Determining yield stress in toothpastes

Introduction

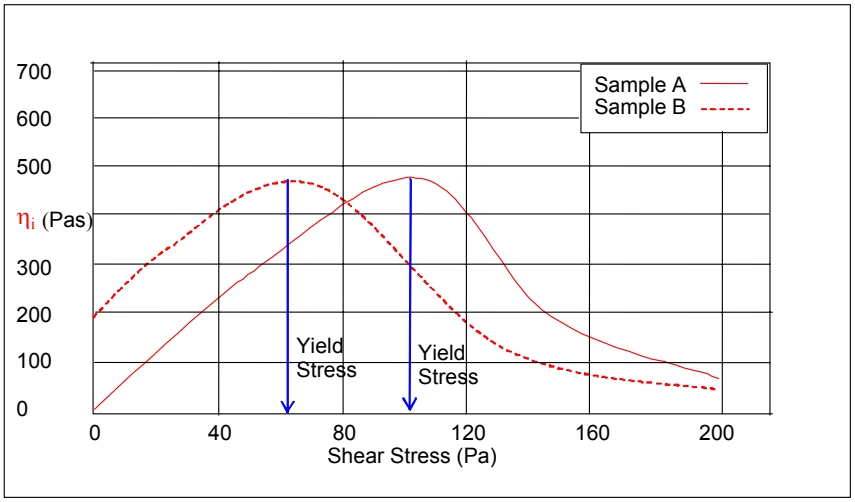
On application of stress, a sample with a yield stress initially acts as an elastic solid. The instantaneous viscosity appears to increase, as more stress is applied to the sample, the more the sample resists flowing. When the yield stress is reached, the sample starts to flow and the measured viscosity falls rapidly. The peak of the viscosity curve therefore indicates the yield stress of the sample.

Interpretation

We can see that Sample A showed a yield stress of 100 Pa and will therefore resist pumping or flow much more than Sample B, which showed a yield stress of 60 Pa.

Conclusion

The yield stress can be used to calculate whether a sample is likely to be difficult to start pumping or stirring. Consumer perception is also an important factor, if the bead of toothpaste appears to be 'runny' because of a very low yield stress, it may be perceived as less effective, or dilute. Good rheological product design can dramatically enhance processing and consumer perception.



Measurement Conditions:

Geometry: Cone and plate system 40°/40 mm with a solvent trap

Temperature: 25°C

Shear stress sweep: 1 - 100 Pa Up Linear

Ramp time: 30 seconds

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