



COMPARISON OF THREE TEST METHODS FOR PREPARED TOPPING

The prepared food industry is a rapidly growing and very competitive market segment. Reliable, consistent product quality is key to the success of every company competing here. Establishing that high level of product quality is a many faceted process involving appearance, aroma, flavor and texture. Much money and time can be spent in the areas of product research and development, consumer surveys and trained panels of sensory experts to achieve success in this area.

Once accomplished, it is imperative that cost effective test methods are employed to assure that a high level of consistency is maintained. One of the important characteristics for ready-to-use products, such as frosting and other decorative toppings, is the ability to be applied smoothly, usually by spreading or extruding, and to stay in place once applied. Viscosity alone is often not enough to completely characterize the rheology of decorative toppings. For example, the ability of a topping to be easily spread without damaging the fresh, tender cake underneath is a required characteristic. But after spreading, the frosting should be able to stand up into small peaks or hold a pattern on its surface. This describes two different, yet related, flow properties of these toppings.

In rheological terms, the easy spreading characteristic defines the pseudoplastic, or shear thinning, nature of the topping. The stiffness when motionless provides the ability to hold peaks and is known as the yield stress of the material. Simple laboratory instruments using different test methods can quantify both of these properties.

A rotational viscometer such as the new Brookfield DV-I Prime using vane spindles can be used to characterize the pseudoplastic, or shear thinning, property of the topping sample. (See Figure 1a and 1b) The vane spindles are necessary for thick

products such as frosting because the sample can slip against the surface of the traditional smooth, disc spindle. Vane spindles will not slip so the shear thinning behavior of the sample can be measured by recording viscosity as the rotational speed of the DV-I Prime is gradually increased. Viscosity will quickly fall as the RPM increases.

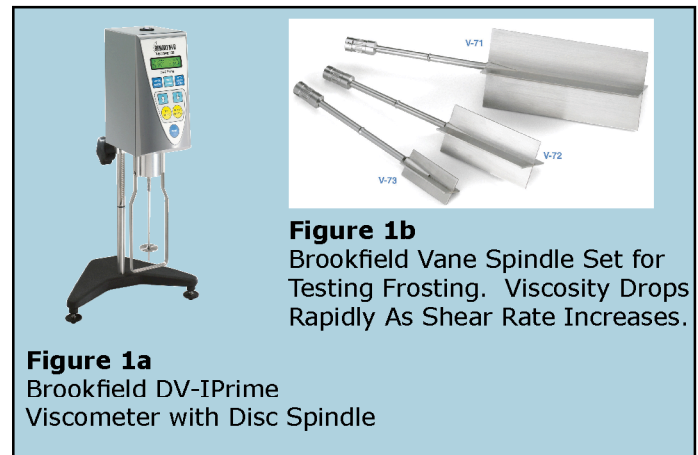


Figure 1a
Brookfield DV-I Prime
Viscometer with Disc Spindle

Figure 1b
Brookfield Vane Spindle Set for
Testing Frosting. Viscosity Drops
Rapidly As Shear Rate Increases.

Figure 2 shows two such pseudoplastic curves from the softest and the firmest of five ready-to-use frostings recently tested. The firmest was the “Chocolate” flavor while the softest was the “Whipped Cream” flavor. It can be seen from the graph that the viscosity of the Chocolate is nearly 1.5McP at 1RPM. Its viscosity falls rapidly as its flow rate increases, so that by 10RPM it has lost over 1McP. The same behavior can be seen from the much softer “Whipped Cream” frosting. At all speeds and flow rates, its viscosity is significantly less. (See Figure 2)

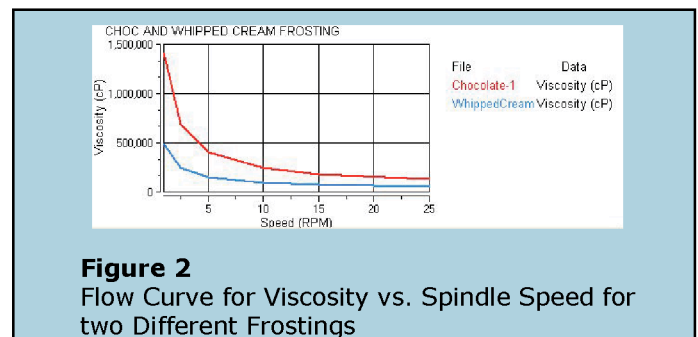


Figure 2
Flow Curve for Viscosity vs. Spindle Speed for
two Different Frostings

The Brookfield YR-1 Yield Stress Rheometer, again using vane spindles, can directly measure the yield stress of the product in the retail packaging. Transferring it into a laboratory container is not necessary so sample preparation is kept to a minimum. The result of a simple test conducted in less than one minute will show the yield stress of the product on the instrument display. (See Figure 3)

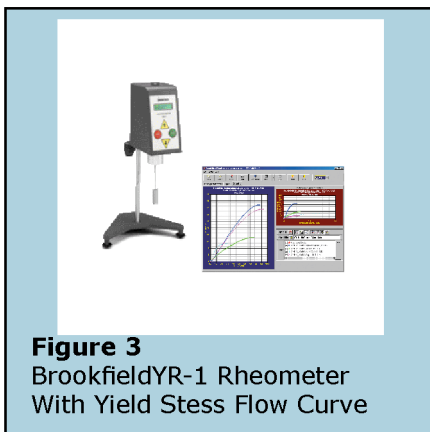


Figure 3
Brookfield YR-1 Rheometer
With Yield Stress Flow Curve

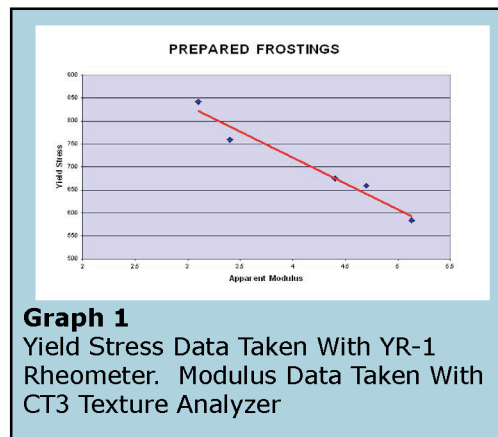
An alternative method of indirectly quantifying yield stress of a product can be quickly done with the CT3 Texture Analyzer using a cylindrical probe. (See Figure 4) In this test, the probe is driven into the frosting while in its retail package. The in-



Figure 4
Brookfield CT3 Texture Analyzer

strument output from this test is a load force profile as the probe displaces the frosting. During the initial stage of the test, the load builds quickly until sufficient force is applied to make the product flow away from the probe as it descends. The slope of this portion of the load curve is termed “apparent modulus.” The graph below demonstrates the high correlation between the test results of yield stress and apparent

modulus for five different ready-to-use frosting products. (See Graph 1)



Graph 1
Yield Stress Data Taken With YR-1
Rheometer. Modulus Data Taken With
CT3 Texture Analyzer

Both test methods described above can be useful for simple, quick QC tests to assure consistent product quality of toppings like frosting.