Realtime monitoring of polymer degradation

When polymers in solution undergo degradation reactions the light scattered by the solution will decrease in time. The interesting physical problem is to relate the time and angular dependent scattered intensity I(q,t) to the mechanisms and kinetics of the degradation reactions, and to the structure of the degrading polymer.

Over the years we have built up a library of degradation signatures via time dependent static light scattering (TDSLS) which both characterize the reactions and polymer structure and provide kinetic rate constants. Some of these include

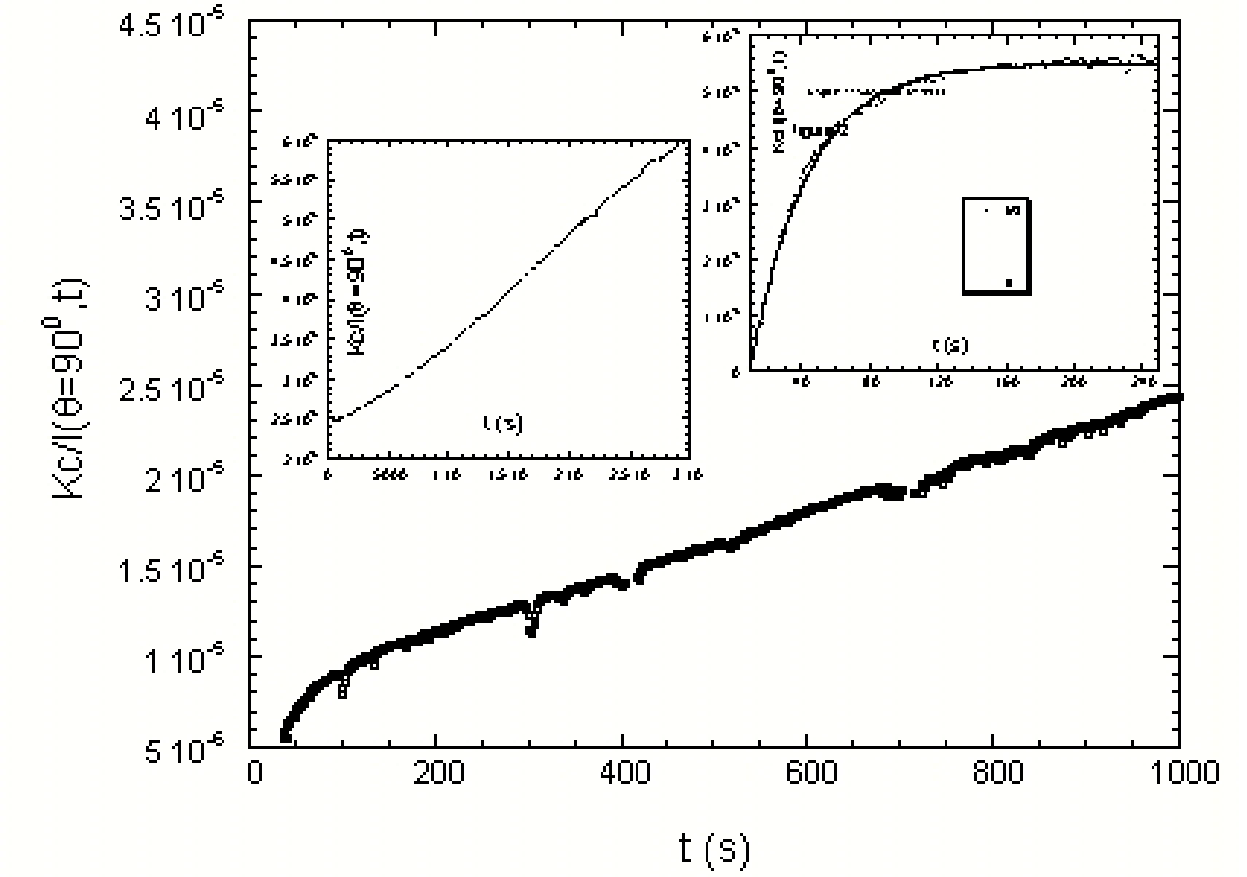
Random degradation of single and multiply stranded random coils.

Stripping of sidechains from a branched molecule

Simultaneous sidechain stripping and backbone degradation

The figure below shows combined action of sidechain stripping and enzymatic opening of backbone cleavage sites. Upper left inset shows random stripping of the galactose sidechains of a galactomannan by galactosidase. Right upper inset is the action of mannanase, which cleaves only mannose sidechains unprotected by galactose. The main figure shows simultaneous stripping of the sidechains and backbone degradation, caused by mixing the enzymes.

Adapted from J.L. **Ganter, J. Sebbi, W.F. Reed; Biopolymers,** 59, 226-242, 2001



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