

Application Note

AN 1003.01

Color Measurement on Very Small Samples

“The consistent measurement of ultra small samples provides a measurement challenge in addition to a business challenge.”

ABSTRACT

When product is in short supply or is very expensive, it is important to use the smallest amount of sample possible for color measurement.

This application note describes HunterLab's color measurement solutions for consistently reading very small amounts of solids, powders, and liquids.



CHALLENGE: To measure small-to-micro samples with precision.

In some applications, samples may be rare, very valuable or in short supply, typically in quantities from small-to-micro. The consistent color measurement of small samples is possible with special accessories. Development of a repeatable measurement method is essential for color discrimination in these small samples. Consideration should be given to an appropriate instrument, color scale, illuminant, observer and special sample holder, if necessary.

MEASUREMENT SOLUTIONS FOR SOLIDS IN REFLECTANCE MODE

In the case of a solid sample, the port opening must be reduced to allow for viewing of the sample without a background. Many HunterLab instruments have the ability to switch from the normal LAV - Large Area of View to an SAV - Small Area of View by a motorized. When placing the sample for measurement, the retroviewer option is used to ensure that the desired sample area completely covers the opening in the port plate. This means that the sample size must be equal to or slightly larger than the 4 mm or 3 mm openings. In addition to lining up the sample correctly, the change of geometry with this option will cause a slight shift in the color values of the calibration standards.

MEASUREMENT SOLUTIONS FOR POWDERS IN REFLECTANCE MODE

For small quantities of powder, HunterLab has designed a special modified port plate for reflectance measurements of approximately 0.4 cc of packed powder. The sample is scooped into the powder holder and packed down with a plunger. The powder holder is then placed in a specially-designed port plate and the powder measured through the holder's clear window.



Figure 1. The Small Area View (SAV) or VSI options are required. Performance specifications will not be met with this smaller-than-standard port plate. The change of geometry with this option will cause a slight shift in the color values of the calibration standards.

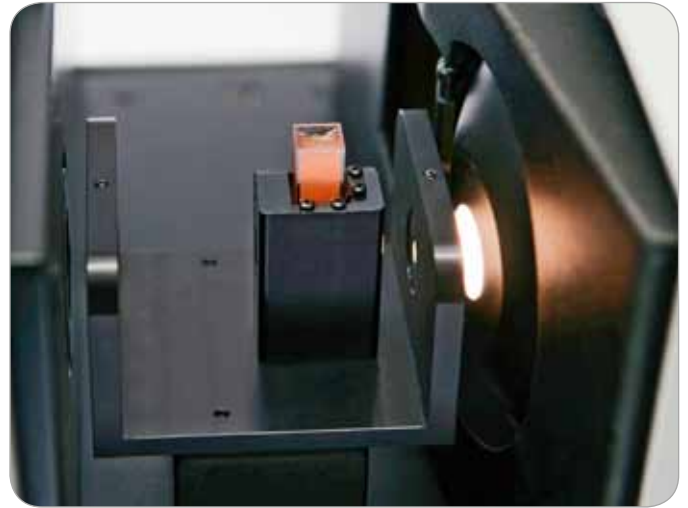


Figure 2. The powder holder should be used ONLY for color difference measurements.

MEASUREMENT SOLUTIONS FOR TRANSPARENT LIQUIDS IN TRANSMITTANCE

For liquids, HunterLab offers a semi-micro cell holder with beam-reducing optics fitted into the holder. This is installed in the transmission compartment and then the instrument is standardized. The user chooses a 10 mm or 20 mm transmission cell. A semi-micro cell filled with the sample is then inserted for measurement.

Note: The same cell used to hold the blank during standardization should be used for sample measurements, particularly when disposable cells are used.



CONCLUSION

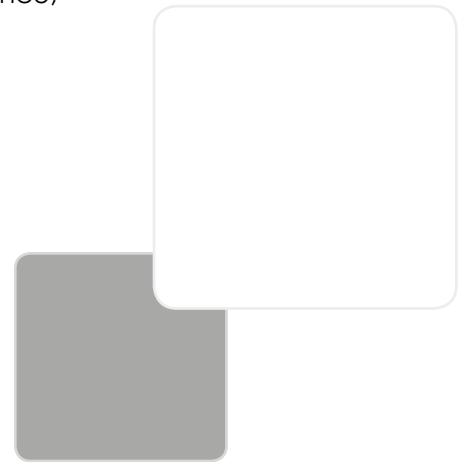
HunterLab has developed several helpful accessories (see Table 1) to assist customers with some unique sample presentation involving small-to-micro quantities of sample. For more information and to solve another unique problem, please contact Technical Services at www.hunterlab.com/service.

TABLE 1. SEMI-MICRO ACCESSORIES FOR SMALL SAMPLES

Instrument	Sample Type	Mode	Viewing Area	
Diffuse/8*	Solid	Reflectance	4 mm round opening with SAV Option	A02-1011-184 Modified Port Plate
	Powder - 0.4 cc	Reflectance	Requires SAV Option	Holder and special port plate: D02-1012-313 for ColorQuest D02-1012-252 for UltraScan
	Transparent Liquid	Transmission	10 mm (0.4 mL) or 20 mm (0.8 mL) pathlength	L02-1012-202 Semi-micro cell holder and optical assembly
Directional 45/0**	Solid		3 mm round opening with VSI Option	CMR 2562 Modified Port Plate
	Powder - 0.4 cc	Reflectance	Requires SAV Option	CMR 2439 Holder and special port plate
	Transparent Liquid	Transmission	10 mm (0.4 mL) or 20 mm (0.8 mL) pathlength	L02-1012-202 Semi-micro cell holder and optical assembly

REFERENCES

Hunter, Richard S., and Harold, Richard W., The Measurement of Appearance, 2nd Ed., John Wiley and Sons, Inc. New York, NY USA 1987.



*More Information about
Color Measurement on our
HunterLab Blog*

measuretruecolor.com

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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