You can measure your mixture’s uniformity by evaluating samples taken from the mixture. The first step is to decide how large a sample — and how many samples — you must take from the mixer.

In most applications the sample should be the same size as the minimum amount of your mixture that will be used in final product form — for instance, a 200-milligram sample for a pharmaceutical mixture that will be formed into 200-milligram tablets, or a 1-ounce sample for a powdered drink mixture that will be filled into 1-ounce packets. If the final product will be used in more than one form, such as a powdered drink mixture that will be packaged both in 1-ounce packets and 48-ounce cans, the sample size should be the same as the smallest product form — in this case, 1 ounce.

If your ingredients have different particle sizes that can be screened into fractions, then you can perform a statistical analysis of multiple samples. In this method, each sample is separated into fractions, often by sieve testing, and then each fraction is weighed to determine whether the amount of each ingredient in the sample is in correct proportion. The results for all the samples are statistically analyzed to determine the mixture quality.

There are also some useful variations to this method. In one, a small quantity of a tracer, a test powder with a particle size different than that of the mixture’s ingredients, is added before mixing begins to check the mixing action. (Often a magnetic tracer is used, so that it can be removed from the finished mixture by a magnet at the mixer discharge.) Samples taken from the mixer are then analyzed by separating them into fractions and weighing the fractions to determine whether the proportions of ingredients — including the tracer — are correct. (One caution: With this method, the scale for weighing the sample fractions must have enough resolution to weigh the small quantity of tracer.)


Batch uniformity might be considered subjective, with different people measuring uniformity in different ways. I’ve witnessed many installations where batch uniformity is considered by a visual inspection of the mixed material. However, when mixing microingredients, a visual, taste, or other sensory evaluation isn’t appropriate. Multiple microingredients in a large batch require a more scientific approach to analysis.

I would suggest, depending upon particle size, a sieve analysis with multiple samples taken from the mixer at distinct locations. Many companies collect five, seven, or nine individual samples from various segments of the mixer to evaluate. Additionally, testing the individual samples for coefficient of variation and charting these results should lead to an accurate assessment of the distribution of individual microingredients.

You must also recognize that mixers can be influenced by many different parameters, such as loading location, sequence, and time and the similarity or difference between the materials being mixed in terms of particle size and bulk density.

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