

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

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### 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 CO<sub>2</sub> 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

DOI: <https://doi.org/10.1080/15567036.2019.1645762>

## **ACKNOWLEDGEMENT**

The authors would like to thank the Ministry of Education, Malaysia and Universiti Malaysia Pahang for the financial support through the research grant awards with vote number of FRGS/1/2018/TK02/UMP/02/12 (RDU190197) and RDU1803118.