Effect of Distribution of Molecular Weight

A - M_w/M_n=1.09

B - M_w/M_n= 2.0

C - *branched*

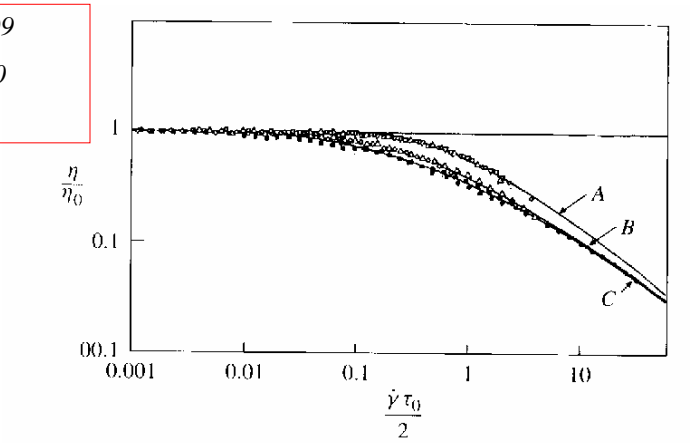
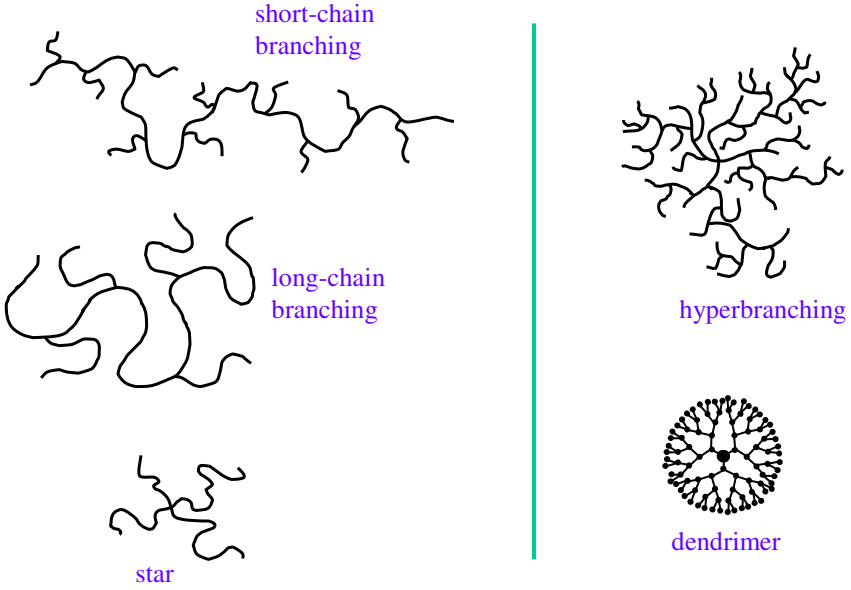


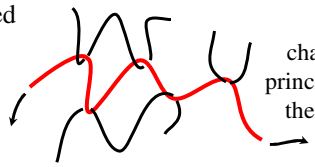
Figure 6.14, p. 179 Berry and Fox; PVA solns in DEP

