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Application Note 03

Thixotropy

Introduction

Thixotropy is a measure of the time dependency of the sample. Under shear, there is a reduction in apparent viscosity; if the sample takes a while to return to its initial value, then it is time dependant. The material is gel-like at rest, but exhibits fluid like behaviour when agitated.

Experimental

A hysteresis loop is produced whereby the sample is subjected to ascending and descending shear stresses. The loop indicated by the blue line in figure 1 illustrates a high degree of thixotropy, the sample has changed significantly before and after shearing. For the red graph, on the other hand, the up and down stresses overlay each other, indicating that the sample is shear thinning. This gives a measure of thixotropy at its most basic, the magnitude of the loop indicating the degree of time dependency.

Measurement conditions

Samples: Paints, sauces, toothpaste *etc*.
Geometry: 4˚/40 mm cone and plate
Rheology option: Viscometry
Shear rate: Sweep up and down 1 – 900 s^{-1}

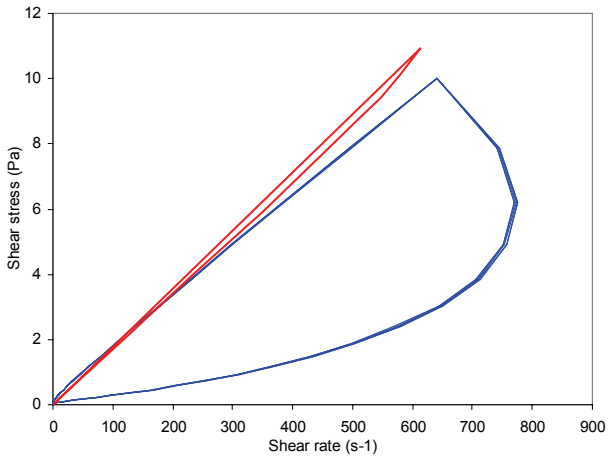

Figure 1: Flow hysteresis

Conclusion

Sample history must be taken into account when analysing a thixotropic material. Either sufficient time must be taken between measurements to allow the sample structure to rebuild to its initial state or an identical level of pre-shear must be applied prior to each test to ensure the same shear history.

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