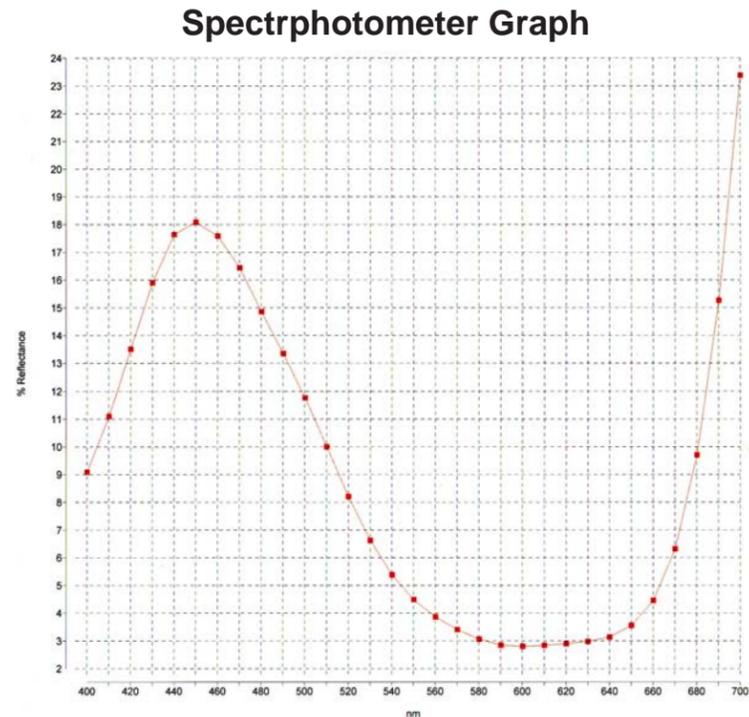


# Spectrophotometer Color Analysis

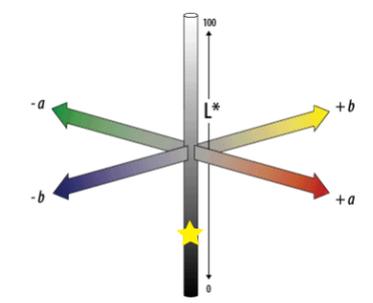
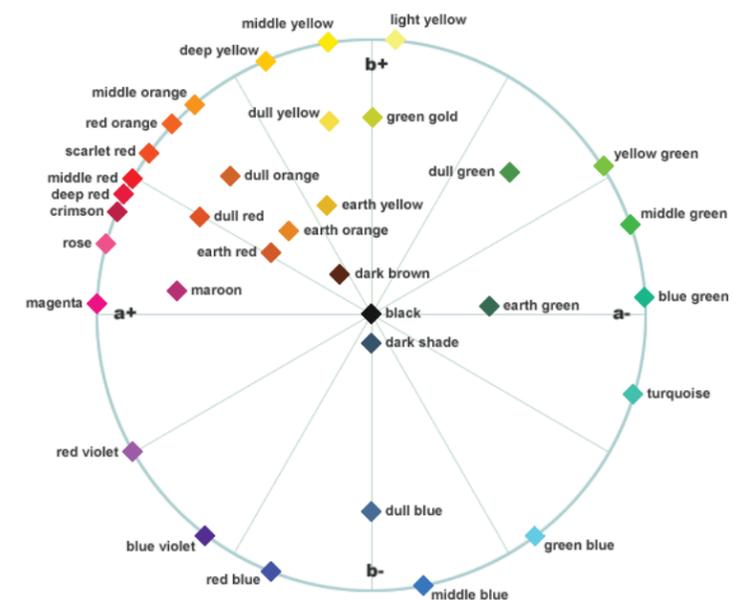
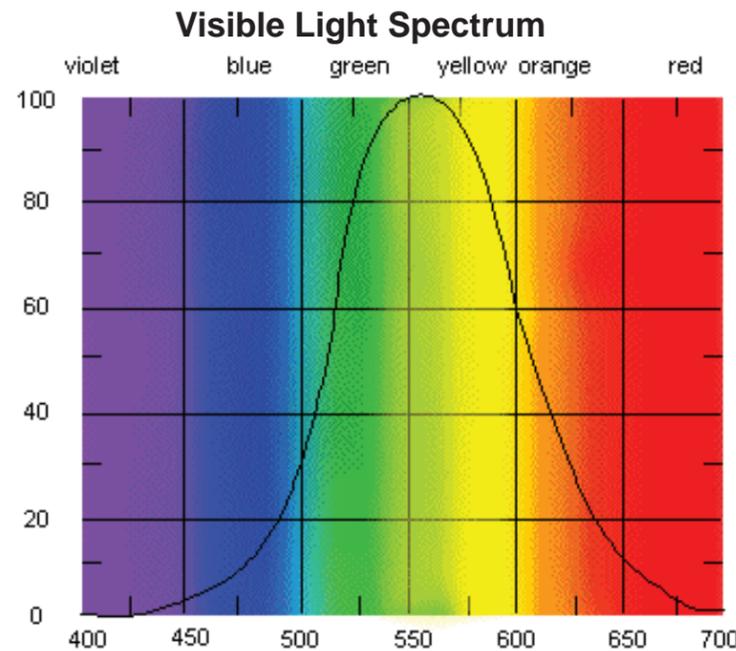
Spectroscopy is the study of the emission and absorption of light and of the electromagnetic spectrum.

