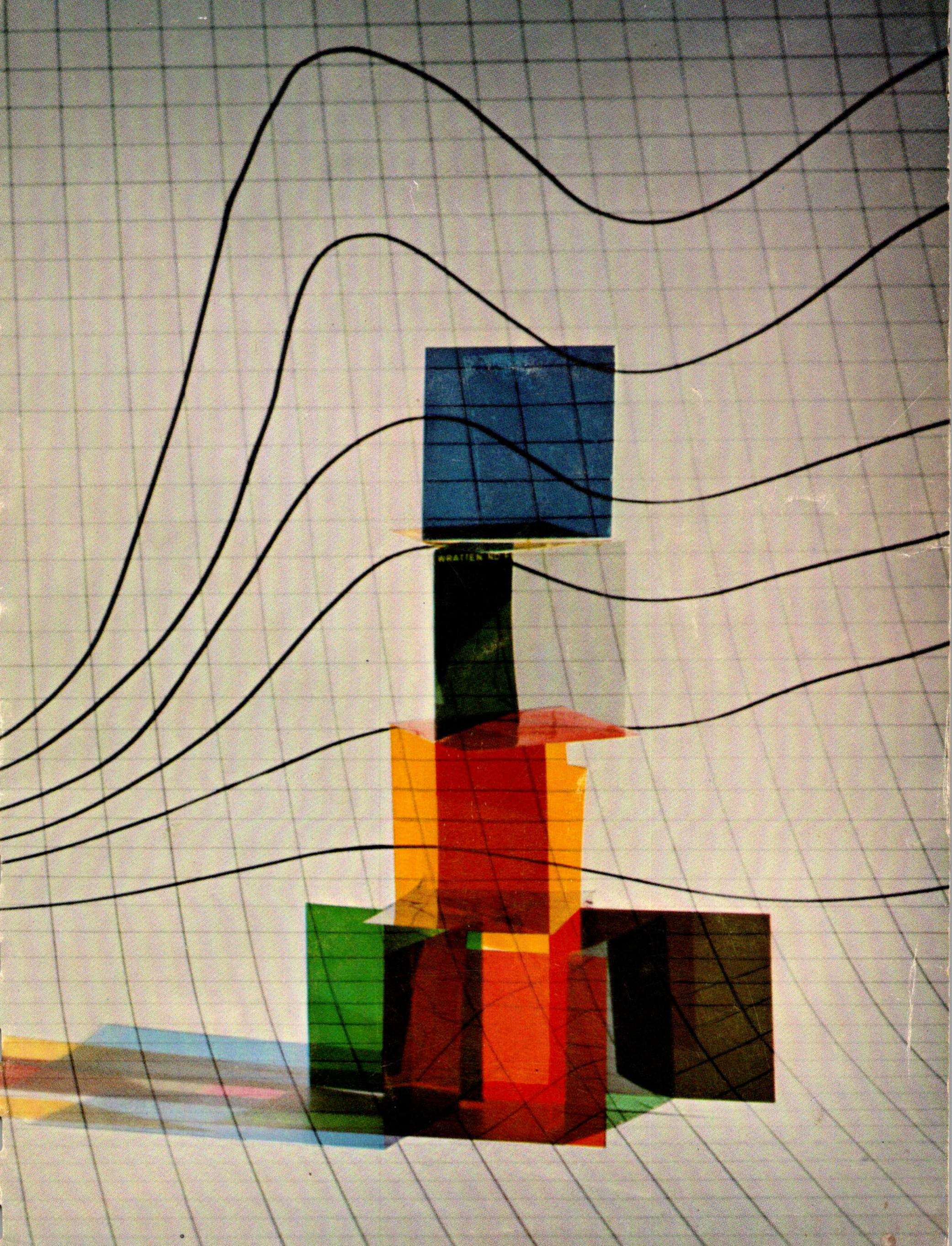
KODAK WRATTEN FILTERS

FOR SCIENTIFIC AND TECHNICAL USE

$1.00

Kodak

SCIENTIFIC
and TECHNICAL
DATA BOOK
B-3



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KODAK WRATTEN

FILTERS

FOR SCIENTIFIC & TECHNICAL USE

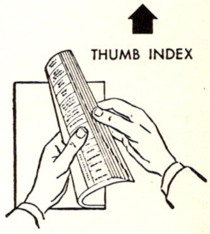
This new edition, the twenty-second, has small changes in transmittance data for many filters. These changes represent slight but unavoidable differences in presumably identical batches of dye. In some cases, they represent reformulations.

