and secure energy era. This study is specifically focused on the synthesis of nickel-based nano catalysts by wet impregnation and co-precipitation methods by adding modifiers such as magnesium and cobalt over alumina support for renewable and clean hydrogen production by steam reforming of glycerol. Nickel-based catalysts are preferred as they have good attributes such as efficient bond cleavage, high stability, and economical in comparison to noble metals. Alumina support increases the surface area and provides optimal dispersion, strong mechanical strength, and an anti-sintering effect that improves overall catalytic performance. Different techniques were employed for the characterization of synthesized catalysts, including XRD, SEM. The performance of catalysts was evaluated in atmospheric gas-solid fixed-bed catalytic reactor. The study focuses on the effect of different parameters including temperature, contact time, steam-to-glycerol ratio, and metallic loadings on catalytical performance. Promoters such as cobalt and magnesium are added to increase the activity of nickel catalyst. Ni/Co/Mg/Al_2O_3nano catalyst prepared by using wet impregnation method showed promising results with good glycerol conversion and hydrogen yield.

Keywords Nano catalysts · Hydrogen · Nickel · Wet-impregnation · Glycerol conversion

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