

Coefficient of Variation (CV) Calculator

The evaluation of mixer efficiency requires that a minimum of 10 samples of about 100g be taken at equal intervals as the batch passes an access point immediately after discharge from the mixer. Samples must be sent to the laboratory for evaluating one or two key components. Usually those that are easy to assay and are of low concentration in the product, and thus more difficult to distribute evenly throughout the product (e.g. minerals, such as iron or zinc).

- **For continuous mixing:** for example to take a sample every 15 seconds to obtain a profile.
- **For batch mixing:** for example a 250 kg capacity mixer, to take a sample in each of the 25 kg bag to obtain a profile.

$$\%CV = 100 \frac{\sqrt{\frac{\sum X^2 - \frac{(\sum X)^2}{N}}{N-1}}}{\bar{X}}$$

%CV= percent coefficient of variation

$\sum X$ = sum of the assay values

N = number of assay values

$\sum X^2$ = sum of the squares of all the values

$(\sum X)^2$ = square of the sum of all assay values

\bar{X} = arithmetic average of all assay values

Result evaluation

A profile may be considered to be satisfactorily homogeneous if the **coefficient of variation is no larger than 10%** (i.e. +/- 10% around the average).

If CV greater than +/- 10% mixing time should be increased, if it is not sufficient to reduce the CV, then two-step mixing (i.e. use of preblend) should be envisaged.