

## Measurement Method

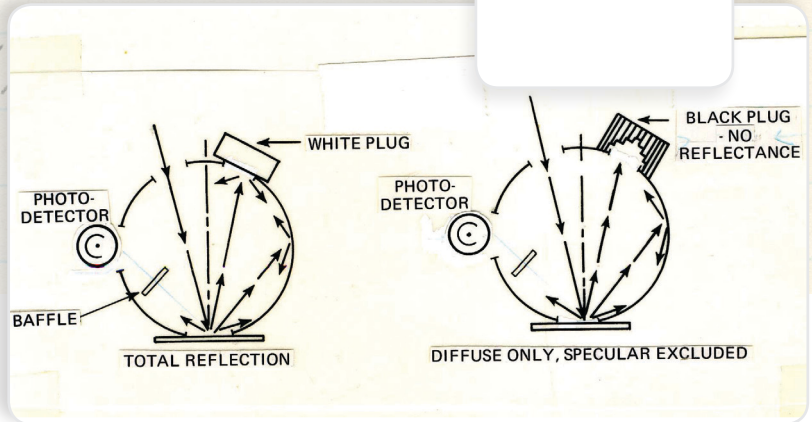
Change of phase of light  
 $\Delta = 2t + \frac{\lambda}{2}$  (must equal a whole number of  $\lambda$  for a bright fringe or

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

substituting

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

MM 5105.00



## Measuring Translucent Semi-Solids with ColorFlex® EZ

Lot-to-lot color consistency is an important indicator of quality for many translucent semi-solids, such as gels, pastes, and slurries. Translucent samples require special handling when being evaluated either visually or instrumentally. The color of a translucent sample changes when the path length is changed, so that path length must be fixed. Since some of the incident light will travel through the sample, its background must also be constant and, ideally, white. Ambient light may also affect the sample's appearance and should be minimized.

A HunterLab ColorFlex® EZ spectrophotometer can be used to measure the reflectance of translucent semi-solids in a glass sample cup with a ring and disk set. This is the most common method advocated by HunterLab for the measurement of translucent semi-solids.

## THE APPLICATION

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

Semi-solids must be measured through the bottom of a clear glass sample cup in order to be effectively made solid.

They are translucent — not opaque — and will be sensitive to ambient light, path length changes, background changes, and small differences in the optical configuration of the instrument. Using a constant sample thickness will minimize these effects.

*Note: If inter-instrument agreement is a concern when measuring translucent semi-solids, all the instruments used for these measurements MUST be the same model to minimize measurement differences.*

Recommended Color Scale

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

Recommended Illuminant/Observer

**D65/10.**



**ColorFlex® EZ**



## MEASUREMENT METHOD

1. Configure your software or the product setup to read using the desired color scale, illuminant, observer and any averaging.
2. Orient the ColorFlex® EZ with the port facing up. Replace the regular port insert with the special port insert for the sample cup (HunterLab Part Number 04-6622-00).
3. Standardize the instrument using the black and calibrated white standards that come with the instrument.
4. Insert the 10-mm black ring (HunterLab Part Number: 02-4570-00) into the 2.5-inch glass sample cup (HunterLab Part Number: 04-7209-00) so that it settles flat on the bottom of the cup. The plastic ring fixes the internal path length of light through the semi-solid sample at 10-mm while excluding outside light that can cause measurement interference.
5. Stir or shake the sample, if necessary, to homogenize it to its usual level. Then fill the cup with the translucent semi-solid sample until the sample is above the level of the ring.
6. Push the white ceramic disk (HunterLab Part Number: 02-4570-00) down through the semi-solid sample. The disk provides a white background to direct light that has traveled through the sample back to the detector.
7. Your goal is to have the sample appear smooth and opaque through the glass bottom of the sample cup.
8. Place the sample cup at the instrument port.
9. Take a single reading of the sample through the bottom of the sample cup. If the sample is uniform in color (such as plain yogurt) or the tolerances are wide, one reading may be sufficient to characterize the sample color.

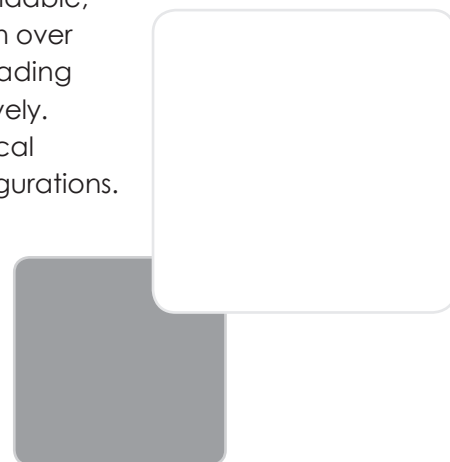
For non-uniform samples or to ensure a higher level of measurement repeatability, average several readings (three for samples such as fruit chunk blends) with sample replacement for a single color measurement representing the color of the batch. Scoop or pour the sample out of the sample cup, refill it, and measure again several times from the same batch. Average the readings together for a single color measurement representing the color of the batch. Averaging multiple readings minimizes measurement variation associated with non-uniform samples.



## 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](http://hunterlab.com)*

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