SUPERCRITICAL LIQUEFACTION OF COMMON REED (PHRAGMITES AUSTRALIS) WITH ALKALI CATALYSTS

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Abstract: Biomass is an attractive alternative to current petroleum based fuels as they can be utilized as transportation fuels with little change to current technologies and have significant potential to improve sustainability and reduce increasing greenhouse gas emissions. Recently, biomass utilization researches have been intensified for both economical and ecological concerns, especially for its use as an alternative to petroleum based fuels [1]. If environmental and economic sustainability are considered carefully, biomass could play an important role in lowering long term carbon dioxide emissions and in reaching targets to replace petroleum based transportation fuels with a viable alternative. The components of biomass include cellulose, hemicelluloses, lignin, extractives, lipids, proteins, simple sugars, starches, water, hydrocarbons, ash, and other compounds. Direct thermochemical conversion of lignocellulosic materials can produce gases and liquid fuels in a quick and efficient way. *Phragmites australis*, the common reed, is a large perennial grass found in wetlands throughout temperate and tropical regions of the world. It can grow up to 6 meters high in dense stands and is long-lived. *Phragmites australis* is widely distributed, ranging all over Europe, Asia, Africa, America and Australia [2,3].

Thanks to its location, Turkey has very rich biomass feedstock including bio wastes, lignocelluloses and aquatics [4]. There are approximately ten thousands plants including *Phragmites australis* growing in the lands of Turkey. These plants could be evaluated as renewable energy sources to produce bio-oil or value-added chemicals. This study was aimed to obtaining liquid products from *Phragmites australis* via liquefaction process in supercritical organic solvents with and without catalyst in a cylindrical reactor. The product yields without catalyst in supercritical methanol, ethanol and acetone were found to as 55.4 %, 64.4 %, and 73.5 % at 573 K respectively. The highest conversion to liquid products was obtained in supercritical acetone with 10% sodium hydroxide as catalyst at the same temperature in the catalytic runs. The chemical compositions of liquid products obtained at 573 K were determined by elemental analysis. Main chemical compounds present in the liquid products obtained in ethanol without catalyst and acetone with sodium hydroxide catalyst at 573 K were analyzed and characterized by GC-MS.

References:

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