b*/a* Ratio

b*/a* Ratio is simply the b* of CIEL*a*b* divided by the a* of CIEL*a*b*.

b*/a* Difference is also available, and is defined as follows:

$$db^*/a^* = (b^*/a^*)_{sample} - (b^*/a^*)_{standard}.$$

Brightness 457

457 nm Brightness can be used to measure the relative brightness of paper. 457 nm brightness is calculated over the range of 400 nm to 510 nm in accordance with TAPPI document T452. While HunterLab's spectrophotometer geometries do not conform exactly to those specified by TAPPI, the measurements correlate closely with those made on TAPPI-compliant instruments.

457 nm Brightness Difference is also available, and is defined as follows:

$$d457nm\ Brightness = (457nm\ Brightness)_{sample} - (457nm\ Brightness)_{standard}.$$

Color Value

Color Value is a single numerical value related to the amount of light-absorbing material (colorant) contained in a sample and is usually based on spectral data. It is most often used to calculate the difference in strength (% Strength) between a standard and a sample. Color Value may be calculated by any one of three acceptable methods. The color value which results from one method may not agree with any other method. The choice of method is usually dependent on the nature of the sample and the need to obtain a color value. The Spectrophotometric methods for obtaining color value are labeled as Color Value SUM, Color Value SWL, and Color Value WSUM, as described below.

Color Value SUM

Color Value SUM is calculated as the sum of the K/S values for the sample read across the spectrum for reflectance measurements, and from the sum of the absorbances for the sample read across the spectrum for transmittance measurements.

$$\text{Color Value SUM} = \frac{\sum_{\lambda=1}^{\#\text{points}} \frac{K}{S\lambda}}{\#\text{points}} \qquad \text{for reflectance}$$

$$\text{Color Value SUM} = \frac{\sum_{\lambda=1}^{\#\text{points}} \text{Absorbance}_{\lambda}}{\#\text{points}} \qquad \text{for transmittance.}$$

K/S and Absorbance are described in the Spectral Data Types section of this appendix.

Color Value SUM Difference is also available, and is defined as follows:

$$dColor\ Value\ SUM = (Color\ Value\ SUM)_{sample} - (Color\ Value\ SUM)_{standard}.$$

Color Value SWL

Color Value SWL is the K/S measured at the wavelength of maximum absorption (minimum reflection) for reflectance measurements or the absorbance at the wavelength of maximum absorption (minimum transmittance) for transmittance measurements. K/S and Absorbance are described in the Spectral Data Types section of this appendix.

Color Value SWL Difference is also available, and is defined as follows:

$$\text{dColor Value SWL} = (\text{Color Value SWL})_{sample} - (\text{Color Value SWL})_{standard.}$$

Color Value WSUM

Color Value WSUM is calculated using the sum of K/S weighted by illuminant and observer for the sample read the spectrum for reflectance measurements, and using the sum of absorbances weighted by illuminant and observer for the sample read across the spectrum for transmittance measurements.

$$\text{Color Value WSUM} = \frac{\sum_{\lambda=1}^{\#\text{points}} \frac{K}{S_\lambda} * E_\lambda * S_\lambda}{\#\text{ points}} \qquad \text{for reflectance}$$

$$\text{Color Value WSUM} = \frac{\sum_{\lambda=1}^{\#\text{points}} \text{Absorbance}_\lambda * E_\lambda * S_\lambda}{\#\text{ points}} \qquad \text{for transmittance}$$

where E = Energy distribution of light source

S = Observer function.

K/S and Absorbance are described in the Spectral Data Types section of this appendix.

Color Value WSUM Difference is also available, and is defined as follows:

$$\text{dColor Value WSUM} = (\text{Color Value WSUM})_{sample} - (\text{Color Value WSUM})_{standard.}$$

Dominant WaveLength and Excitation Purity

The dominant wavelength and excitation purity chromaticity system was one of the first systems for specifying the chromaticity of objects other than by their x, y values. It not only compensates for the influence of the illuminant's chromaticity, but also improves the correlation between the numbers and visual attributes because it permits chromaticity specification in terms of hue and saturation. The system is based on the additive-color-mixing properties of the x,y diagram. A color is specified by describing how it would be matched by additively mixing the illuminant and light of some single wavelengths.

Dominant wavelength is the wavelength needed for mixture with the illuminant. In general, it identifies the hue of the object's color.