A Spectrophotometer performs basic color analysis, including color classification, color matching, & shade sorting.

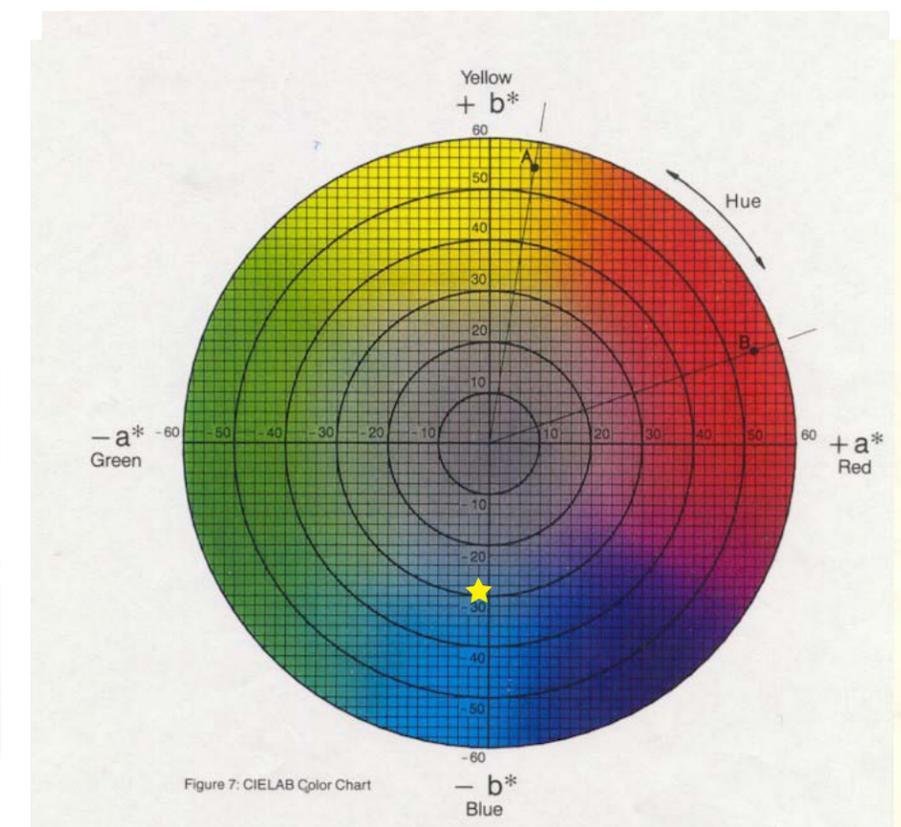


This graph of the sample fabric shows the percentage of light transmitted or reflected at each wavelength in the visible spectrum (400-700 nm) and yields a spectral power distribution of reflectance data. Each spectral power distribution that is produced is specific to the colorant or mixture of colorants used in the object. It may be broad or narrow and have one or more peaks depending on the colorant. The shape describes the color in a two-dimensional plot.

The sample fabric graph shows that the fabric color is a made up of all colors of the visible light spectrum. The fabric has a high concentration of color at 450 on the visible light spectrum. The color at this part of the spectrum is blue-violet. The graph dips significantly after this point and registers very little green, yellow and orange. At 650, the percentage of light transmitted or reflected begins to rise sharply. This shows that the fabric has a high concentration of red in addition to blue & violet. The hue of the color is blue.



Sample Fabric Swatch



## CIE L\*a\*b\*

The CIELAB color space is organized in a cubed sphere form. The L\* axis runs from top to bottom. The maximum value for L\* is 100 which represents white and the minimum value for L\* is 0 which represents black. The a\* and b\* axes have bi specific numerical limits. Positive a\* is red and negative a\* is green. Positive b\* is yellow and negative b\* is blue.

There are delta values associated with this color scale.  $\Delta L^*$ ,  $\Delta a^*$  and  $\Delta b^*$  indicate how much a standard and sample differ from one another in L\*, a\* and b\*. The delta values are often used for quality control or formula adjustment.

The sample fabric color is also converted to L\*a\*b\* coordinates by the spectrophotometer. The coordinates of the sample fabric are:

$$\begin{aligned} L^* &= 29.96 \\ a^* &= -1.98 \\ b^* &= 29.96 \end{aligned}$$

The coordinates of the sample are plotted on the above L\*a\*b\* color wheel chart and 3-D color chart. The yellow star denotes the location of the sample fabric coordinates on both charts.

The sample fabric, when plotted on the CIELAB color wheel chart shows us that the fabric is a mildly saturated blue. It's location on the chart places it near the 3<sup>rd</sup> ring from the center of the circle in the lighter blue section of the visible light spectrum. The sample fabric value, L\*= 29.96, places it low on the value scale. It's position on the L\* axis shows that the sample fabric is a darker shade of blue.