

Measurement Method

Change of phase of
 $\Delta = 2t + \frac{\lambda}{2}$ (must equal a whole number of λ for a bright fringe or

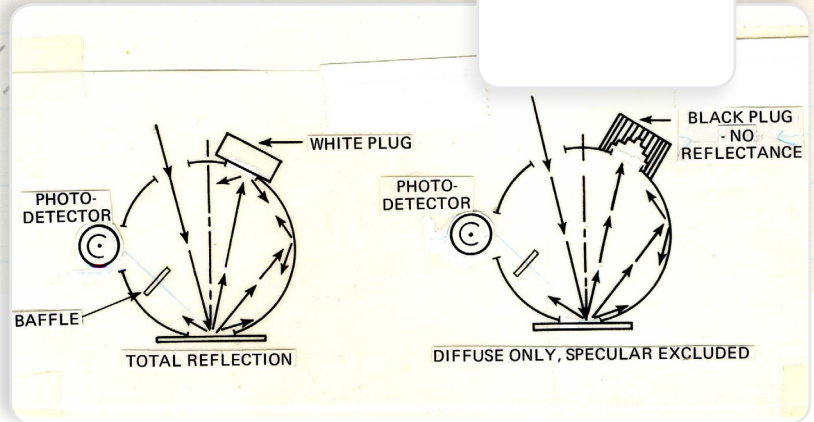
$$n\lambda = 2t + \frac{\lambda}{2}$$

$$t = \frac{n\lambda - \frac{\lambda}{2}}{2} = \frac{\lambda}{2} \left(n - \frac{1}{2} \right)$$

substituting

$$D^2 = 2r \left[\frac{\lambda}{2} \left(n - \frac{1}{2} \right) \right]$$

MM 5014.00



Measuring Loose Powder

with ColorQuest® XE

The color of powders that are used in manufacturing, such as limestone or raw pigment powders, is often measured to evaluate how the manufacturing process is proceeding or to estimate the color of the final product. In other cases, a powder may be the final product itself, such as cosmetic facial powder or baking powder. Color measurement of these types of products is often necessary to ensure lot-to-lot color consistency before they are shipped to the end user.

By convention, the instrument geometry most commonly used to measure the color of powder is a directional ($45^{\circ}/0^{\circ}$ or $0^{\circ}/45^{\circ}$) geometry instrument such as the LabScan® XE with UV control (preferred) or ColorFlex® 45/0. However, it is also possible to measure powder color using a diffuse geometry instrument such as the HunterLab ColorQuest® XE spectrophotometer with appropriate sample devices.

THE APPLICATION

Powders have several non-uniform characteristics that require compensating preparation and presentation techniques in order to ensure a repeatable sample measurement.

Powders come in the form of fine particulates—not a solid sample—and must be measured through the side of a clear glass sample cell in order to be effectively made into a solid.

Powders exhibit light trapping between the particles and will be sensitive to ambient light and to small differences in the optical configuration of the instrument. Using a sufficient sample thickness will minimize these effects.

Powders may be slightly fluorescent, which means that they will be sensitive to the UV content of the light source. If fluorescence is an issue, use of the UV control option is recommended.

Recommended Color Scale

CIE L*a*b* as a full color descriptor

Recommended Single-Number Index

YI D1925 (2/C), YI E313, WI E313 for indication of yellowness and/or whiteness, Y Brightness

Recommended Illuminant/Observer

D65/10°. C/2° may also be used.



ColorQuest® XE



MEASUREMENT METHOD

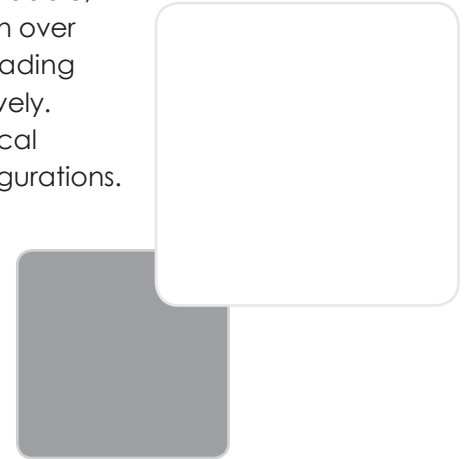
1. Configure your software to read using the desired color scale, illuminant, and observer.
2. Standardize the instrument for RSIN and the large area of view, first using the light trap...
3. ...then the white standard tile that came with the instrument.
4. Lower or remove the sample clamp. Install the shelf of the reflectance sample shelf with light cover (HunterLab Part Number B02-1005-172) at the reflectance port.
5. Scoop up powder from the sample batch and fill the 50-mm glass cell (HunterLab Part Number 13-8573-20) to the top. The 2-inch (50-mm) sample thickness makes the translucent powder effectively opaque for reflectance measurement.
6. Tap the sample cup once on a hard surface to settle the loose powder and then place the filled cell flush against the reflectance port so that the powder will be read through the clear glass window of the cell.
7. Cover the sample cell with the opaque cover. The cover minimizes the possibility of ambient light reaching the detector through the powder sample when the measurement is taken.
8. Take a single color reading of the powder. Dump, refill, and read the powder at least three times from the same batch. Average the three color readings for a single color measurement representing the color of the batch. Averaging multiple readings minimizes measurement variation associated with non-uniform samples.
9. Record the average color values for the sample batch.



ABOUT HUNTERLAB

HunterLab, the first name in color measurement, provides ruggedly dependable, consistently accurate, and cost effective color measurement solutions. With over 6 decades of experience in more than 65 countries, HunterLab applies leading edge technology to measure and communicate color simply and effectively. The company offers both diffuse/8° and a complete line of true 45°/0° optical geometry instruments in portable, bench-top and production in-line configurations. HunterLab, the world's true measure of color.

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**More Information about
Measurement Methods at**

hunterlab.com

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