

## Effect of Hydrophobic Modification on the Rheological Properties of Poly(ethylene glycol).

Tom Annable, Rammile Ettelaie and Richard Buscall

The rheology of hydrophobically end-capped poly(ethylene glycol) in solution and as mixtures with surfactants and polymer latex will be discussed. Such amphiphilic block copolymers associate in solution to build transient networks as shown in Figure 1. The viscoelastic response of such materials in solution is well described by a single Maxwell element. The derived single viscoelastic relaxation time is observed to be dependent on both the hydrophobe length and the polymer concentration. This simple response is consistent with a picture in which stress relaxation occurs by end-cap disengagement from an association followed by the rapid Rouse relaxation of the polymer chain.

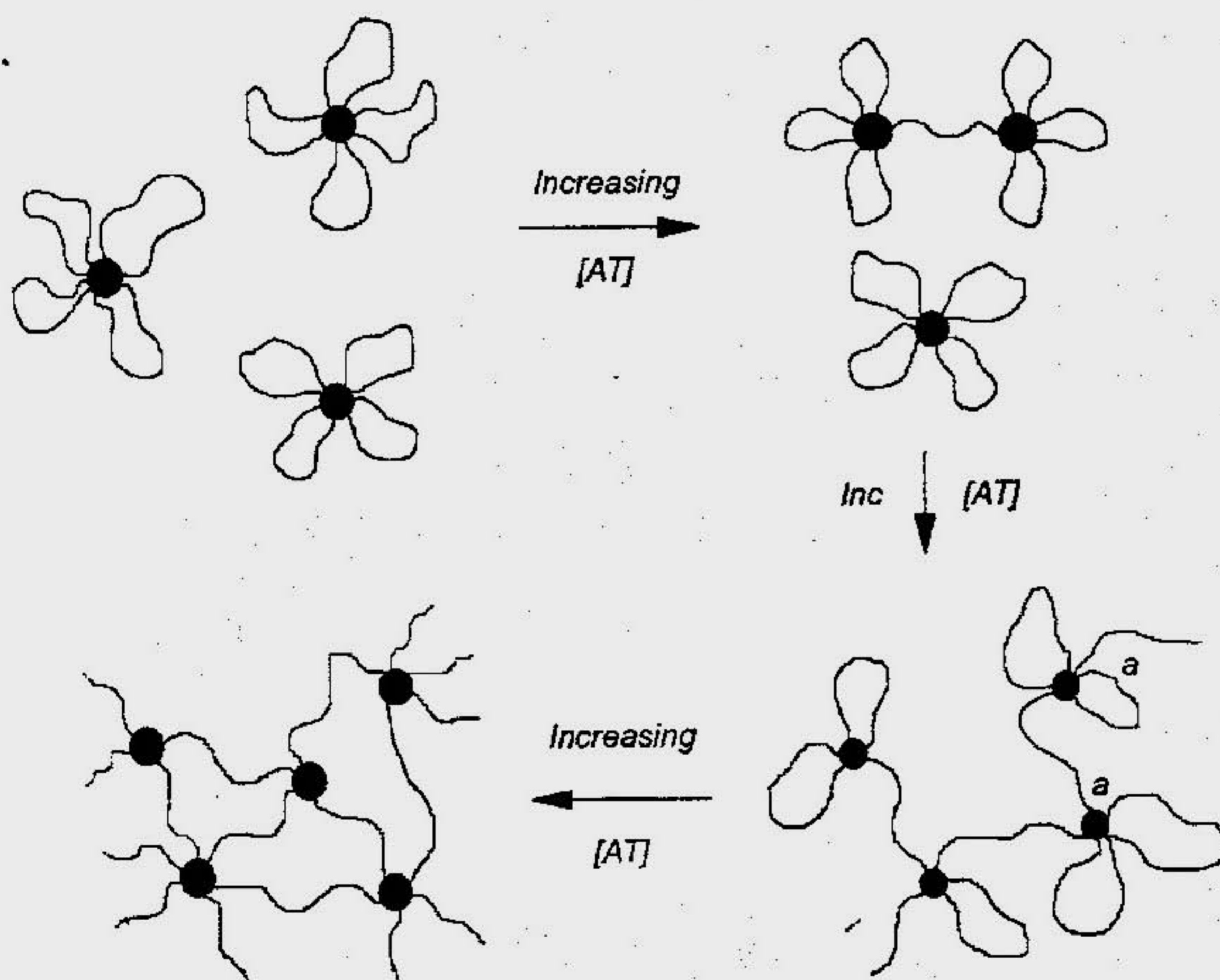


Figure 1. Formation of transient networks by hydrophobically modified poly(ethylene glycol).

The concentration dependence of the viscoelastic modulus is found to be well described by a simple picture in which there is an entropic transition between a network comprising mainly looped chains at low concentrations to one in which linked chains predominate at higher polymer concentrations. This simple picture can also be used to describe the effect of added surfactant which can act to either reinforce or weaken the transient network dependent on both the mole ratio of polymer to surfactant and the overall polymer concentration.