CASE STUDY
Molecular Weight Distribution of PPO

PROBLEM
The purpose of this work was to determine the molecular weight distribution of a modified Polyphenylene Oxide (PPO) sample.

ANALYTICAL STRATEGY
High Temperature Gel Permeation Chromatography (GPC-H) was employed to characterize the PPO sample in terms of number average molecular weight (Mn), weight average molecular weight (Mw), and Z average molecular weight (Mz).

CONCLUSIONS
Molecular weights are provided, along with a refractive index chromatogram for the sample, a cumulative weight fraction curve and a molecular weight distribution curve.

Read the following report to see the full analysis.

Final Report

Jordi Labs LLC
Case Study

Molecular Weight Distribution Determination of Modified Polyphenylene Oxide (PPO) Sample Using High Temperature Gel Permeation Chromatography (GPC-H)

Date: xx/xx/xx

Released by:
Dr. Mark Jordi
President
Jordi Labs LLC

Company Name Confidential

Date

Client Name
Company Name

P: xxx-xxx-xxx
E: xxxxx@xxxx.com

Dear Client,

Please find enclosed the test results for your sample described as:

1. Noryl PPO (modified Polyphenylene Oxide)

The following test was performed:

1. High Temperature Gel Permeation Chromatography (GPC-H)

Summary of Results

The purpose of this work was to determine the molecular weight distribution of a modified Polyphenylene Oxide (PPO) sample using ***High Temperature Gel Permeation Chromatography (GPC-H).*** **Table I** shows the resulting molecular weight values.

Individual Test Results

A summary of the individual test results is provided below. All accompanying data, including spectra, has been mailed in the full version of this report.

GPC

Background: A polymer is a large molecule which is formed using a repeating subunit. A polymeric sample does not have a single molecular weight but rather a range of values and thus an average value is used to indicate its molecular weight.

Three different molecular weight averages are commonly used to provide information about polymers. These are the number average molecular weight (Mn), the weight average molecular weight (Mw), and the Z average molecular weight (Mz).

Mn provides information about the lowest molecular weight portion of the sample. Mw is the average closest to the center of the peak and Mz represents the highest molecular weight portion of the sample. The different molecular weight averages can each be related to specific polymer properties such as material toughness, tensile strength, and total elongation.

By comparing the different averages, it is possible to define a fourth parameter called the polydispersity index (PDI). This parameter gives an indication of how broad a range of molecular weights are in the sample.

Results: Enclosed is a refractive index chromatogram for the sample, as well as a cumulative weight fraction curve and a molecular weight distribution curve. A calibration curve and chromatographic overlay of the standards are included. The molecular weights are summarized in **Table I**.

Table I. Average Molecular Weight

Relative to polystyrene standards

Noryl PPO

Sample	Mn	Mw	Mz	Mw/Mn	IV	Rh
2012-01-01 01:02:05 PPO 01.vdt	18.895	95.454	282.436	5.052	0.0000	0.00
2012-01-01 02:08:53 PPO 02.vdt	18.752	95.952	282.280	5.117	0.0000	0.00

