High Temperature Gel Permeation Chromatography using Dual Flow Refractive Index Detection.

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Single detector high temperature gel permeation chromatography (GPC) is used to extract quantitative information from the elution curves obtained via a concentration sensitive detector with accuracy and precision. Traditionally, molar mass averages and distributions of polymers are determined using peak position calibration involving polystyrene standards of known molar mass and chemistry analyzed by GPC coupled to a differential refractive index detector (RI). The repeatability and reproducibility of the molar mass averages obtained by GPC/RI are directly dependent on the baseline stability of the RI detector. Here, we have studied the repeatability, reproducibility, and baseline stability of a dual flow RI detector in the EcoSEC® High Temperature GPC System for the determination of molar mass averages via peak position calibration at temperatures up to 220 ℃. The dual flow RI detector design is shown to compensate for any changes in the refractive index of the solvent over time by continuously flowing pure solvent through the reference side of the flow cell, thus significantly increasing baseline stability of the RI detector and the repeatability and reproducibility of the molar mass averages. Additionally, we will demonstrate how single detector high temperature GPC can be used for the characterization of polyolefins, polyethylenes of varying density, and polyphenylene sulfide (PPS) compounds. Finally we will show the coupling of a dual flow refractive index detector to a multi-angle light scattering detector for the determination of absolute molar mass and polymeric size of synthetic polymers.