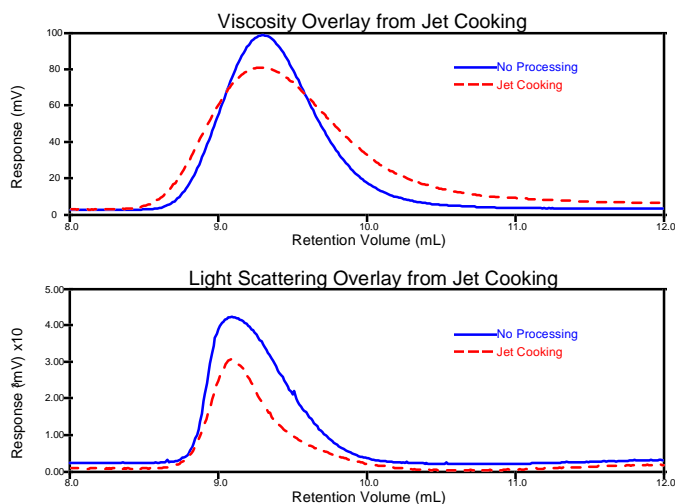


Detectors

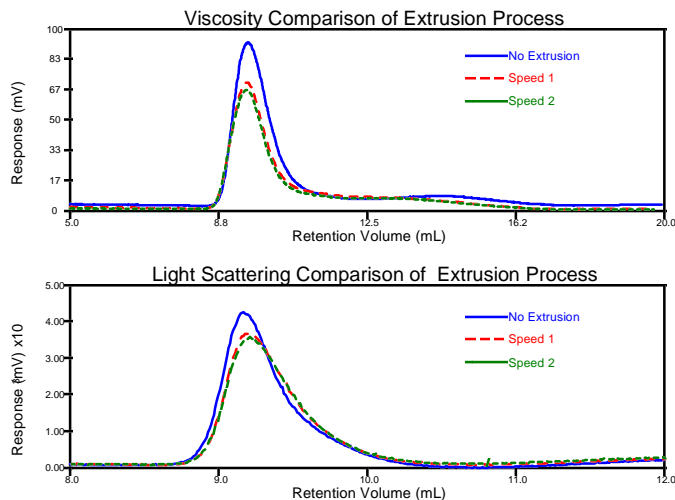
Viscotek RI Detector
Viscotek Differential Viscometer
Viscotek RALLS Detector

Processing of natural polymers can directly effect their direct characteristics, such as molecular weight, size, and most importantly, conformation. By using the Triple Detector approach, changes in molecular structure and molecular chain length can be simultaneously and independently monitored.

Jet cooking and extrusion of starch pastes can greatly affect their molecular weight distributions. Jet cooking reduces both the overall viscosity and molecular weight, as shown in the plot comparisons below.



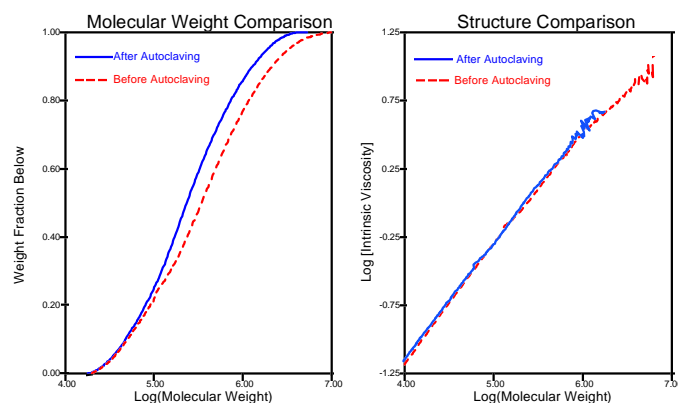
Similar to jet cooking, the extrusion process can reduce the overall physical properties of a macromolecule. Here, it is shown that the speed of the extrusion makes little or no difference compared to the extruding process, itself. Viscosity monitoring is more commonly done to measure polymer degradation and is shown below along with the light scattering profile.



Run Conditions

Solvent: DMSO (Starch) and Aqueous
Column Set: 2xAMPol Stds Linear Mixed Bed (Starch) and TSK PWxL
Concentration: Approximately 0.5%
Injection Volume: 50 μ L
Flow Rate: 0.70 mL/min

Autoclaving is a method of heat treatment which may affect polymers. The plots below compare molecular weight and structure of a sample before and after autoclaving. It is clear that in this particular processing, the high molecular weight polymer end is greatly reduced. However, the polysaccharide structure remains virtually unchanged after autoclaving. In this way, chain length and structural differences may be examined independent of one another.



The plots below illustrate molecular expansion-contraction "memory effects." The chitosan samples were pretreated at 60°C for four hours and 5°C for two days. The change in peak shapes represents molecular size contraction and aggregation. Most notably, this process is reversible with a two day re-equilibration at the same temperature. The combination of intrinsic viscosity and molecular weight is necessary to determine these changes in hydrodynamic radius and aggregation. Aggregation is noted by the normalized rise in molecular weight accompanied by the decrease in viscosity.

