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Can a Rheological Experiment Distinguish Between a Gel and a Soft Glass? If yes, which Experiment? HORST WINTER, University of Massachusetts Amherst — Generic rheological differences between gels and soft glasses appear most pronounced in the *immediate approach of the liquid-to-solid transition from the liquid side.* Two model systems of known linear viscoelasticitywere chosen to exemplify the two material classes: a crosslinking PDMS represents gelation and a concentrated, aqueous suspension represents the soft glass transition. The longest relaxation time and the zero shear viscosity diverge for both materials, which look very similar in this way. However, the relaxation time spectrum and its expression as complex modulus, with components G' and G", provide a clear distinction between gelation and the soft glass transition. While the long-time component of the relaxation time spectrum follows a powerlaw in time for both, log $H \sim n$ log t, their powerlaw exponent $n$is of different sign: negative n for the critical gel (material at the gel point) (Chambon et al. Polym Bull 13:499–503, 1885; Winter et al. J Rheology 30:367–382, 1986; Chambon et al. J Rheol 31:683–697, 1987) and positive n for the soft glass (Siebenbürger et al. J Rheology 53:707-720, 2009; Winter et al. Rheol Acta 48:747–753). The powerlaw spectrum is cut off by the diverging, longest relaxation time (called "alpha relaxation time" for the soft glass) in the approach of the liquid-to-solid transition. In summary, relaxation data provide a clear distinction between these two classes of materials.

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