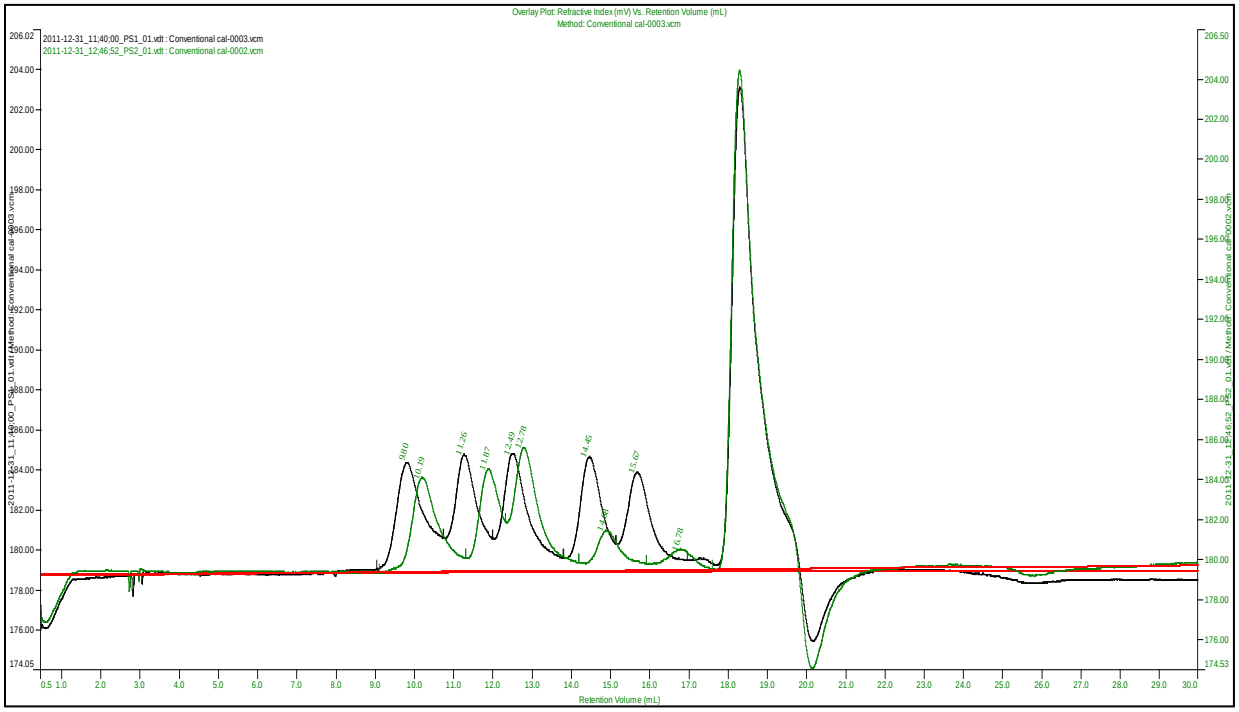

Figure 1: Normalized Overlay of Standards.

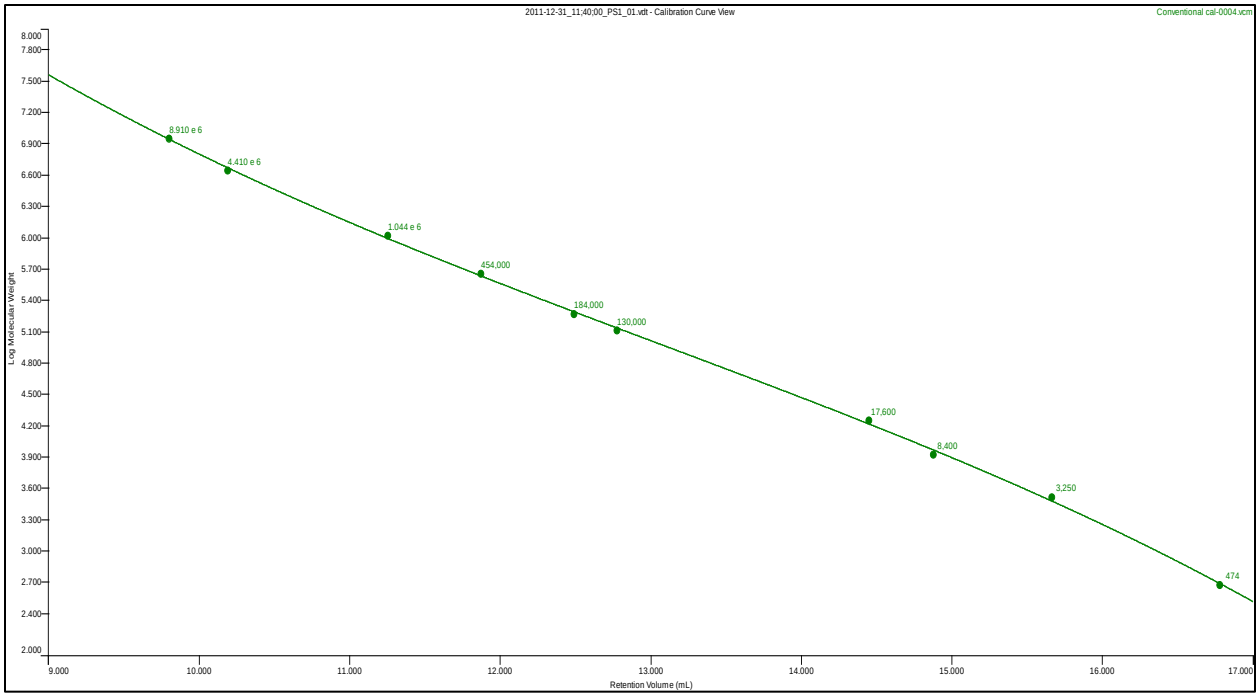

Figure 2: Calibration Curve.

