Topic: Study on degradative solvent extraction of Biomass and Coal by 1-Methylnapthalene, Biodiesel and WS3060 at 350 °C

Name of student: Mr. Supachai Jadsadajerm **ID**: 55300700517

Name of Supervisor: Asst. Prof. Dr. Nakorn Worasuwannarak

ABSTRACT

The degradative solvent extraction of biomasses including rice straw (RS) and Leucaena (LC) and coal was studied. This method treats raw material in solvent at around 350 °C, under pressure, to dewater, remove oxygen functional groups, and to produce low-molecular-weight compounds. The solvent acts as a dispersant for the sample and it does not participate in chemical reaction. In this study, 1-Methylnaphthalene (1-MN), Biodiesel from palm oil (B100) and WS3060 were used as a solvent. The products were separated into residue (termed "Residue"), gaseous products and the extract in solvent. The extract was recovered as a solid by removing the solvent by vacuum evaporator and was called "Soluble". The small molecular compounds dissolving in the solvent were removed together with the solvent was called "Liquid". The yield of "Liquid" could not be measured directly, but was calculated by the difference.

At 350 °C, the carbon-based yields of the Soluble fraction from RS and LC were as large as 57.2 % and 58.2 %, respectively when using 1-MN as a solvent. On the other hand, the highest yield of the Soluble fraction from coal was found at 380 °C and was 34.6 %. It is difficult to remove the solvent from the Soluble fraction when using B100 as a solvent due to its high boiling point. Therefore the "Soluble + Liquid" fraction for B100 was quantified by the difference. At 350 °C, the carbon-based yields of the "Soluble + Liquid" fraction from RS, LC and coal were as large as 43.5 %, 46.1 % and 17.0 %, respectively. The extraction yields were increased when increasing treatment temperature to 380 °C. The carbon-based yields of the "Soluble + Liquid" fraction from RS, LC and coal were as large as 45.3 %, 51.7 % and 17.7 %, respectively. The last solvent was WS3060. The carbon-based yields of the Soluble fraction from RS, LC and coal were 8.7 %, 10.5 % and 5.9 %, respectively when using this solvent. The Soluble yields extracted from this solvent were very small when compared with 1-MN solvent and B100. This is probably because the soluble product does not dissolve in WS3060 and precipitated into

solid at room temperature. These results indicated that B100 and WS3060 had a potential as a solvent for the degradative solvent extraction.

Keywords: Biomass; Degradative Solvent Extraction;Upgrading