Some new filters have been added: KODAK WRATTEN Filters Nos. 47A, 80A, 80D, 87A, and 87B. Nos. 80B and 80C are reformulated.

EASTMAN KODAK COMPANY

TWENTY-SECOND EDITION

◆ This punching fits the *Kodak Photographic Notebook.* See your Kodak dealer.



Kodak Wratten Filters
for Scientific and Technical Use

Since 1909, Kodak Wratten Filters have been recognized as occupying a unique position for photographic, technical, and scientific work. This has been due in part to the wide range of filters available, to their exact adjustment for the purpose for which they were designed, and to the great care exercised in their preparation. The standardization of each filter for color and spectral transmission has been carefully worked out and the standards adopted have been maintained rigidly.

This booklet is written primarily for the technical and scientific laboratory worker whose use of filters requires extensive spectrophotometric data. Some information of a more general photographic nature is included. A more complete treatment of the photographic use of filters is contained in the Data Book, *Kodak Filters and Pola-Screens.* (For further information on this and other Kodak publications, see Kodak Book List 2, *Advanced and Professional Photography* and Book List 3, *Specialized Photography,* available on request from the Sales Service Division, Eastman Kodak Company, Rochester, N. Y. 14650.)

Note: The filter recommendations given in this book are not intended to suggest that other types of filters having proper transmission characteristics cannot be used.

FORMS AND TYPES OF FILTERS

Most Kodak Wratten Filters are prepared from organic dyes, of which a large number have been investigated in the Kodak Research Laboratories. The dyes are obtained from a number of sources, and many have been specially synthesized.

The filters are made by mixing the dyes in gelatin, and coating the proper amount on prepared glass. After the coating is dry, the gelatin film filter is stripped from the glass. Each filter is standardized for spectral transmittance and for total transmittance by special instruments which apply an optical form of limit gauge to these characteristics. *Notice:* Dyes used in filters, like other dyes, may, in time, change. Filters will therefore not be replaced or otherwise warranted against change in transmittance.

With few exceptions, Kodak filters are supplied either as lacquered gelatin film, or as gelatin film cemented between pieces of "B" glass. The exceptions are: Wratten filters No. 18A and 39 which are supplied only as glass filters containing no gelatin film; Wratten filters No. 76, 77, and 77A, compound filters composed of combinations of gelatin film filters, or gelatin film filters and glass filters. Filters in "B" glass are cemented between sheets of plane-parallel glass, which is surfaced in quantities and is of sufficient accuracy for general photographic work and for most scientific purposes, such as spectrography or photomicrography. This glass is not of sufficiently good surface for use in photography with large-aperture lenses of long focal length, such as those used on process cameras, in map-making equipment, and on large copying cameras. Unmounted gelatin filters should be used for this purpose.

There are over one hundred varieties of KODAK WRATTEN Filters. They include groups of filters suitable for experimental work in scientific photography, contrast photography of colored objects, color photography and color cinematography, photomicrography, graphic arts, spectroscopy, and photometry. Recommended groups are given on pages 5 to 16. Other filters can be selected from the list for a variety of scientific purposes.

Pages 24 through 69 of this book present the following data on each filter:* (1) a spectrophotometric absorption curve; (2) a table of percentage transmittance at wavelengths from 400 to 700 mμ in intervals of 10 mμ; (3) dominant wavelength (Illuminants "A" and "C"); (4) percentage of excitation purity (Illuminants "A" and "C"); (5) percentage luminous transmittance (Illuminants "A" and "C"); and (6) colorimetric coordinates x_A, y_A, x_C, and y_C.

The Eastman Kodak Company welcomes opportunities to suggest filters for any special purpose and to put the knowledge and resources of its Research Laboratories, as far as possible, at the service of investigators.

ORDERING FILTERS

When filters are ordered, the number of the filter, its shape, and its size should be given, with a statement as to whether it is wanted in the form of gelatin film or cemented in "B" glass.

Most WRATTEN gelatin filters are stocked in 2- and 3-inch squares, but it is not possible to stock them in all listed sizes. Special sizes of gelatin filters are made up on order. Stocks of 2- and 3-inch square filters cemented in "B" glass are maintained only in filters usually used for general photographic work. Therefore, most other sizes of filters cemented in "B" glass, except the series sizes, are special-order items and require several weeks for delivery.

For size and price information on filters and photographic filter accessories, write to the Special Sensitized Products Sales, Eastman Kodak Company, Rochester, N. Y. 14650.

