

Pharmaceutical Powders

Small Sample Sizes Yield Big Results

Pharmaceutical powders are expensive in all aspects, from initial definition through development to final product. The prohibitive costs involved with pharmaceutical powders translate to small sample sizes needed to define powder flow characteristics such as flow function, bulk density and arching dimension. Being able to measure these parameters is a must to ensure proper handling, dispensing and storage of these materials.

Small sample sizes are usually all that is available to define these necessary characterization tests. This is a double-edged sword. Most powder test methods need large sample sizes on the order of hundreds of cc's to run these tests. So the producer must make these large volumes of sample powder available for testing, or risk the other edge of the sword: downstream powder jams, equipment lock-up and costly downtime until these problems can be sorted out, characterized, defined and solved. The other choice is to produce small volumes of product and run sample tests using methods such as flow cup, angle of repose, and tap test (Carr Index or Hausner Ratio) which do not give a direct correlation with flow behavior.

Brookfield Engineering has answered the needs of the pharmaceutical industry by producing a reliable test method for handling small volumes of pharmaceutical powders. With the introduction of the small volume shear cell for its popular Powder Flow Tester, powder sample volumes needed for testing have been reduced from 263cc to a mere 43cc. See figure

This small shear cell was specifically designed to address the pharmaceutical industry with no sacrifice in test results. Results given by the larger 263cc shear cell (flow function, bulk density, arching dimension, internal friction angle, rat-hole diameter) can also be attained with the small volume shear cell.

The small volume shear cell does have an additional advantage over the larger 263cc shear cell in that higher consolidation strengths are realized. So, this is not only a good solution for the pharmaceutical industry's requirement for testing small volumes of powder; the small volume shear cell can also solve the problem for industrial customers requiring higher consolidation tests to mimic conditions in large containers.

For example, the Brookfield large volume shear cell can apply consolidation stresses up to 4.8kPa . The small volume shear cell can apply consolidation stresses up to 13.25 kPa, which is three times greater. This makes it the perfect device for customers with larger or taller bins who need reliable powder flow information at these higher consolidations. See figure 2

All tests with the Powder Flow Tester are performed with Brookfield's intuitive Powder Flow Pro software. This user-friendly

Figure 1: Brookfield Small and Large Volume Shear Cell



Figure 2: Brookfield Small and Large Shear Cell Flow Function Test Results



software interfaces seamlessly with the Brookfield Powder Flow Tester. Tests with the small (or large) shear cell are easily set up and performed with minimal training being required. A user can be trained on how to run a sample in a matter of minutes.

Choosing from a list of test options, flow function results (including flow function, bulk density, internal friction angle, arching dimension and rat-hole diameter) can be realized in less than an hour; a dedicated bulk density test can be run in less than three minutes.

For the first time the pharmaceutical industry has a choice for small volume testing with cost-effective accurate, repeatable, informative results, which can easily be categorized, stored, and exported to Excel, at the press of a button.

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