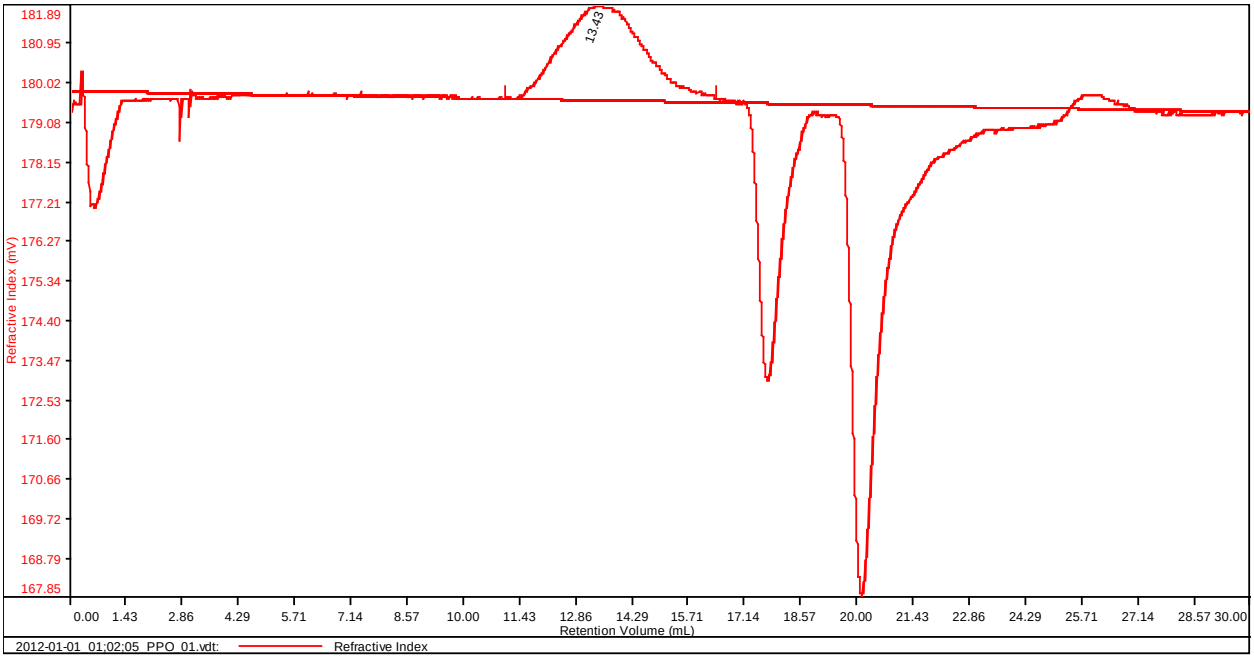

Figure 3: Refractive Index (RI) Chromatogram of PPO.