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*Data at 700 to 1,100 mμ (infrared) for No. 87, 87A, 87B, 87C, 88A, and 89B are on pages 70 and 71. Additional infrared transmittance data (700 to 850 mμ) is given for those filters which have a significant amount of absorption in this range in the Spectrophotometric Absorption Curves on pages 72 through 75.

THE CARE OF FILTERS

Although the gelatin film filter is protected by a thin lacquer coating, the filter should be handled only by the edges or at the extreme corners.

Gelatin film filters should be kept flat and dry. Continued stress can deform them permanently, and moisture tends to cloud them. Storage in clean paper between the leaves of a book, immediately after use, is safe and convenient.

If it is necessary to cut the filter, it should be placed between two pieces of clean, fairly stiff paper and cut with a pair of sharp scissors.

Cemented filters should be treated with care equal to that accorded to lenses. They should be kept in their cases, and on no account allowed to get damp or dirty. Cemented filters are lacquered on the edges to resist the entry of moisture. However, a filter should never be washed with water under any circumstances. If water should come in contact with the gelatin at the edges of the filter, it will cause it to swell and separate the glasses so that air can enter between the gelatin and the glass. Even if the swelling does not cause air to enter in this manner, the filter might be strained and its optical surface changed.

Filters are cleaned when packed for distribution. With reasonable care, they can be used indefinitely. If, for any reason, a cemented filter becomes so dirty that it cannot be cleaned by simply rubbing after breathing on it, a piece of soft cloth or KODAK Lens Cleaning Paper moistened with KODAK Lens Cleaner (which should not be permitted to touch the cemented edges of the filter) can be employed for the purpose of cleaning the glass surfaces. Before attempting to clean a filter, it is well to make sure that the surfaces of the glass and the tissue or cloth are free from grit which might scratch the glass.

It is difficult to classify the stability of either gelatin film filters or those cemented in glass when subjected to high temperatures. We recommend that WRATTEN filters should not be subjected to temperatures higher than 120 to 130 F, and then for only relatively short periods. The factors of time, temperature, and humidity are quite closely related in their effect on filter stability. Since individual dyes respond quite differently when exposed under identical conditions, some WRATTEN filters undoubtedly will retain their absorption characteristics at temperatures above 130 F, but others will not. For this reason, precautionary measures should be taken, if possible, to avoid subjecting WRATTEN filters to high temperatures. See statement about "Filter Stability" on page 22.

When used under tropical conditions, filters should be treated with utmost care. They should be cleaned frequently, as described above, to prevent damage from fungus. Dry, cool storage conditions are desirable; a desiccated, hermetically sealed container is usually satisfactory.

FILTERS FOR BLACK-AND-WHITE PHOTOGRAPHY

No. 6, 8, 11, 13, 15, 25, 29, 47B, 58. For description and uses, see page 18.

Filters for Photomechanical Work

WRATTEN gelatin filters, especially selected for uniform thickness, are available for critical photomechanical work. These filters are designated "KODAK WRATTEN Photomechanical Filters" and are particularly useful in cases where partial exposures are to be made through each of several filters. The KODAK WRATTEN Photomechanical Filters are PM8, PM23A, PM25, PM29, PM33, PM47, PM47B, PM58, PM61, PM85B, and PM96.

FILTERS FOR COLOR PHOTOGRAPHY

Filters for Exposing KODAK Color Films

No. 1A, 80A, 80B, 80C, 80D, 85, 85B, 85C, 85N3, 85N6. For description and uses, see page 18.

KODAK Color Compensating Filters

Peak Density	Yellow (Absorbs Blue)	Exposure Increase in Stops*	Magenta (Absorbs Green)	Exposure Increase in Stops*	Cyan (Absorbs Red)	Exposure Increase in Stops*
.025	CC 025Y	—	CC 025M	—	CC 025C	—
.05	CC 05Y	—	CC 05M	1/3	CC 05C	1/3
.10	CC 10Y	1/3	CC 10M	1/3	CC 10C	1/3
.20	CC 20Y	1/3	CC 20M	1/3	CC 20C	1/3
.30	CC 30Y	1/3	CC 30M	2/3	CC 30C	2/3
.40	CC 40Y	1/3	CC 40M	2/3	CC 40C	2/3
.50	CC 50Y	2/3	CC 50M	2/3	CC 50C	1
Peak Density	**Red (Absorbs Blue and Green)**	**Exposure Increase in Stops***	**Green (Absorbs Blue and Red)**	**Exposure Increase in Stops***	**Blue (Absorbs Red and Green)**	**Exposure Increase in Stops***
.025	CC 025R	—	—	—	—	—
.05	CC 05R	1/3	CC 05G	1/3	CC 05B	1/3
.10	CC 10R	1/3	CC 10G	1/3	CC 10B	1/3
.20	CC 20R	1/3	CC 20G	1/3	CC 20B	2/3
.30	CC 30R	2/3	CC 30G	2/3	CC 30B	2/3
.40	CC 40R	2/3	CC 40G	2/3	CC 40B	1
.50	CC 50R	1	CC 50G	1	CC 50B	1 1/3

