Response to DE-FOA-0001615: Request for Information: Cellulosic Sugar and Lignin Production Capabilities

Company name	Renmatix, Inc.
Company contact	Frank Lipiecki
Contact's details	660 Allendale Road King of Prussia, PA 19406 Phone: 484-751-4013 Frank.Lipiecki@renmatix.com

Category 2: Lignin

Question 1: To which types of research entities are you willing and able to sell or otherwise provide your lignin? (e.g., university researchers, national laboratories, industry/private sector)? Are there any types of research entities to whom you are not willing and able to sell your lignin?
Renmatix is willing and able to provide our lignin, Omno® Polymer, to university researchers, national laboratories, and to the industry/private sector pursuant to mutually agreed-upon material transfer agreements.

Question 2: What are the maximum and minimum quantities of lignin that you are willing and able to sell (kg)?
Renmatix lignin is available as Omno Polymer grades in quantities from grams to hundreds of kilograms

Question 3: In what units do you sell your lignin and is it packaged (e.g., super sacks), or sold in bulk?
Lignin is shipped in sizes and packages that are appropriate for the specified sample volume (vials to drums to totes)

Question 4: How do you ship lignin?
Shipped according to US DOT or UN and customer specifications

Question 5: What is the lignin concentration in your product?
Omno Polymer grade lignin is available at a few concentrations.

Question 6: What type(s) of biomass do you use in your process?
Most available grades of lignin in inventory have been produced from woody biomass. Some lignin is available from other feedstocks that include agricultural residues (e.g. cornstover, palm residues, bagasse, etc.), and grasses (e.g. switchgrass, miscanthus, etc.).

Question 7: What process do you use that produces lignin (dilute acid, ammonium fiber expansion (AFEX), hot water, organosolv, etc.)?
Renmatix lignin has only been exposed to water, heat and pressure; not to acids, ammonia, nor enzymes. Renmatix produces lignocellulosic sugar and lignin using its proprietary Plantrose® process. Renmatix's Plantrose process uses a two-step process to deconstruct the lignocellulosic biomass. The first step consists of a hot water extraction and auto hydrolysis of hemicelluloses to

C5/C6 sugars. This step leaves most of the lignin and the cellulose intact. The second step uses supercritical water to first solubilize the cellulose from the first step and then hydrolyze it to glucose. After the second step, the lignin contained in the biomass is recovered as a co-product.

Question 8: What details of the scale of your process are you willing to share (e.g. batch and/or continuous or volumetric productivity)?
Our current capability is a continuous, multi-ton per day scale

Question 9: Do you measure the typical composition of your lignin? If so, what method do you use? How consistent is the composition of your lignin?
The Klason method is used to measure composition

Question 10: Do you routinely test your lignin for consistency within and between lots?
Each lot of lignin is tested for its physical characteristics and chemical composition.

Question 11: What impurities are present in your lignin and what testing do you perform to determine the presence of impurities?
A: Residual cellulose and ash remain from the biomass itself

Question 12: Does your process include a purification or filtration step?
Product lignin is available in dry or wet forms. Lower assay product can be purified to meet customer requests as desired.

Question 13: What is the typical concentration in g/L you can provide?
Not applicable

Question 14: Have you examined the impacts of transport and storage on lignin? If so, can you please provide any relevant (non-proprietary) details of these impacts?
Renmatix lignin is bio-stable for shipping and storage.

Question 15: What additional information are you willing and able to provide to the research community about the lignin? Please provide any non-proprietary cost information you are willing to share.
Renmatix can provide chemical and physical characteristics information for our lignin once an agreement is in place with the receiving party.

Question 16: Into what markets do you typically sell your lignin? What is a typical application for your lignin?
A: Various joint-development and internal application development initiatives are underway for markets like: adhesives, thermoplastics, composites, coatings, consumer goods, and additional longer term opportunities.