

# Grab Sample Testing Vs. On-Line Viscosity Measurement

By Robert G. McGregor

Mixing and blending are time-critical processes for those materials where the final end point condition of the mixture defines acceptability of the product. Viscosity may be the key parameter for liquids and semi-solids when flow behavior is the determining factor that the product is ready. Whether it's the syrup-like texture of a cough medicine or the flowability of a gel coating used on tablets, process managers need a reliable method to know that the mixture is "good to go".

The prevalent method for determining acceptable end point during mixing and blending is either visual observation or grab sample testing. The former is easier and relies on the expertise of production floor personnel to use best judgment based on prior runs. Grab sample testing adds extra assurance to product acceptability, but takes time to accomplish and may increase total processing time.

Typical grab sample tests for viscosity involve a procedure for obtaining the sample and running a specific test method, either on the production floor near the mix tank or close by in a QC Lab. Standard equipment might include the setup **shown in Figure 1**, which is a popular choice because of the instrument's ability to measure viscosity while controlling temperature simultaneously. The importance of temperature measurement/control in a grab sample check deserves its own discussion because material flow behavior can vary significantly with small temperature changes.



Figure 1  
Brookfield DVII+Pro  
Benchtop Viscometer

Gaining in consideration are heavier duty instruments which can work right at or in the mix tank and provide continuous viscosity measurement during the mix/blend process.



**Figure 2 shows** a portable viscometer which can be inserted into the tank manually when necessary to make an instantaneous viscosity reading. **Figure 3 shows** an on-line viscometer that can be mounted directly in a circulation loop at the tank to provide continuous viscosity sensing. The added advantage of the latter method is that automatic feedback control is possible. The process can self adjust when the measured viscosity deviates from the desired value by either adding corrective ingredients (E.g. thickeners, water or adjusting the control parameters (E.g. mixing speed or time).

Figure 2  
Brookfield TT-220 Portable Viscometer

The tradeoff in grab sample vs. on-line measurement for viscosity is the expense of investment. The former typically costs a small fraction of the latter. If turnaround time for getting the test results back to the production floor is not critical, then grab sample is the way to go. If lost time is lost money, then on-line viscosity measurement is worth considering. Or if the end point viscosity cannot be exceeded for whatever reason, then on-line measurement may be the only way to go.



Figure 3  
Brookfield AST-100  
On-Line Viscometer

Robert G. McGregor, Sales/Marketing Manager  
Brookfield Engineering Laboratories, Inc.  
11 Commerce Blvd., Middleboro, Ma 02346  
Tel: 508.946.6200 ext. 143 Fax: 508.946.6262  
Email: r\_mcgregor@brookfieldengineering.com  
Website: <http://www.brookfieldengineering.com>