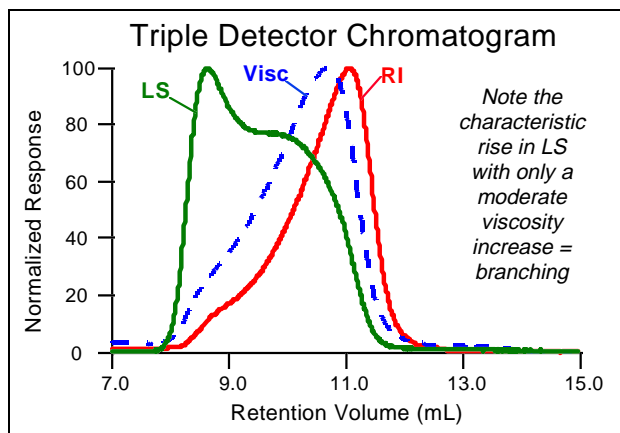


### Detectors

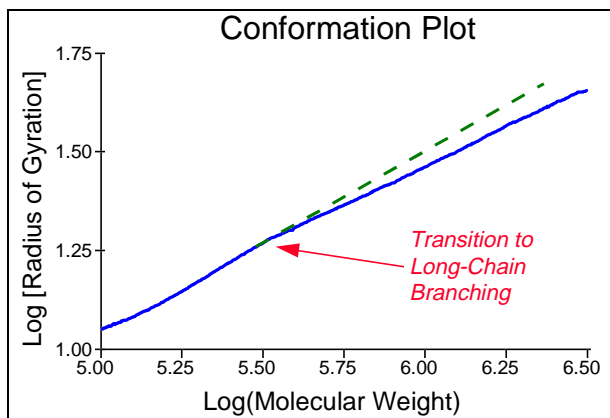
Viscotek Laser Refractometer  
 Viscotek Differential Viscometer  
 Viscotek RALLS Detector

The triple detector approach is a valuable tool in polymer characterization. Whereas conventional calibration detects only differences in hydrodynamic size, the triple detector method *directly detects changes in polymer structure as well as molecular weight*. This is especially valuable in the study of branched species such as dextran, a carbohydrate polymer with both short and long chain branching.



Branching is indicated in the chromatogram above simply by comparing the light scattering and viscosity peaks. Noting the higher ratio of MW to IV of the early-eluting species, one can conclude that its structure is more dense than the rest, meaning it is branched.

Traditionally, branching has been determined using a conformation plot, shown below.



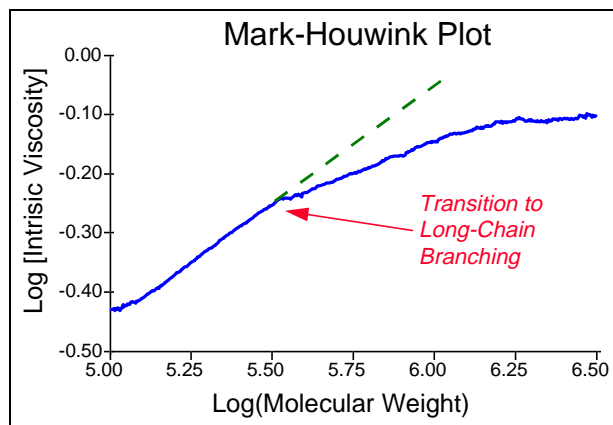
By the technique of SEC<sup>3</sup>, information about R<sub>g</sub> is obtained through the Flory-Fox equation:

$$R_g = \frac{1}{6} \left( \frac{[\eta]M}{\Phi} \right)^{\frac{1}{3}} \quad \text{where } \Phi \text{ is a shape factor.}$$

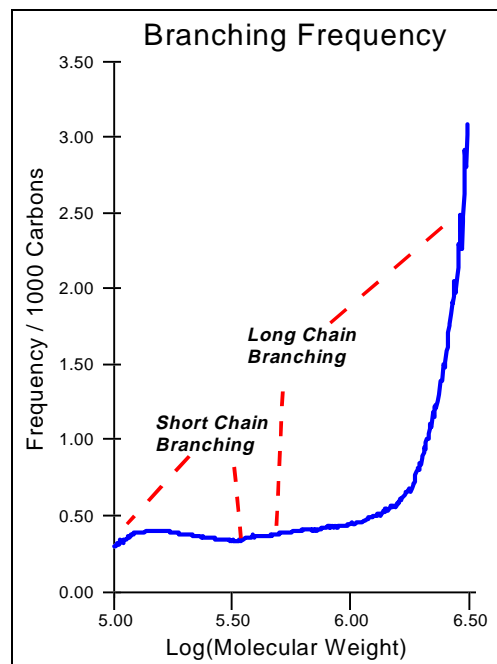
### Run Conditions

Solvent: 0.05 M Sodium Nitrate  
 Columns: 2x 4000, 1000 Synchrom  
 Concentration: 8 mg/mL  
 Injection Volume: 100 μL  
 Flow Rate: 0.500 mL/min

The Mark-Houwink plot is the preferred method of structural comparison: greater slope change is exhibited for the branching phenomenon.



The Mark-Houwink slope is more sensitive to branching for random coil polymers and is a more natural way to look at branching, since molecular density is plotted as a direct function of molecular weight.



A branching frequency plot can also be generated for the dextran standard using Mark-Houwink coefficients of a linear pullulan polysaccharide, as shown above.