

## IN FOCUS

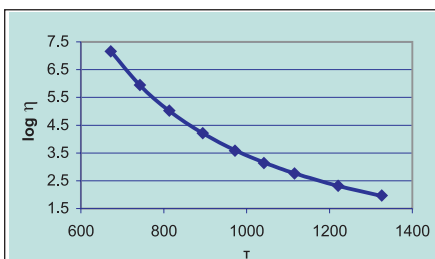
glass analysis  
viscosity at high T

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## Determination of the viscosity of molten glass by the rotation method



### Method Description

In the lower viscosity range,  $\log \eta = 2 - 7$  dPa.s, a cylinder is rotated in the molten glass at a constant temperature. The viscosity is determined from the relation between torque and rotation speed. Generally the measurement is done at 9 different temperatures. The data are fitted to the Vogel Fulcher Tamman (VFT) equation.

### Measured Quantity

Viscosity  $\eta$  in dPa.s.

### Derived Quantity

The constants, A, B and C of the Vogel Fulcher Tamman equation:

$$\log \eta = A + B/(T-C)$$

Where T is the temperature in °C and  $\eta$  is the viscosity.  $[\log \eta]$  values at various T can be determined from the equation.

### Measuring Range

T = 400 - 1600°C  
 $\eta = 10^2 - 10^7$  dPa.s

### Precision

T [ $\log \eta = 2$ ]:  $\sigma = 3^\circ\text{C}$   
T [ $\log \eta = 6$ ]:  $\sigma = 1.5^\circ\text{C}$

### Accuracy

Depends on the accuracy of the reference materials and NBS standards.

### Possible Errors

Calculation of viscosities using the constants of the VFT equation should only be done in the given temperature range, i.e. within the experimental measuring range. Extrapolation can result in significant deviations.

### Sampling

Approximately 40 cm<sup>3</sup> should be available. Special attention should be given to the fact that the sample is representative for the batch.

### Calibration

Against reference materials, NBS.

### Measuring Time

1 day.

### Cost Aspect

3 man hours.