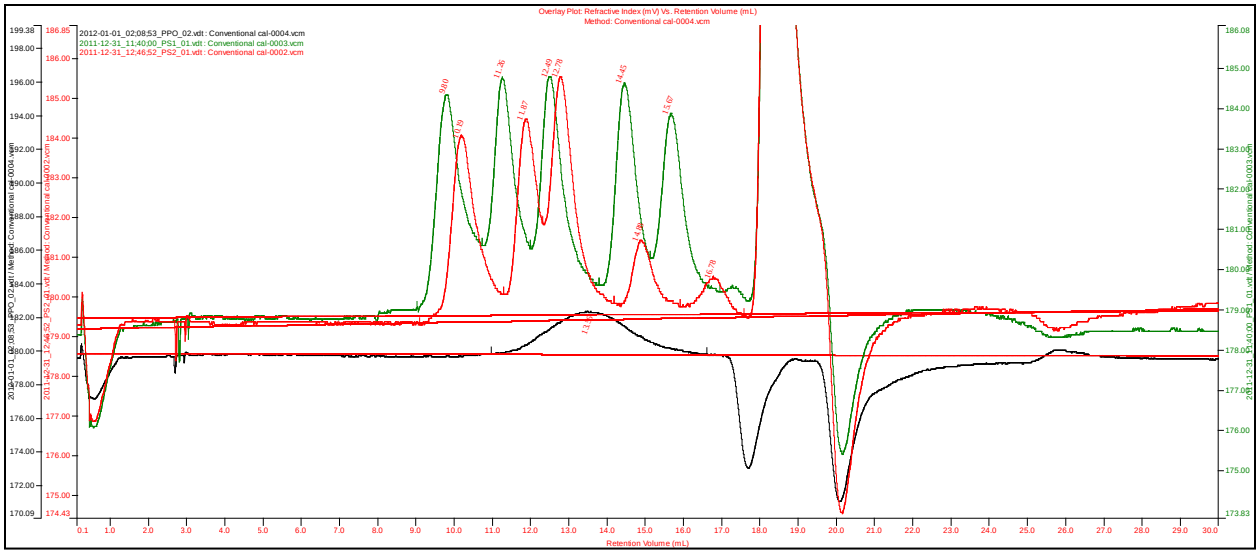

Figure 4: Normalized Overlay of Standards and PPO sample.

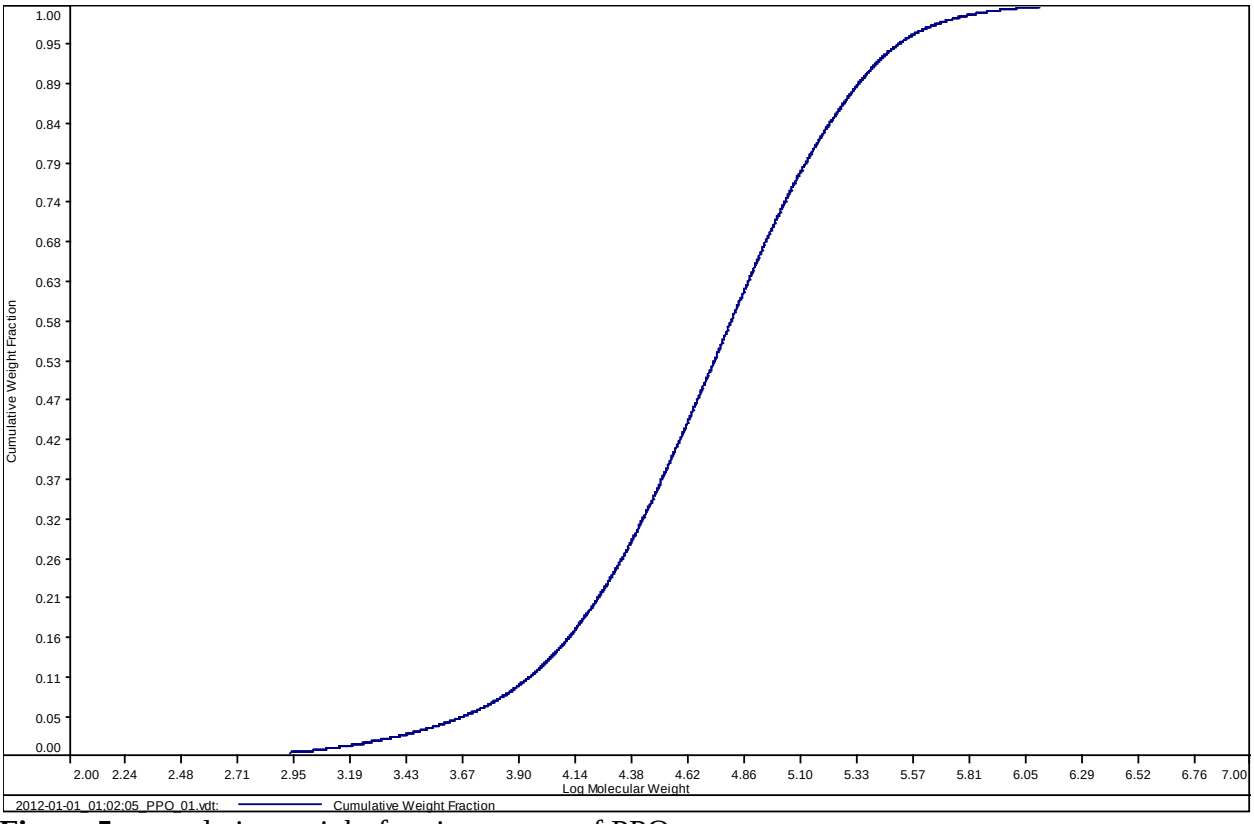

Figure 5: cumulative weight fraction curves of PPO.