Types of polymer architecture



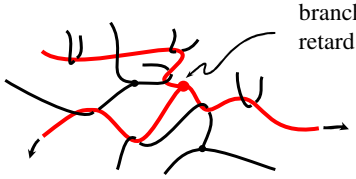
Motion of Branched Polymers

Entangled linear polymer



chains move principally along their contour

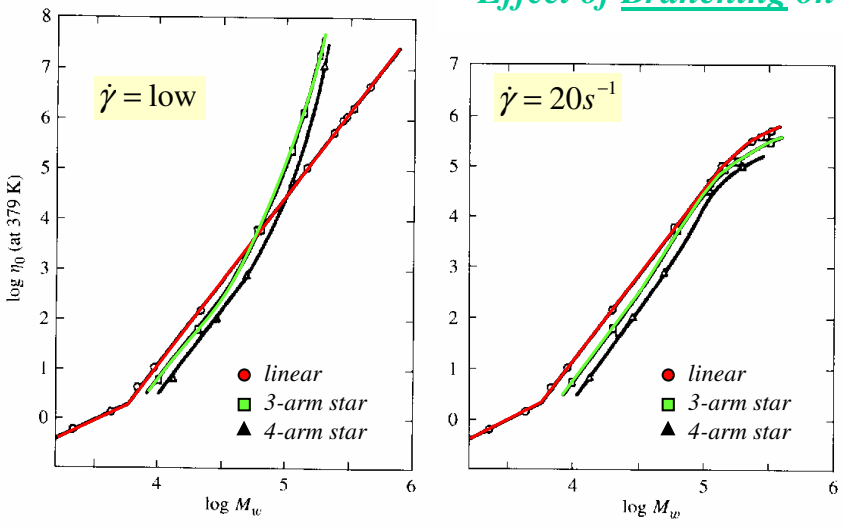
Entangled branched polymer



branch points retard motion

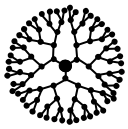
once disentangled (high shear rate), branched polymers flow more freely

Effect of Branching on η



Figures 6.17, 6.18, pp. 181,3 Kraus & Gruver; PB

Steady shear rheology of PAMAM dendrimers



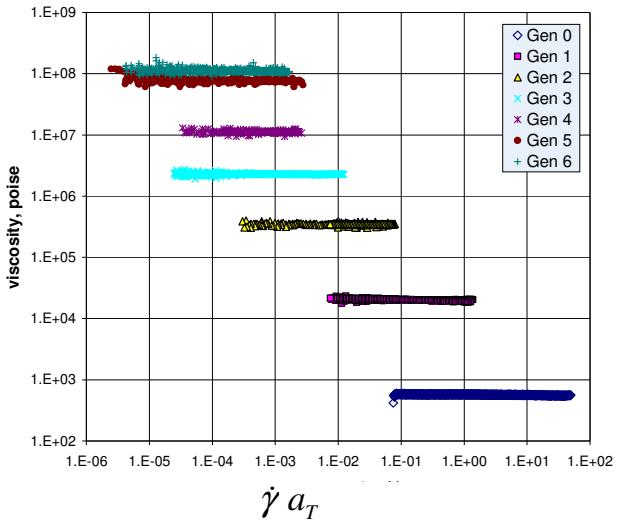


Figure 6.20 p. 183; from Uppuluri

Mixtures of Polymers with other materials - Filler Effect

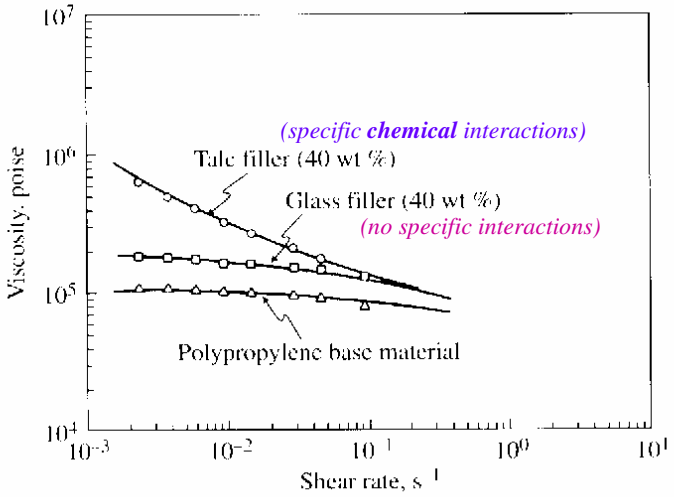


Figure 6.22, p. 184 Chapman and Lee; PP and filled PP

For more on filled systems, see Larson, *The Structure and Rheology of Complex Fluids,* Oxford, 1999.

