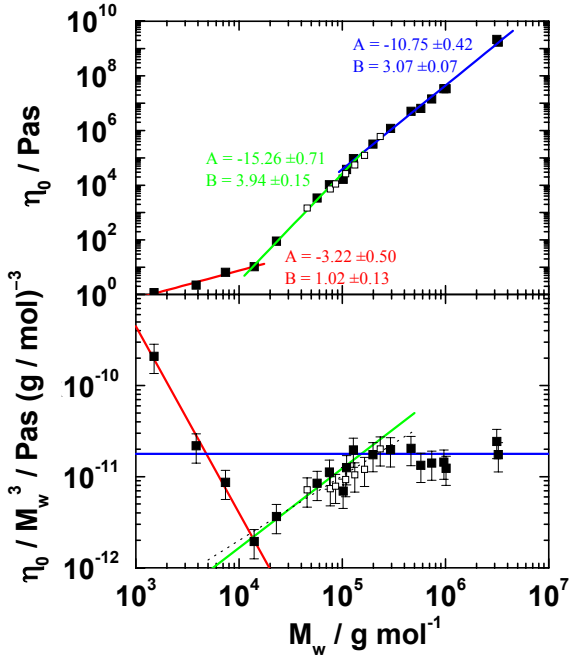

Molecular Rheology and Rubber elasticity

Linear as well as non-linear rheology is of interest to help to understand the neutron scattering results and vice versa. Both methods, rheology and scattering, are complimentary and fulfill exactly the need of correlating structure with macroscopic properties. The connection allows a necessary feedback. The rheological method delivers the timescale of relaxation processes or equivalently the temperature range where specific mechanisms ought to act. Also, a selected process can be shifted or pre-programmed by a simple temperature change to occur in an experimentally easely accessible range.

Linear rheology is used for investigations of the packing length model in uncrosslinked melts and its implications for the dependence of viscosity and the proof of contour-length fluctuations and constraint-release effects in collaboration with the IRC in Leeds. The viscosity vs M relationships (see figure) is just an indication of interesting mechanisms, connected to specific sub-molecular weights. Further, the interplay between chemical architecture and flow for processing conditions e.g. is a unique pathway for optimizing polymeric materials.

Rubber elasticity is studied with focus on the tube model for SANS and NSE under strain and presently to investigate tube dilution effects on the chain deformations due to the number of dangling ends as in the double reptation model. The tube model from linear rheology is here fixed due to the crosslinking and only perpendicular segmental fluctuations remain.

The rheo-mechanical lab consists of an strain-controlled ARES (Rheometric Sci, TA), an Instron tensile tester, a Mettler viscosimeter, a Rheowis couette rheometer (for insitu SANS to come) and a Haake minilab-Extruder.

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