

## RHEOLOGY SOLUTIONS

### GELATION OF WHEAT SOLUTIONS

#### Problem

The gel point in materials represents the point where behavior changes from more viscous (liquid-like) to more elastic (solid-like). The conditions under which this occurs are critical to many food constituents, such as wheat/soya solutions used as setting agents within reconstituted meat products.

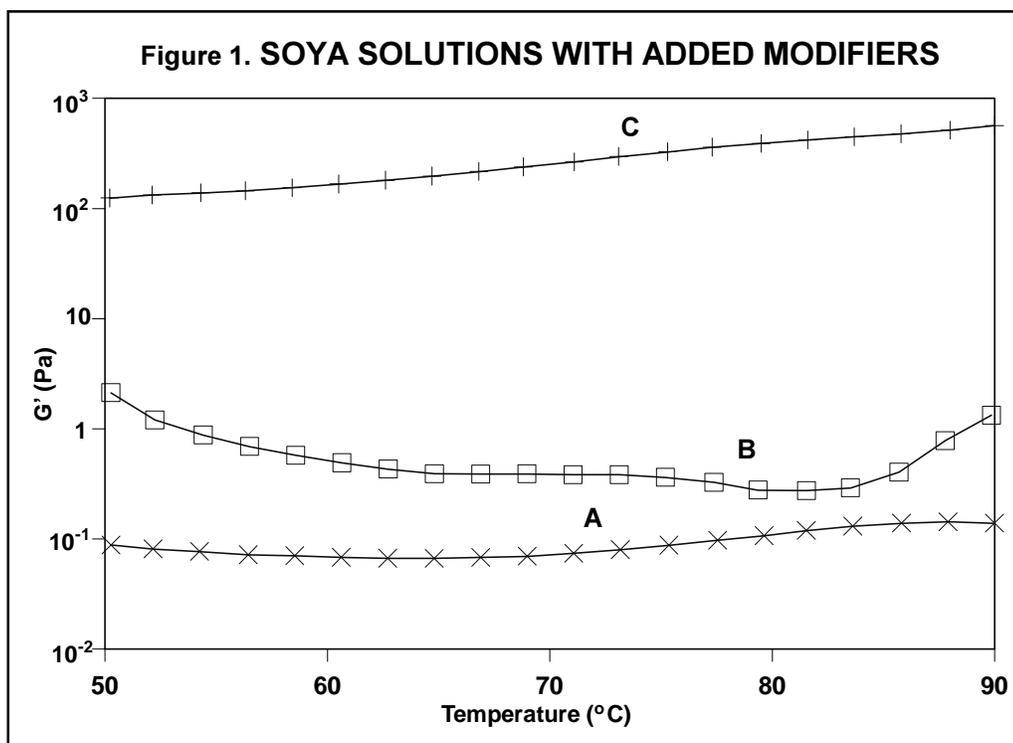
#### Solution

Oscillatory controlled stress experiments, in which a small sinusoidal stress is applied to the material, provide a convenient method for evaluating elastic and viscous properties without destroying the delicate structure of soft semi-solids.

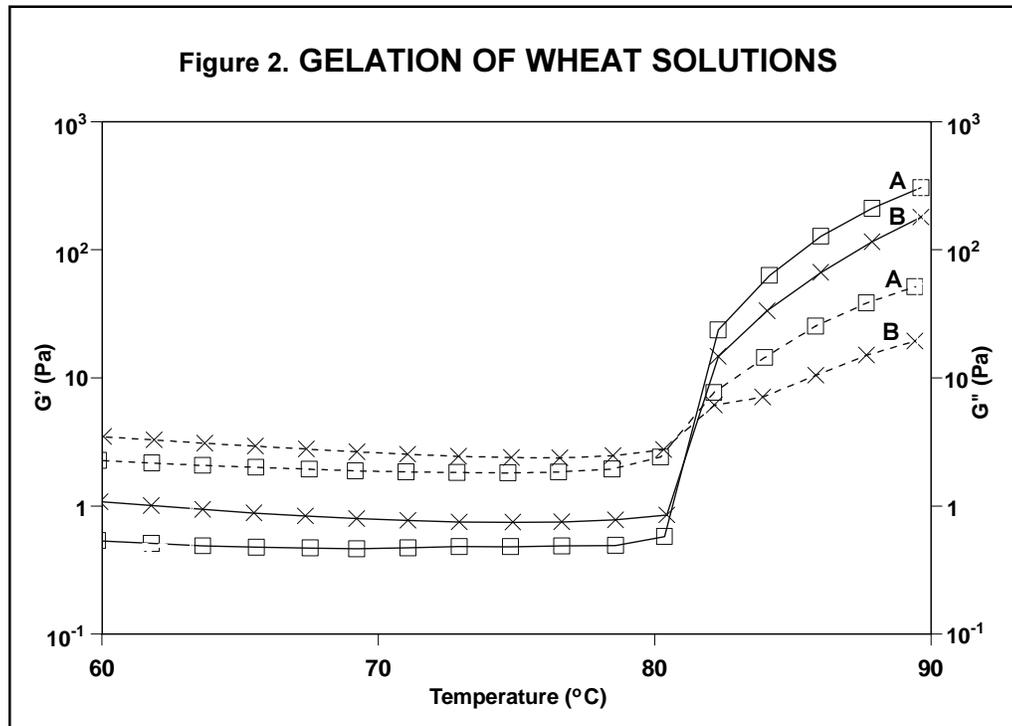
Figure 1 shows the oscillatory elastic modulus ( $G'$ ) results for several soya solutions containing ionic strength modifiers at

a variety of processing temperatures. Although none of the solutions show significant temperature effects up to 85°C, both solutions with added salts (B,C) exhibit higher  $G'$  (elastic/solid-like behavior) than the solution made up in pure water. The solution (C) containing a small amount of potassium chloride (KCL) in fact gelled prior to this temperature sweep. This test, therefore, represents a way to evaluate the effect of ionic strength on gelation.

Figure 2 illustrates the ability to detect the temperature of gelation for two aqueous wheat solutions with different gelation enhancing enzymes. The temperature of gelation is the point where the  $G'$  and  $G''$  curves cross. ( $G''$  being the loss modulus, and the cross over point being the point at which there is a balance between solid and liquid-like structure). Even though the different enzymes yield the same *gel temperature*, the final *gel strength* ( $G'$ ) is much higher for enzyme A. This information can be used to gain an



appreciation of the food product's behavior in production and when consumed. For example, at the *gel point* the character of food changes significantly. It may therefore be crucial to pump products into packaging before this point is reached. The *gel strength*, on the other hand, has a great bearing on a food's texture, and hence its appeal when consumed. In the case of reconstituted meat products the gel strength also dictates whether or not they hold together.



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