SYNTHESIS GAS PRODUCTION FROM GLYCEROL USING NICKEL LOADED ZEOLITE CATALYST

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ABSTRACT

Glycerol is the main by-product of biodiesel production through transesterification process. In this study, focused was mainly on synthesis gas production via glycerol steam reforming using nickel incorporated on HZSM-5. Modified catalyst were prepared through wet impregnation method with different weight percent of nickel. The catalyst was characterized using FTIR, FESEM and XRD for their structure. The study were conducted by applying different value of reaction temperature (300°C-500 °C), catalyst weight (0.1g-0.3g) and glycerol flowrate (0.2ccm-0.4 ccm). The experiment were carried out using experimental rig at atmospheric pressure and nitrogen as the carrier gas. The products gas were analyzed using gas-chromatography with thermal conductivity detector (GC-TCD). Response Surface Methodology (RSM) were applied in this study in order to investigate the relationship of reaction temperature, weight of catalyst and glycerol flowrate on synthesis gas yield. From the result of the experiment, the optimum condition that produced highest yield of synthesis gas using 15wt% Ni/ZSM-5 was at temperature 400°C, catalyst weight 0.3 g and glycerol flow rate 0.4 ccm.
ABSTRAK

Gliserol adalah produk sampingan utama dalam penghasilan biodiesel melalui proses transesterifikasi. Objektif utama penyelidikan ini adalah untuk mengkaji penghasilan gas sintesis menggunakan pemangkin ZSM-5 yang telah diperbadankan dengan nikel. Pemangkin telah disediakan menggunakan kaedah pengisitepuan basah. Struktur pemangkin yang telah diubah suai dianalisis menggunakan FTIR, FESEM dan XRD. Eksperimen dijalankan dengan suhu (300°C-500 °C), jisim pemangkin (0.1g-0.3g) dan kadar aliran gliserol (0.2-0.4 ccm). Ujikaji dijalankan pada tekanan atmospera dan gas Nitrogen sebagai gas pembawa. Gas yang terhasil daripada tindak balas dianalisis menggunakan GC-TCD. Penggunan RSM bertujuan untuk mengenal pasti interaksi di antara parameter yang terlibat. Hasil daripada eksperimen, keadaan optimum bagi penghasilan gas sintesis menggunakan 15% Ni yang diperbadankan dengan ZSM-5 adalah pada suhu 400°C, jisim pemangkin 0.3g dan kadar aliran gliserol 0.4 ccm.


