Lawrence Berkeley National Laboratory Pigment Database: Guide to Reading Spectral Datafiles

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February 13, 2005

Each pigmented coating is described by a tab-delimited text file that provides one column of data per pigment property. It can be read by nearly any spreadsheet application, charting utility, text editor, word processor, or custom program. One easy way to view its contents is to open the file with Microsoft Excel, select all cells, and execute Format/Column/Autofit Selection for best display.

The first row of each column names the property, and the remaining rows give its value(s). Pigment properties are detailed in Table 1.

Note: each spectral datafile is stored in the LBNL Pigment database as a ZIP archive with AES 128-bit encryption. The archives can be unzipped with any modern file compression/expansion utility, such as WinZip 9.0 or later (http://WinZip.com). Members and industrial partners of the Cool Colors project may obtain the decryption key via fax by contacting Ronnen Levinson and providing a fax number.

References

1. R. Levinson, P. Berdahl, and H. Akbari. 2005. Solar spectral optical properties of pigments, Part I: Model for deriving scattering and absorption coefficients from transmittance and reflectance measurements. *Solar Energy Materials & Solar Cells* (in press).

2. R. Levinson, P. Berdahl, and H. Akbari. 2005. Solar spectral optical properties of pigments, Part II: Survey of common colorants. *Solar Energy Materials & Solar Cells* (in press).

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instructions	how to view and interpret this datafile
comments	authorship and disclaimer
computation date	when K-M coefficients were calculated
color family	white, black/brown, blue/purple, green, red/orange, yellow, or pearlescent
pigment category	pigment chemistry or characteristic (e.g., cobalt titanate green or non-selective black)
code	used to identify this pigment in our pigment characterization paper (note: this value likely to be replaced)
paint name	assigned by the paint manufacturer
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internal description	LBNL's description of masstone, tint, or mixture
component names	LBNL's description of the paint's components
component ratios	parts by volume of each component
dry-film PVC	pigment volume concentration (volume pigment:volume paint) in dry film
delta.v (microns)	thickness of film sample over void background [exclusive of substrate, if present] (μm)
delta.w (microns)	thickness of film sample over opaque white background [exclusive of background and substrate, if present] (μm)
delta.b (microns)	thickness of film sample over opaque black background [exclusive of background and substrate, if present] (μm)
sigma	non-spectral forward scattering ratio
spectral ranges	definitions of solar, ultraviolet, visible, and near-infrared ranges used in spectral averaging
R.tilde.fv averages	spectrally averaged, irradiance-weighted values of the measured reflectance of the film over a void background
T.tilde.fv averages	spectrally averaged, irradiance-weighted values of the measured transmittance of the film over a void background
A.tilde.fv averages	spectrally averaged, irradiance-weighted values of the measured absorptance of the film over a void background
R.tilde.fw averages	spectrally averaged, irradiance-weighted values of the measured reflectance of the film over an opaque white background
R.tilde.fb averages	spectrally averaged, irradiance-weighted values of the measured reflectance of the film over an opaque black background
R.tilde.ow averages	spectrally averaged, irradiance-weighted values values of the measured reflectance of the opaque white background
lambda (nm)	wavelengths at which spectral values are presented
insolation (W/m^2/nm)	air-mass 1.5 hemispherical solar spectral irradiance (W m^{-2} nm^{-1})
R.tilde.fv	measured spectral reflectance of the film over a void background
T.tilde.fv	measured spectral transmittance of the film over a void background
A.tilde.fv	measured spectral absorptance of the film over a void background
R.tilde.fw	measured spectral reflectance of the film over an opaque white background
R.tilde.fb	measured spectral reflectance of the film over an opaque black background
K (1/mm)	Kubelka-Munk (K-M) spectral absorption coefficient (mm^{-1})
S (1/mm)	K-M spectral backscattering coefficient (mm^{-1})
R.inf	continuous refractive index (CRI) spectral reflectance of an opaquely thick film
R.tilde.inf	observed spectral reflectance of an opaquely thick film
R.tilde.fw.calc	observed spectral reflectance of the film over an opaque white background, as computed from the K-M coefficients
R.tilde.fb.calc	observed spectral reflectance of the film over an opaque black background, as computed from the K-M coefficients
T.v	internal transmittance of the film
q.i.at.zero	diffuse fraction q of the downflux i exiting the bottom of the film ($z = 0$)
q.j.at.delta	diffuse fraction q of the upflux j exiting the top of the film ($z = \delta$)
omega.i.at.zero	interface reflectance ω to the downflux i exiting the bottom of the film ($z = 0$)
omega.j.at.delta	interface reflectance ω to the upflux j exiting the top of the film ($z = \delta$)

Table 1: Pigment property definitions.