

Hydrogen production by glycerol dry reforming over rhenium promoted Ni-based catalyst supported on Santa Barbara Amorphous 15 (SBA-15)

Nurul Asmawati Roslan^a, Nur Nabillah Mohd Arif^a, Jessy Lynn Jaspin^a, Nurul Aini Mohamed Razali^a, and Sumaiya Zainal Abidin^{a,b}

^aFaculty of Chemical and Natural Resources Engineering, Universiti Malaysia Pahang, Gambang Kuantan, Pahang, Malaysia;

^bCentre of Excellence for Advanced Research in Fluid Flow (CARIFF), Universiti Malaysia Pahang, Gambang Kuantan, Pahang, Malaysia

ABSTRACT

This paper presents the glycerol dry reforming (GDR) reaction using rhenium (Re) promoted on Ni-based catalyst supported on Santa Barbara Amorphous 15 (SBA-15) for the production of hydrogen. In this study, the non-promoted (15%Ni/SBA-15) and promoted (3%Re-15%Ni/SBA-15) catalysts were first synthesized using wet impregnation method and their physicochemical characteristics were analyzed with Brunauer–Emmet–Teller (BET), scanning electron microscopy (SEM), X-ray diffraction (XRD), and thermogravimetric (TGA) analyses. Their performances were evaluated in GDR reaction and it was found that 3%Re-15%Ni/SBA-15 exhibited higher glycerol conversion (57%) and hydrogen yield (55%) than 15%Ni/SBA-15 (i.e., 20% glycerol conversion and 18% hydrogen yield). From the GDR study, the highest glycerol conversion (57%) and hydrogen yield (55%) for 3%Re-15%Ni/SBA-15 were obtained at 0.2 g catalyst, 700°C of reaction temperature, and CO₂ to glycerol ratio (CGR) of 1:1. The small crystallite size and BET surface area of 3%Re-15%Ni/SBA-15 had successfully reduced the carbon deposition and indirectly contributed to high glycerol conversion and product yield.

KEYWORDS

Glycerol; dry reforming; hydrogen; SBA-15; rhenium

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