

RHEOLOGY SOLUTIONS

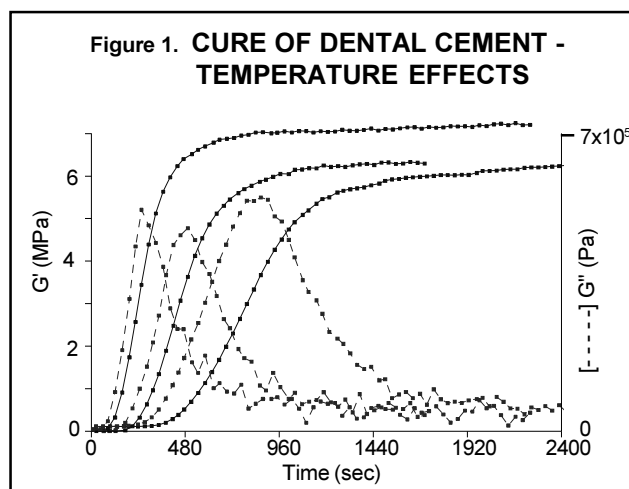
CURE TEMPERATURE EFFECTS ON DENTAL CEMENTS

PROBLEM

The cure time (processing time) of thermoset materials such as dental cements is affected by temperature. Generally, raising cure temperature reduces the time for initiation and completion of cure which, in turn, improves productivity. However, faster cure can sometimes result in inferior final product strength. Hence, new cement formulations need to be evaluated to determine the cure temperature which provides the best combination of production time and final product properties.

SOLUTION

Oscillation tests in a controlled stress rheometer provide complete curing profiles for thermosets. During these tests, the material is subjected to a small oscillating stress. The resulting strain and the phase difference between the input stress and output strain are measured to obtain G' (elastic modulus), which indicates solid-like (cured) behavior, and G'' (loss modulus) which indicates liquid-like (uncured) behavior. Figure 1 shows the G' and G'' results for a dental cement cured at several different temperatures. As expected the onset and rate of cure are accelerated by increasing temperature. Moreover, the strength of the cured product is also improved by faster cure, making selection of the best cure temperature easy.



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