CHROMATOGRAPHY METHOD OPTIMIZATION FOR LIGNIN AND ITS DEGRADATION PRODUCTS ANALYSIS

Natallia Yeudakimenka, Anastasia Artemyeva, Evguenii Kozliak, Alena Kubátová

Interdisciplinary Renewable & Environmental Chemistry REU

Objectives:

The aim was optimization of chromatography method:

- Finding an optimal Size Exclusion Chromatography (SEC) column without specific column-analyte interaction effects.
- Finding a suitable mobile phase for the column.
- Calibration of the column with appropriate standards.
- Analysis of lignin and its degradation products utilizing the optimal column.
- Combination of the developed chromatography method with the mass spectrometry detection.

Natallia Yeudakimenka working on the sample preparation

Research Project:

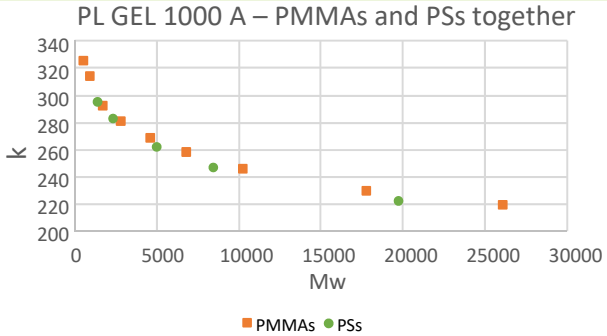
All the experiments were performed using an Agilent LC 1100 coupled with DAD detector.

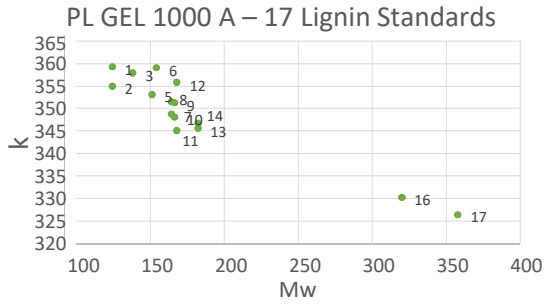
One Gel Filtration Chromatography (GFC) column and three Gel Permeation Chromatography (GPC) columns were tested:

Ultrahydrogel (GFC), Gel GBR 100 Jordi, PL gel 500 Å, PL gel 1000 Å (GPC).

For calibration of the columns and verification of the proper size-based separation polymeric standards and 17 lignin standards were used.

As the result separation with Ultrahydrogel column was strongly affected by pKa value, GPC Jordi column was affected by functionalities, PL Gel 500 Å showed promising size-based separation, same as PL Gel 1000 Å, but better separation was achieved utilizing PL Gel 1000 Å.





Both plots are showing molecular weight separation without any other specific interactions for the PL Gel 1000 Å column.

This material is based upon work supported by the National Science Foundation Research Experience for Undergraduates under Grant No. CHE 1460825 and EPSCoR track II DakotaBioCon. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the authors and do not necessarily reflect the views of the National Science Foundation.