



Renmatix Omno Introduction

Joint Development in Hard Carbon Bio-Material for the Battery Sector

November 7, 2023

Renmatix Introduction

- Developer of patented SuperCritical Water (SCW) bio-process: Plantrose™
- Using the power of water and deep process understanding, the Plantrose team has demonstrated the extraction of:

- Cellulosic sugars & oligomers
- Unique forms of cellulose
- Non-odor, reactive lignin
- Specialty biomass fractions



Presidential
Green Chemistry
Award winner



- Renmatix is active in providing blends and high purity bio-products across a range of markets... wood adhesives, concrete additives, molded fiber, food, skin care, etc.

Why it Works?

- A non-toxic solvent which works as a catalyst
- Provides structural modification and increases the reactivity of polymeric carbohydrates by:
 - Changing from crystalline to amorphous structure
 - Changing the reactions from heterogeneous to homogeneous reactions
 - ***In-situ separation of biomass components***

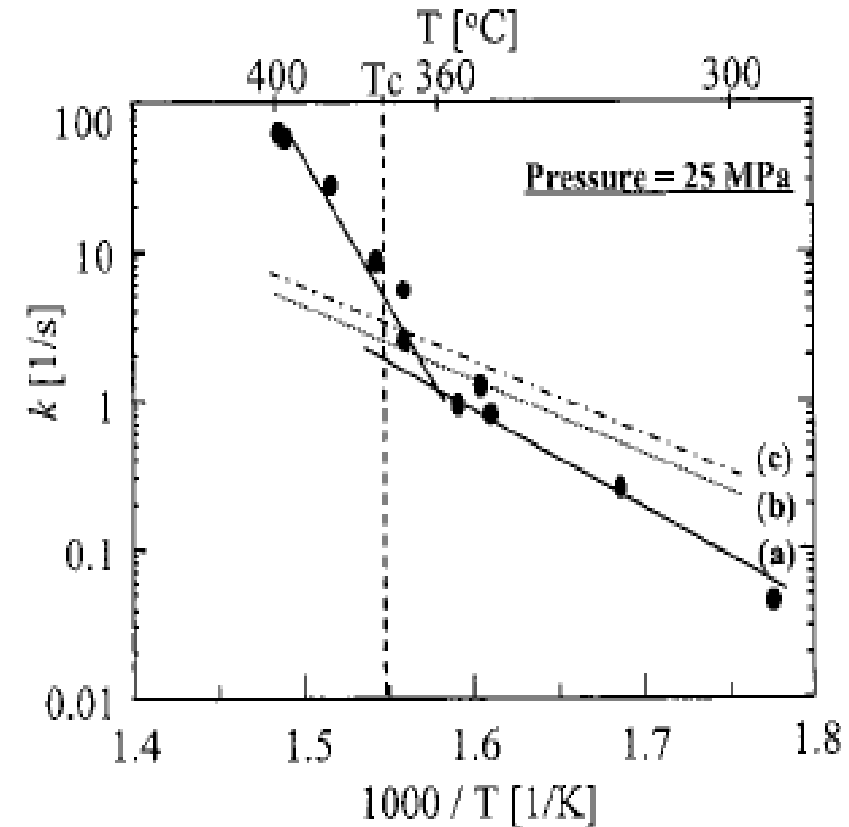


Figure: Arrhenius plot of the decomposition rate constants of cellulose and related cellulosic compounds in subcritical and supercritical water: (a) cellulose; (b) cellobiose; (c) glucose

[Sasaki, M., Z.Fang, Y.Fukushima, T.Adschiri, and K.Arai, "Dissolution and hydrolysis of cellulose in subcritical and supercritical water", *Ind Eng. Chem. Res.* 2000, 39, 2883-2890]

