

# Lignin depolymerization and catalytic conversion to liquid fuels

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## INTRODUCTION

Lignin received from DONG Energy's refinery needs to be depolymerized for valorization. The depolymerization was carried out in a batch reactor with elevated temperature and high hydrogen pressure. These yielded conversions up to 84 % and with methanol as the main product.

## THEORY

In recent years there has been a lot of focus on bringing down CO<sub>2</sub> emissions and being independent of fossil fuels. A solution to this is to use biofuel. 2<sup>nd</sup> generation biofuels are based on lignocellulosic biomass which is found in various amounts in almost all plant material. This consists mainly of three compounds cellulose, hemicelluloses and lignin. To valorize 2<sup>nd</sup> generation biofuels it will be necessary to find a way to utilize lignin to its full potential.

## METHODS

It is the objective of this project to contribute to the development of a process through which lignin from bio-refineries can be converted into high value added products such as liquid fuels and chemicals. The experiments are conducted in a high pressure batch reactor at high temperatures under hydrogen pressure. A ruthenium catalyst is used to find optimal conditions by varying pressure, residence time and temperature. It is thought to investigate different catalysts later on.

## RESULTS

Solvent	T (° C)	P (bar)	Catalyst	Conversion (w/w%)	Residence time (h)
Water	300	135	none	75	4
Water	250	135	Ru/C	56	4
Water	300	135	Ru/C	71	4
Water	300	135	Ru/C	83	18
Water	325	160	Ru/C	84	4
Methanol	230	135	Ru/C	31	4
Methanol	260	90	Ru/C	66	4

Table 1 – Results

## CONCLUSION

It is possible to convert the lignin received from DONG Energy in satisfactory amount. The main product is methanol but further measurements are necessary to quantify this. This is a great result although a distillation is needed to isolate the methanol.