Supachai Reakasame 2010: Potential of L-phenylalanine Production from Raw Glycerol of Biodiesel Process. Master of Engineering (Chemical Engineering), Major Field: Chemical Engineering, Department of Chemical Engineering. Thesis Advisor: Assistant Professor Anusith Thanapimmetha, D.Eng. 131 pages.

The possibility of using raw glycerol from RBD palm oil biodiesel process for bacteria growth and L-phenylalanine production using recombinant *Escherichia coli* BL21 (DE3) was investigated. Raw glycerol from the biodiesel industry with 76% (w/w) glycerol content was pretreated with concentrated sulfuric acid to reduce the amount of impurities which were 7.9% (w/w) of soap and 3.9% (w/w) of ash. The acid was added into raw glycerol until the pH of raw glycerol decreased from 12 to 6, 5, 4, 3 and 2, respectively. After that, raw glycerol was separated into 3 phases: free fatty acid (top phase), glycerol (middle phase) and sulfate salt (bottom phase). The recovered glycerol phase was analyzed to determine the glycerol composition. The results showed that glycerol content in the recovered glycerol phase increased when the pH of acid-pretreated glycerol decreased. The pH 3 acid-pretreated glycerol contained 91% (w/w) glycerol, 2.59% (w/w) ash and non-detectable level of soap. Then raw glycerol, acid-pretreated glycerol and USP grade glycerol (99.5% w/w) at the concentration of 5, 10, 30 and 50 g/L were used as a carbon source in culturing *E. coli* BL21 (DE3). The results showed that the cells were able to use raw glycerol efficiently for their growth. The cell dry weight and L-phenylalanine concentration obtained after 36 h of cultivation from raw glycerol were much higher than that from the other kinds of glycerol. The highest cell dry weight (3.47 g/L) and L-phenylalanine concentration (55.2 mg/L) were obtained from the medium containing 30 g/L of raw glycerol. The results indicated that raw glycerol from RBD palm oil biodiesel is an interesting carbon source for *E. coli* BL21 (DE3) cultivation.

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