Omno™ Polymers – Lignin based bio-products

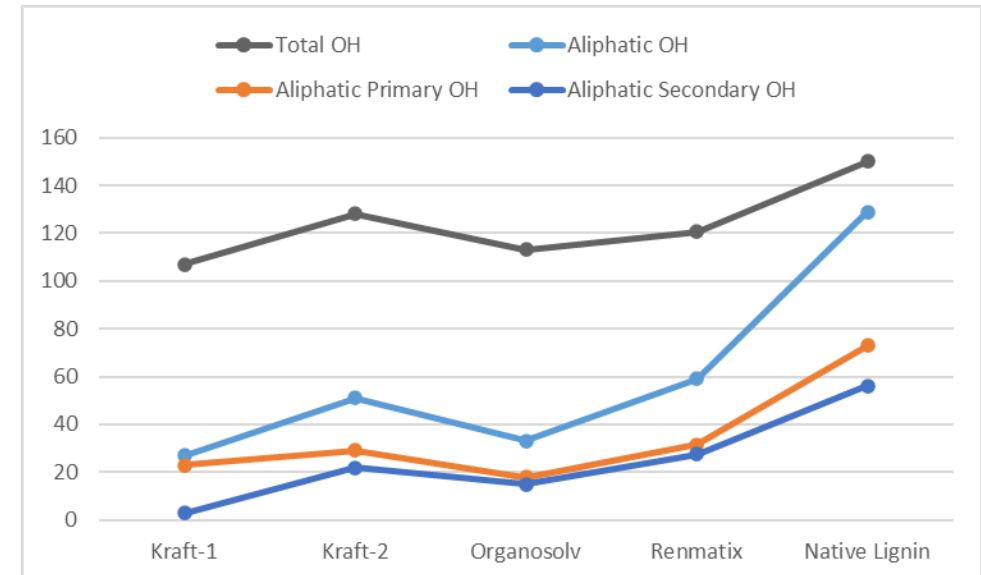
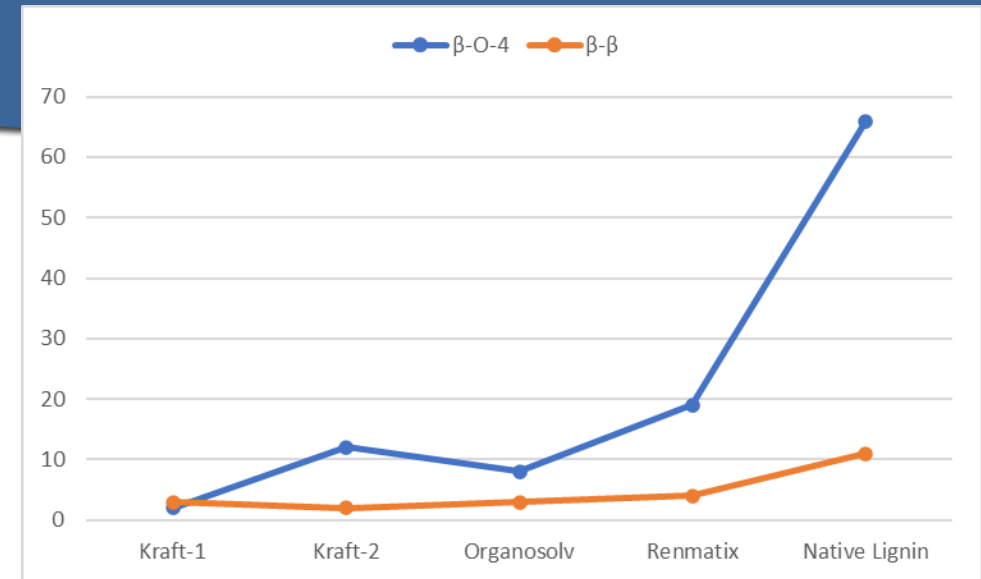


- Lignin, cellulose, and oligomer blends for advanced applications.
- No odor, no ash (sulfur), high consistency with improved reactivity

Omno is the most native lignin

Only exposed to water

- Native lignin is a polyphenol high in aliphatic & low in phenolic OH, carbonyl, carboxylic acid, and methoxyl.
 - Allows trees to persist in nature under constant UV exposure
- All technical lignins show degradation:
 - Functional group changes
 - Reduction in linkages
 - MW changes
- Omno advantages, more native:
 - Higher aliphatic OH – higher reactivity
 - Higher linkages (MW)
 - Non-ash & non-sulfur (thiols, etc.)



Renmatix Omno – Commercially Available

- Operating facilities in Rome, NY (Syracuse) & Kennesaw, GA (Atlanta)
- SCW extracted grades of Omno up to 5k MT/yr



Renmatix & Li-Ion Batteries

- Plantrose™ bio-material is cost advantaged and functional.
- Omno proven successful in traditional carbon and petroleum markets
- Looking for collaborative partner in energy storage systems
- Design formulation to high purity hard carbon



OMNO™
POLYMERS

Next Steps?