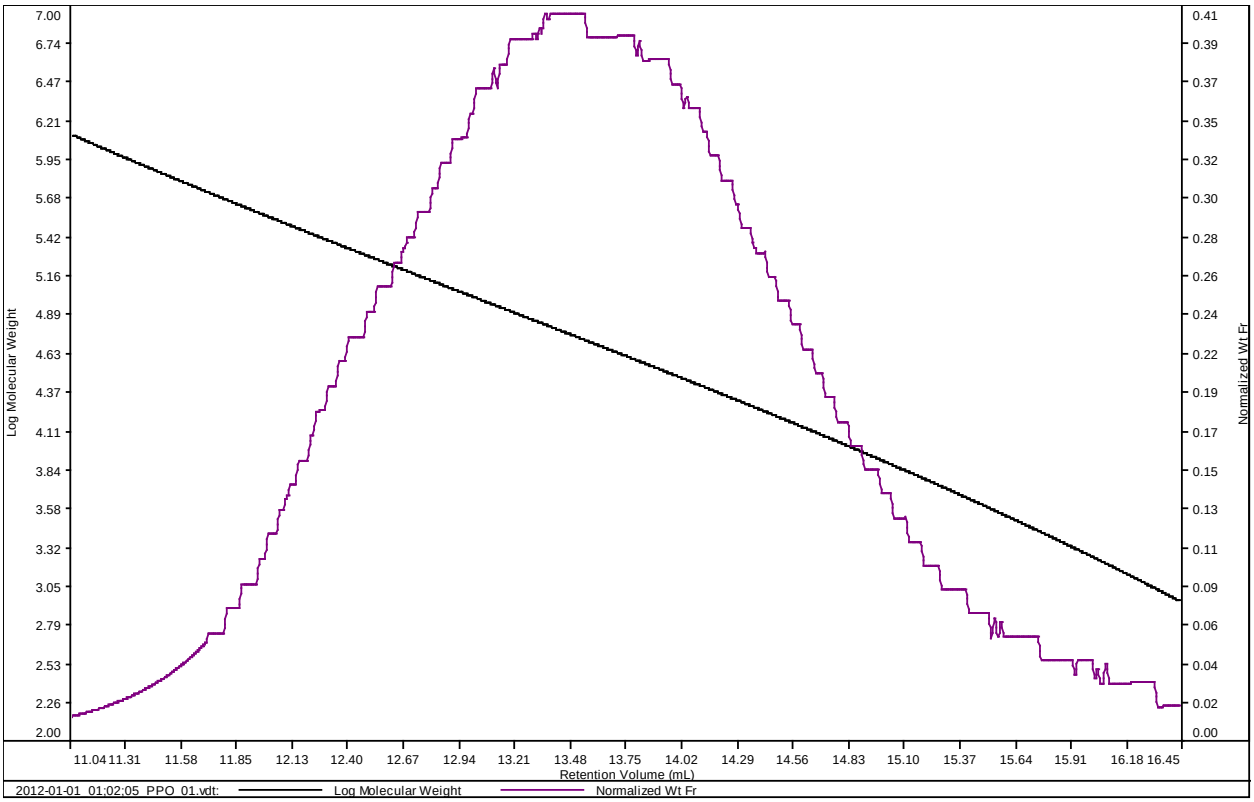

Figure 6: Mw distribution curves.

Analysis Conditions

Information on the specific conditions used to perform the analysis is typically listed in this section of the report.

Closing Comments

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Jordi Labs specializes in polymer testing and has 30 years experience doing complete polymer deformulations. We are one of the few labs in the country specialized in this type of testing. We will work closely with you to help explain your test results and solve your problem. We appreciate your business and are looking forward to speaking with you concerning these results.

Sincerely,

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