*These values are approximate. For critical work, they should be checked by practical test, especially if more than one filter is used.

KODAK CC Filters can be used singly, or in combination, to introduce almost any desired correction in various phases of color photography. If several filters are used together over a lens, definition may be affected adversely by (1) scattering of the light, (2) combined errors of several glass surfaces. It is best to use the minimum number of filters which will produce the desired correction.

The term "peak density" in the table on page 5 is the density measured at the wavelength of maximum absorption. The density-values do not include the density of the gelatin in which the filter dye is coated or the density of the glass in which a filter may be mounted.

Color Printing Filters

The acetate-film KODAK Color Printing (CP) Filters are recommended for use in enlargers which provide a convenient means for placing the filter pack between the light source and the negative. These filters are less expensive than gelatin-film filters, but they cannot be used in the path of image-forming light without affecting print definition. The CP filters are supplied in cyan, magenta, red, and yellow, and in density values of 0.05, 0.10, 0.20, and 0.40. There is also a No. CP2B to absorb ultraviolet radiation. All are available in 5-, 6-, 8-, and 12-inch squares and in an 8 by 10-inch size.

Cyan	*Magenta*	*Red*	*Yellow*
CP05C	CP05M	CP05R	CP05Y
CP10C	CP10M	CP10R	CP10Y
CP20C	CP20M	CP20R	CP20Y
CP40C	CP40M	CP40R	CP40Y

CP2B (Equivalent to KODAK WRATTEN No. 2B)

The CP filters are not supplied in green or blue, because the number of filters above the negative is not important. Hence, these colors can be obtained by using the proper combinations of cyan, magenta, and yellow filters.

Filters for Three-Color Separation

Direct Color Separation: No. 25 (Red), No. 58 (Green), No. 47B (Blue)

Color Transparencies: No. 29 (Red), No. 61 (Green), No. 47B (Blue)

When used for projected color-separation work, filters should be used in the gelatin form, not cemented. Small variations in thickness or parallelism of cemented filters may throw the projected image out of register.

For details, write to the Special Sensitized Products Sales Division, Eastman Kodak Company, Rochester, N. Y. 14650.

Filters for additive projection and other special purposes are described in the list on page 18.

Three-Filter Densitometry of Color Films and Papers

No. 92 (Red), No. 93 (Green), No. 94 (Blue)

Since all three filters transmit in the infrared, a physical densitometer using these filters should be equipped with an infrared rejecting filter, such as a dichroic interference filter which transmits in the visible and reflects much of the near infrared. Such a filter will restrict measurements to the red, green, and blue regions.

COLOR-TEMPERATURE CORRECTION

Color films are usually designed for use with a specific type of illuminant. Ideally, the specific illuminant should be used; but, when this is not practical, a conversion filter can be placed over the camera lens to adjust the color quality of the illuminant to that for which the film was designed.

The color quality of some illuminants can be expressed in terms of "color temperature"—a measure which defines the color of a light source by reference to the visual appearance of the light radiated by an ideal radiator, that is, a black body heated to incandescence. When the color of the illuminant is the same, or very nearly the same, as that of the ideal radiator at a given temperature, this temperature is defined as the color temperature and is expressed in degrees Kelvin (K).

The following table shows the approximate color temperatures of various standard and practical light sources.

