

REPRESENTATIVE SAMPLING FOR SURFACE AREA MEASUREMENTS

For maximum accuracy a powder sample chosen for analysis must be representative of the larger batch from which it is taken. A representative sample can be described as one that possesses the same particle and pore size distributions and specific surface area as the larger batch. In general, particles tend to segregate such that the finer ones settle toward the bottom of the container. This phenomenon is caused by the smaller particles falling through the voids between the larger ones.

A convenient and accurate method to obtain representative samples from a batch of powder utilizes the spinning riffler¹. In the riffling process a sample is loaded into a vibrating hopper which delivers the sample down a chute into rotating collectors. Both the hopper vibration and the collector rotation rates can be controlled. When the entire sample has been delivered, each collector will contain a fraction of powder exactly representative of the original batch. Since each collector will contain the same particle size gradient as the original, the entire contents of each collector must be used in the subsequent analysis. If a smaller quantity is required, the contents of one or more collectors may be riffled repeatedly until the appropriate sample size is obtained.

A comparison of surface area measurements on a silica powder with and without riffling are shown in Table 1. The results² illustrate the necessity for using representative samples in surface area analyses. The five samples of unriffled powder were obtained by removal at different

Table 1.

B.E.T. SURFACE AREA,^am²/g

Sample No.	Riffled	Not Riffled
1	10.2	9.8
2	10.1	10.2
3	10.2	10.4
4	10.2	10.5
5	10.1	10.7

^a Measurements were obtained on a Quantachrome Monosorb Single Point Surface Area Analyzer.

depths from a 2 pound container. Sample numbers 1 through 5 correspond to samples taken from top to bottom of the container. The large discrepancies in the measured surface area in the non-riffled samples are an indication that the samples were not representative of the larger batch. However, when the powder was riffled with three size reductions, the specific surface areas of five samples were essentially identical.

REFERENCES

1. Available from Quantachrome Corporation.
2. S. Lowell, "Introduction to Powder Surface Area," p. 109, Wiley Interscience, N.Y., (1979).
3. S. Lowell and J.E. Shields, "Powder Surface Area and Porosity", p. 141, 2nd ed., Chapman & Hall (1984).