TA Instruments

Thermal Analysis & Rheology

RHEOLOGY SOLUTIONS

EVALUATION OF DENTURE ADHESIVES

PROBLEM

Suppliers of denture adhesives need a rapid method for comparing different product formulations for a variety of properties including their ability to coat a complex surface such as the denture cavity.

SOLUTION

Controlled stress rheology provides several measurements which can be used to compare these materials. Figure 1, for example, shows the creep results for three different formulations. Creep measurements are based on the application of a small constant stress to the material and monitoring the resultant strain with time. If the applied stress is sufficiently small, the material deforms within its linear viscoelastic limits, and the shape of the strain curve indicates the relative viscous/elastic behavior. In this case, adhesives B and C are more compliant than adhesive A and hence should deform more easily to fill the denture cavity. Subsequent test panels confirmed this projection with B and C providing acceptable denture seals while A was unacceptable, indicating that creep curves, once a threshold compliance is established with suitable known materials, can be used to rapidly assess coating acceptability of new formulations.

All three materials show good recovery in the relaxation made after stress is removed, implying that the pastes will "bounce back" from applied stress either during dispensing from a container or during placement in the mouth.

If it is desirable to quantitatively compare formulations and model their behavior, this can also be accomplished from these creep curves. Figure 2 shows the quantitative parameters determined for Adhesive C when fitted to a simple Voigt model using the ***Rheology Solutions*** software.

Figure 1. COMPARISON OF DENTAL ADHESIVES

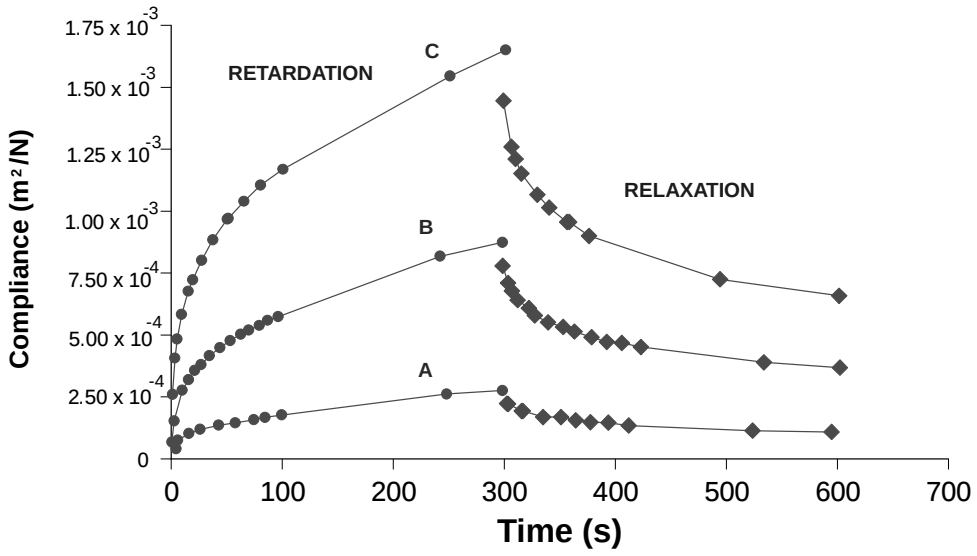

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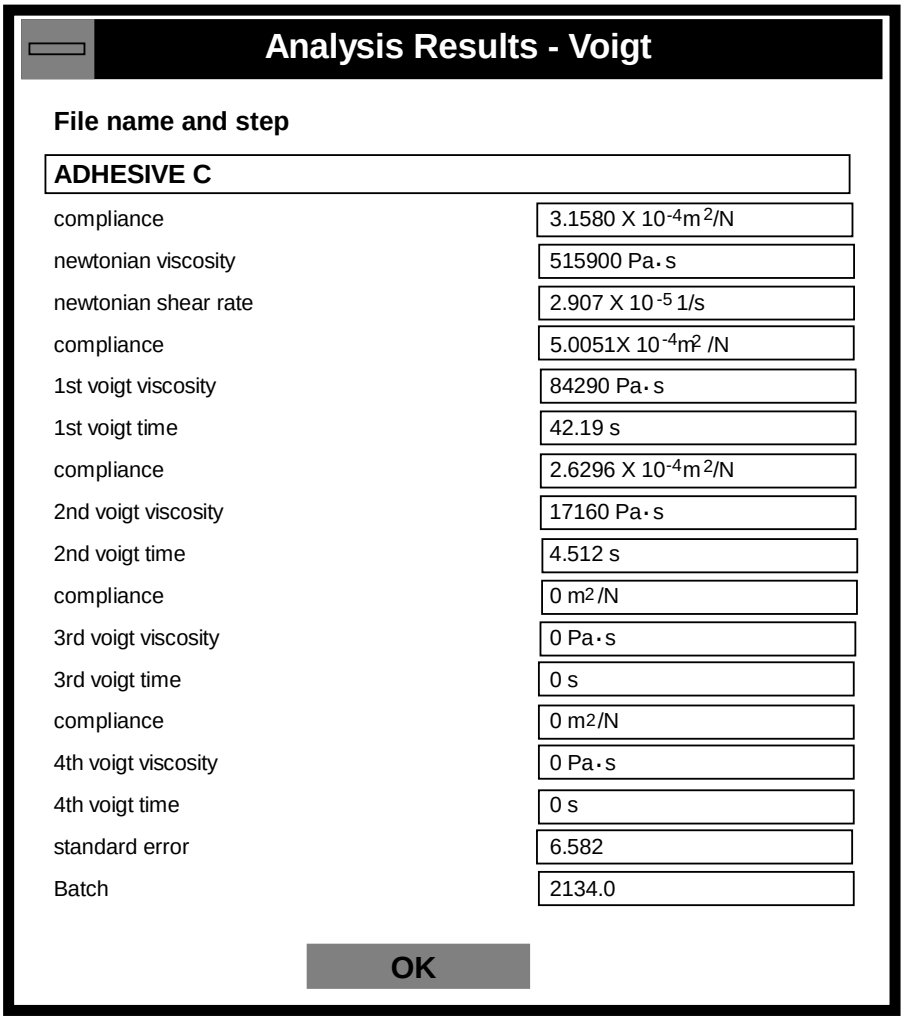
Figure 2. ANALYSIS RESULTS (Voigt Model)



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