Standards of Luminous Intensity and Their Color Temperatures

Source	*Color Temperature (in K)*
Standard British candle	1930
Hefner	1880
Harcourt pentane	1920
Acetylene	2415
Incandescent carbon (4 watts/candle)	2080
Incandescent tungsten (1.25 watts/candle)	2400
Freezing point of platinum	2042

Practical Sources of Illumination and Their Color Temperatures

Source	*Color Temperature (in K)*
Sunlight (mean noon)	5400
Skylight	12000 to 18000
Photographic Daylight*	5500
Crater of carbon arc (ordinary hard-cored)	4000
White-flame carbon arc	5000
High-intensity carbon arc (sun arc)	5500
Clear foil-filled flash	3800
500-watt (photoflood) approx 34.0 lumens/watt	3400
500-watt (3200 K photographic) approx 27.0 lumens/watt	3200
200-watt (general service) approx 20.0 lumens/watt	2980
100-watt (general service) approx 17.5 lumens/watt	2900
75-watt (general service) approx 15.4 lumens/watt	2820
40-watt (general service) approx 11.8 lumens/watt	2650

*Condition of daylight which best represents that encountered in typical photographic situations.

Each color temperature can have assigned to it a "mired" (*mi*cro-*re*ciprocal *de*grees) value. Mired value $= \dfrac{1{,}000{,}000}{\text{color temperature in degrees Kelvin}}$. Kodak Wratten Photometric Filters and Kodak Light Balancing Filters have the power to shift the color temperature, and hence the mired value, of any one light source by a definite amount. Each filter can therefore be given a "mired shift value," represented by the expression $\left[\dfrac{10^6}{T_2} - \dfrac{10^6}{T_1}\right]$ when T_1 represents the color temperature of the original light source, and T_2 the color temperature of the light through the filter. This value will be either positive or negative, depending on the color of the filter. Yellowish filters, which lower the color temperature and therefore increase the mired value, will have a positive mired shift value; those in the bluish series, which raise the color temperature and therefore reduce the mired value, will have a negative mired shift value.

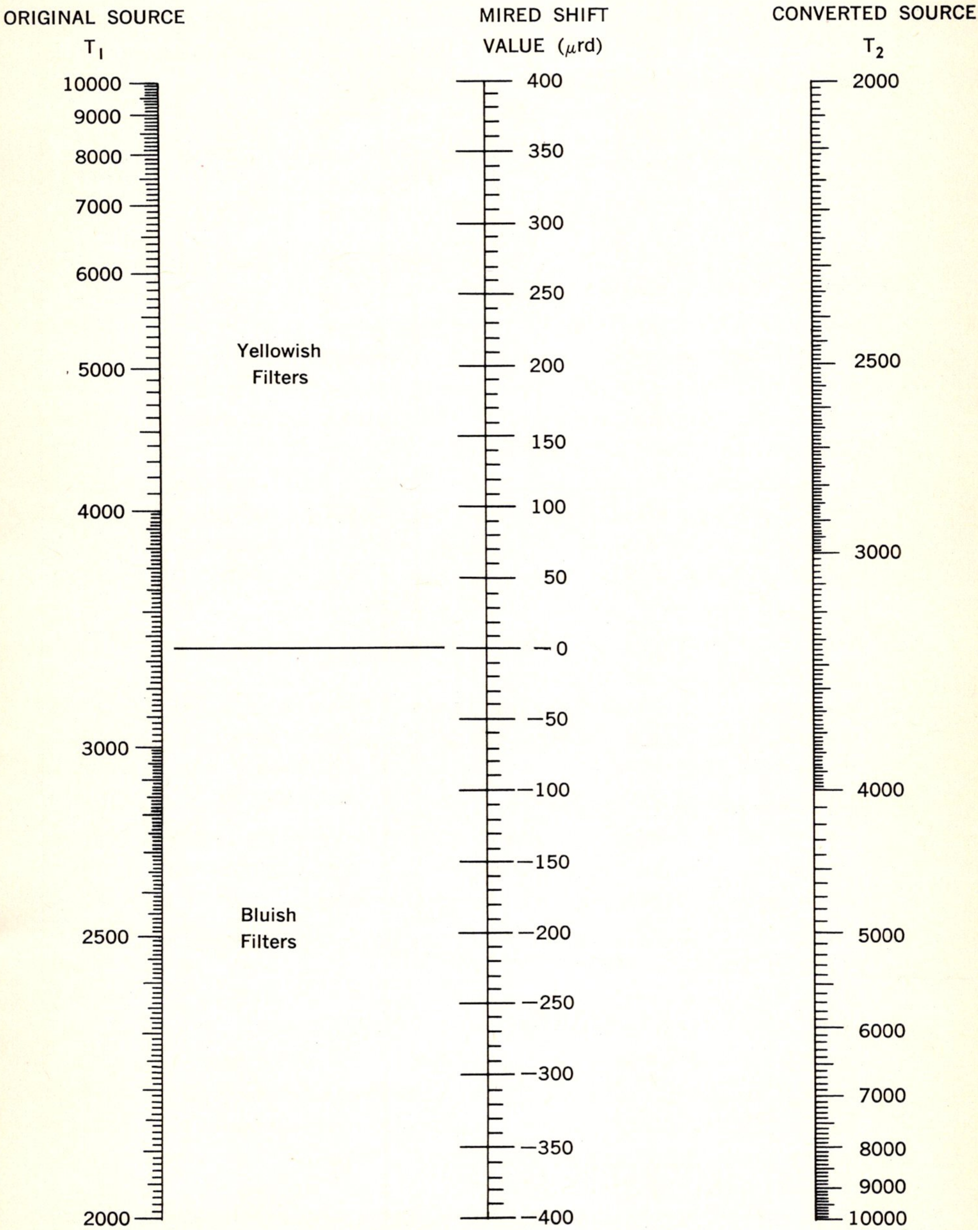
The nomograph on page 9 is designed to simplify the problem of selecting the proper conversion filter. The original light source, T_1, is listed in the left column and covers the practical range of color temperatures from 2,000 to 10,000 K. The right-hand column lists the color temperature of the light through the filter—that is, the converted source, T_2. The center column shows the scale of mired shift values. To find the mired shift value and consequently the filter required for a particular conversion, it is only necessary to place a straightedge on the points corresponding to the color temperature of the available source, T_1, and the color temperature of the desired source, T_2, respectively. The straightedge crosses the center column and indicates the mired shift value of the required filter. It is clear that the zero point on this column indicates that no filter is required and that mired shift values above the zero point (+) require yellowish filters and those below the zero point (—) require bluish filters.

