color space CIELAB 1976, color values, -attributes, -chromaticities *(a', b')*

tristimulus values *X, Y, Z* −> color attributes *L*, a*, b**

lightness $L^* = 116\,(Y/Y_n)^{1/3} - 16$

RG−chromaticness $a^* = 500\,[\,(X/X_n)^{1/3} - (Y/Y_n)^{1/3}\,] = 500\,[\,a' - a'_n]\,Y^{1/3}$

JB−chromaticness $b^* = 200\,[\,(Y/Y_n)^{1/3} - (Z/Z_n)^{1/3}\,] = 500\,[\,b' - b'_n]\,Y^{1/3}$

color attributes *L*, a*, b** −> tristimulus values *X, Y, Z*

tristimulus values

$X = X_n\,[\,(L^* + 16)/116 + a^*/500\,]^3$

$Y = Y_n\,[\,(L^* + 16)/116\,]^3$

$Z = Z_n\,[\,(L^* + 16)/116 - b^*/200\,]^3$

chromaticity for CIELAB 1976, LABHNU 1977, LABHNUx 1979

CIELAB 1976, 2^o	$a' = 0{,}2191\,(x/y)^{1/3}$		$b' = -\,0{,}08376\,(z/y)^{1/3}$
LABHNU 1977	$a' = (x/y + 1/6)^{1/3}/4$		$b' = -\,(z/y + 1/6)^{1/3}/12$
LABHNU1 1979	$a' = (x/y + 1)/15$	*linear!*	$b' = -\,(z/y + 1/6)^{1/3}/12$
LABHNU2 1979	$a' = (x/y + 1/6)^{2/3}/15$		$b' = -\,(z/y + 1/6)^{1/3}/12$
CIELAB 1976, 10^o	$a' = 0{,}2193\,(x_{10}/y_{10})^{1/3}$		$b' = -\,0{,}08417\,(z_{10}/y_{10})^{1/3}$
chromaticity constants CIELAB, 2^o,10^o	$a_2 = 500\,(1/X_n)^{1/3} = 0{,}2191$		$b_2 = -\,200\,(1/Z_n)^{1/3} = -\,0{,}08376$
	$a_{10} = 500\,(1/X_{n10})^{1/3} = 0{,}2193$		$b_{10} = -\,200\,(1/Z_{n10})^{1/3} = -\,0{,}08417$