Steady shear viscosity - shear thickening

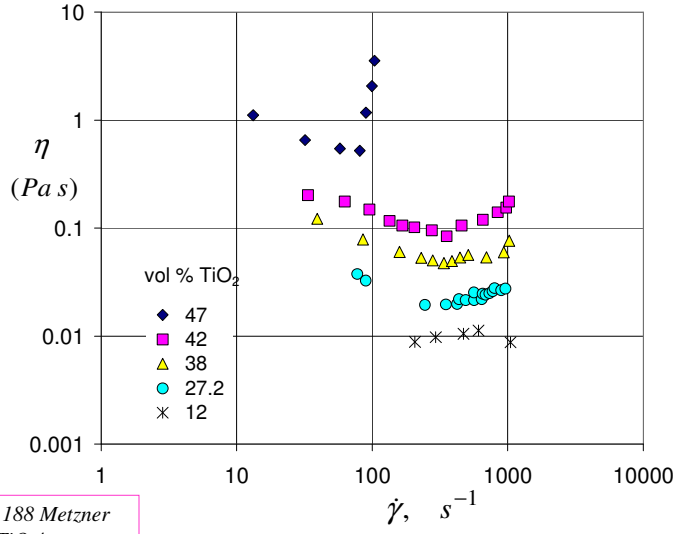


Figure 6.27, p. 188 Metzner and Whitlock; TiO_2/water suspensions

Steady shear viscosity - temperature dependence

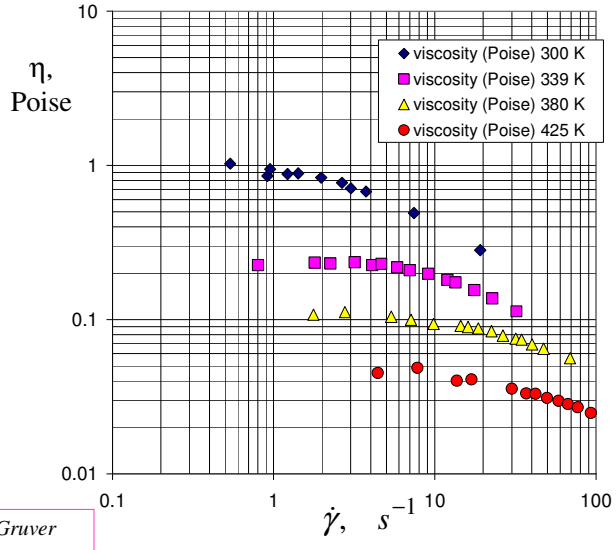


Figure 6.28, p. 189 Gruver and Kraus; PB melt

Steady shear viscosity - pressure dependence

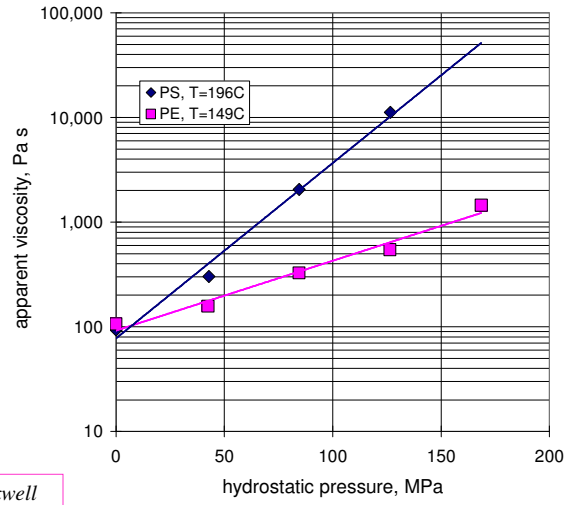


Figure 6.29, p. 189 Maxwell and Jung; PS and PE

*Steady shear flow - **Summary***

- Linear Polymers - *complex rheology*
- Limits on measurability - *instabilities*
- Material effects - MW, MWD, branching, mixtures, copolymers - *strongly affect rheology*
- Temperature and pressure - *T strongly affects rheology; P less of an effect, but can be important*

Next:

Unsteady shear flow (SAOS, step strain)
Steady elongation
Unsteady elongation