

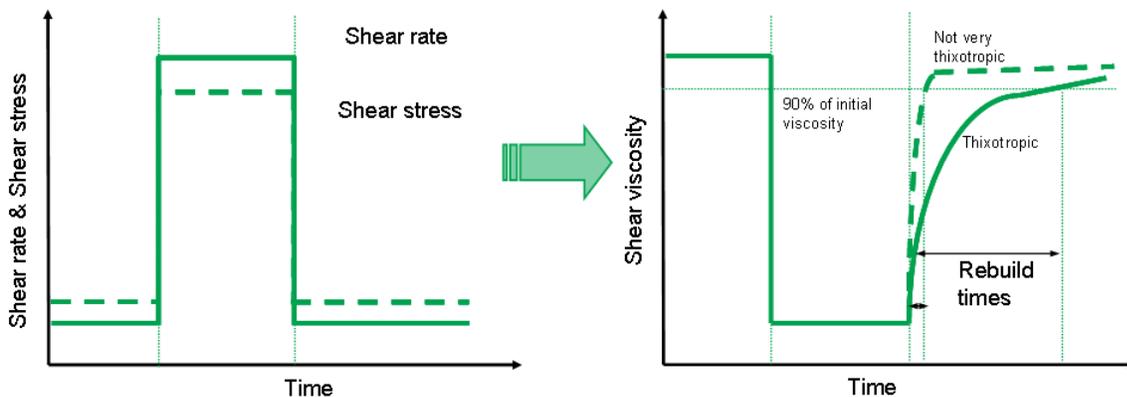
Three Step Shear Rate / Thixotropy Test

Many useful materials which are structured demonstrate shear thinning behavior. This shear thinning behaviour can result from breakdown or alignment of the 'at rest' structure under the influence of an applied shear. Depending on the nature of the microstructure such a process may or may not be reversible. If it is reversible then structure rebuild is often not instantaneous but occurs over a certain period of time. Materials which demonstrate such behaviour are often classed as thixotropic. The best way to evaluate and quantify thixotropy is using a three step shear test as shown below.

This sequence makes a 3 step shear rate measurement, with shear rates and times inputted by the user at run time. The steps should follow the rule: low shear rate; high shear rate; low shear rate.

This sequence assumes that the sample has been loaded correctly using the load sample button from the toolbar.

The sequence will perform a rebuild analysis which is designed to determine the time taken to achieve rebuild of the viscosity to 90% of the original value.



A low shear rate is employed in stage one which is meant to replicate the samples at near rest behaviour. In stage two a high shear rate is applied for a given time to replicate the break down of the sample's structure. The shear rate employed can be matched to the process of interest. In the third stage the shear rate is again dropped to a value generally equivalent to that employed in stage 1 and viscosity recovery followed as a function of time.

To compare thixotropic behaviour between samples the time required to recover 90% of the initial viscosity can be used. This time can therefore be viewed as a relative measure of thixotropy - a small rebuild time indicates that the sample is less thixotropic than a sample with a long rebuild time.

Prompt default values:

Enter temperature properties

Temperature 25°C

First phase:

Shear rate 0.1s⁻¹

Test time 30s

Sampling interval 2s

Second phase:

Shear rate 100s⁻¹

Test time 30s

Sampling interval 2s

Third phase:

Shear rate 0.1 s⁻¹

Test time 3min

Sampling interval 2s

Protocol

Name of student:

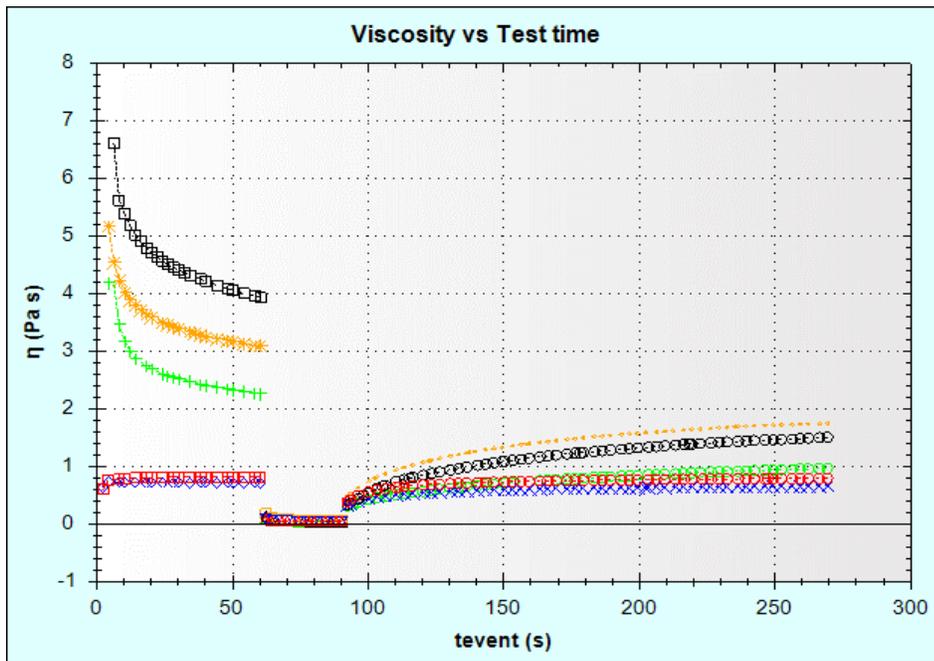
Sample:

Device:

Geometry:

Test sequence:

Testing parameters:



Sample	1. step viscosity (Pa·s)	3. step viscosity (Pa·s)	Rebuilt (%)
A	0,8210	0,7961	96,97
B	0,7240	0,6662	92,02
C	3,9546	1,2497	31,60
D	4,8157	1,4985	31,12
<i>Avamys</i> [®]	7,5743	4,7832	63,15