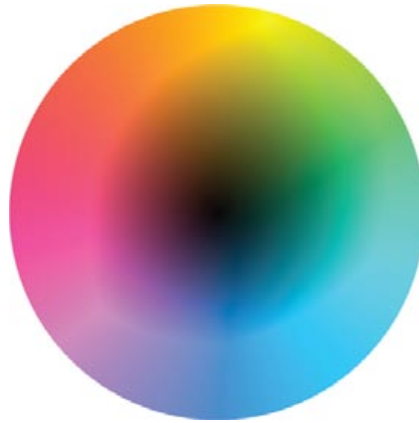


Definition of
CIE Lab Color Space



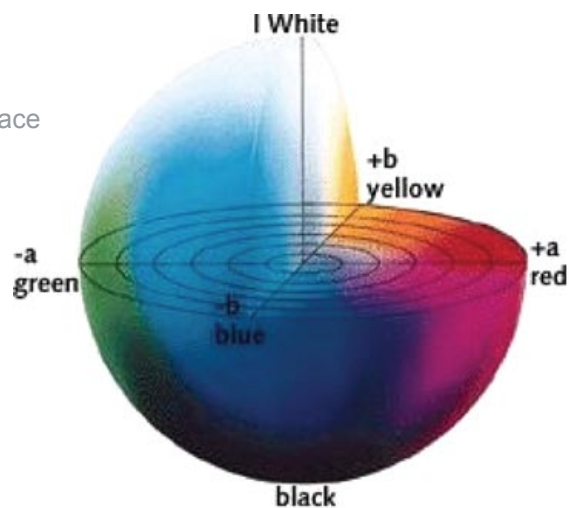
CIELab Color Space

The two CIE color space versions, 1931 CIE and 1976 CIE (or CIELab), are used for defining human color perception of an object. The 1931 CIE system is limited in that it does not uniformly express differences in lightness, purity and dominant wavelength between colors. However, the CIELab system has improved organization of colors so that numeric differences between colors agrees more consistently with human visual perceptions, and therefore, offers specific advantages over the 1931 CIE system.

Since CIELab defines colors more closely to the human color perception, this system is often used in the quality control of colored products. For example, once the color of a production sample is located within the CIELab color space, it is compared to the color quality control production standard. Color differences between the production sample and the standard are then determined and compared to predetermined acceptance tolerances.

The CIELab color space is based on the concept that colors can be considered as combinations of red and yellow, red and blue, green and yellow, and green and blue. To determine the exact combination of colors of a product, coordinates of a three dimensional color space are assigned.

Figure 1 CIELab Color Space
(from www.linocolor.com)



The three color coordinates:

- L^* – the lightness coordinate
- a^* – the red/green coordinate
- b^* – the yellow/blue coordinate

1. L^*

The L^* coordinate of an object is the lightness intensity as measured on a scale from 0 to 100, where 0 represents black and 100 represents white.



Figure 2 CIELab System L^* Coordinate

2. a^*

The a^* coordinate of an object represents the position of the object's color on a pure green and pure red scale, where -127 represents pure green and +127 represents pure red.



Figure 3 CIELab System a^* Coordinate

3. b^*

The b^* coordinate represents the position of the object's color on a pure blue and pure yellow scale, where -127 represents pure blue and +127 represents pure yellow.



Figure 4 CIELab System b^* Coordinate

Another interesting characteristic of the CIELab system is that the distance that can be calculated between two colors, is directly proportional to the difference between the two colors as perceived by the human eye.