



Pyrolysis of lignin—Novel Way of Producing Biofuels

Haoxi Ben



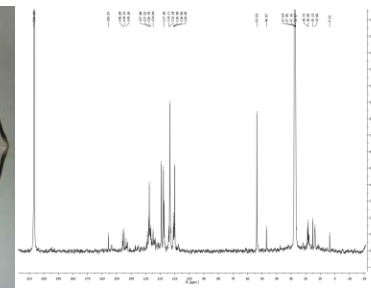
PROGRAM DESCRIPTION

- The development of inexpensive renewable alternatives transportation fuels
- Lignin is the second most abundant biopolymer on Earth With a 20×10^9 annual biosynthesis rate
- Lignin is an abundant bioresource available from:
 - Currently from Chemical Pulp Mills
 - Shortly from Cellulosic Ethanol Biorefineries
- Typical kraft pulp mill utilizes about 650,000 tons of wood/year generating approximately 200,000 tons of lignin/year



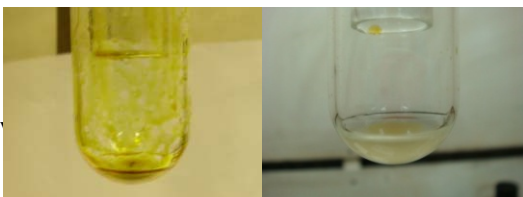
TECHNICAL DETAILS

- Pyrolysis of lignin at different temperature from 300°C to 600 °C
- Use different types of zeolites as catalyst
- Use NMR, GC, GC-MS, GPC and elemental analysis to analyze the pyrolysis oil



PAYOFF

- Pyrolysis oil from lignin is a potential green diesel or biogasoline bioresource
- Enhanced pyrolysis oil production
- Improved pyrolysis oil properties



KEY ACCOMPLISHMENTS

- Optimized pyrolysis conditions without catalyst: 500 °C the yield is 43%
- The optimized condition of pyrolysis with zeolites as catalyst is using powder zeolites at 500 °C the yield is 70%.

Without catalyst at 500 °C for different times

with catalyst at different temperatures

| 500°C | Oil/% | Char/% |
|--------|-------|--------|
| 60 min | 43.20 | 54.41 |
| 30 min | 35.79 | 53.03 |
| 15 min | 32.57 | 51.91 |

| | Oil/% | Char/% |
|---------------------|-------|--------|
| 600 °C | 33.21 | 41.87 |
| 500 °C ¹ | 51.17 | 33.68 |
| 500 °C ² | 70.32 | 10.20 |
| 400 °C | 32.86 | 46.61 |
| 300 °C | 16.68 | 76.49 |

Professor AJ Ragauskas, Supervisor

