

Wilasinee Phromsila 2012: Bio-oil Production from Grease Wastes under High Pressure and Temperature. Master of Science (Environmental Science), Major Field: Environmental Science, Department of Environmental Science. Thesis Advisor: Associate Professor Apinya Duangchan, Ph.D. 65 pages.

In this research, conversion of grease into bio-oil has been studied under high pressure and temperature. A grease waste with moisture content more than 80% was placed in a 0.5 liter autoclave reactor. Each feed of grease of 25, 50, 100 and 150 g was pressurized with nitrogen gas with initial pressure of 7 bar. After the temperature reach 420°C the final pressure of each run was raised to 74.46, 119.97, 210.98 and 234.42 bar, respectively. The 30, 60 and 90 minutes of residence time were also studied. The experimental results showed that the increase of final pressure increased bio-oil yield and reduced the gas and char contents. The quality of bio-oil was also improved as shown by the increase of H/C and the high heating values and the lower value of O/C when the final pressure was increased. The residence time of 30, 60 and 90 minutes showed no significant effect on both yield and quality. 100 g of feed with a final pressure of 210.98 bar and 30 minutes of residence time to produce bio-oil of 95.32 wt% of the feed. The bio-oil consisted of 9.87 wt% hydrogen, 28.65 wt% oxygen and 61.49 wt% carbon providing a heating value as 32.52 MJ/kg.

The effect of temperature of 420, 380, 300, 260, and 220°C on a feed of 100 g and a residence time of 30 minutes were studied. The results showed that temperature affected the quality and yield of bio-oil significantly. However at the temperature of 220°C the pressure was raised up to 33.09 bar and it was feasible in engineering practice. Under these conditions it produced the bio-oil of 80.28 wt% which consisted of 8.47 wt% hydrogen, 34.32 wt% oxygen and 57.21 wt% carbon and 30.25 MJ/kg heating value. The bio-oil from grease could be a potential fuel used to substitute a fuel oil.

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Thesis Advisor's signature