The mired shift values of Wratten filters which may be used for color-temperature conversion are listed in the following tables: page 10, Kodak Light Balancing Filters, and page 11, Kodak Wratten Photometric Filters.

Filters can be combined, the desired combination being calculated by adding the mired shift values of the filters, with due regard to the sign. If more than one filter is used, it should be remembered that the reflection loss due to the multiple surfaces may become considerable. This, however, can be partly eliminated by cementing the filters together in pairs.

It should be noted that the color-temperature specification for the color quality of a light source is adequate only for those sources whose spectral-radiation characteristics are not markedly different from those of the ideal thermal radiator.

MIRED NOMOGRAPH FOR LIGHT SOURCE CONVERSION



KODAK Light Balancing Filters

These filters enable the photographer to adjust the color quality of the illumination in order to obtain cooler (bluer) or warmer (yellower) color rendering.

Filter Color	WRATTEN Number	Exposure Increase in Stops*	To obtain 3200 K from:	To obtain 3400 K from:	Mired Shift Value
Bluish	82C + 82C	1⅓	2490 K	2610 K	−89
	82C + 82B	1⅓	2570 K	2700 K	−77
	82C + 82A	1	2650 K	2780 K	−62
	82C + 82	1	2720 K	2870 K	−55
	82C	⅔	2800 K	2950 K	−45
	82B	⅔	2900 K	3060 K	−32
	82A	⅓	3000 K	3180 K	−18
	82	⅓	3100 K	3290 K	−10
	No Filter Necessary		3200 K	3400 K	—
Yellowish	81	⅓	3300 K	3510 K	10
	81A	⅓	3400 K	3630 K	18
	81B	⅓	3500 K	3740 K	27
	81C	⅓	3600 K	3850 K	35
	81D	⅔	3700 K	3970 K	42
	81EF	⅔	3850 K	4140 K	53
Bluish	80A	2⅓	3200 to 5500		−131
	80B	2	3400 to 5500		−112
	80C	1	3800 to 5500		−81
	80D	1	4200 to 5500		−56
Yellowish	85C	⅓	5500 to 3800		81
	85	⅔	5500 to 3400		112
	85B	⅔	5500 to 3200		131

*These values are approximate. For critical work, they should be checked by practical test, especially if more than one filter is used.

COMPLEMENTARY FILTERS

No. 44A . . . . Minus Red
No. 32 . . . . Minus Green
No. 12 . . . . Minus Blue

WRATTEN PHOTOMETRIC FILTERS

When light sources of different colors are compared on the visual photometer, the color difference introduces difficulty in making an accurate balance. This difficulty can be eliminated, or at least lessened considerably,

THE NO. 78 SERIES			THE NO. 86 SERIES		
Filter No.	Description	Mired Shift Value	Filter No.	Description	Mired Shift Value
78	2360 K to 5500 K	−242	86	5500 K to 2360 K	242
78AA	2360 K to 4400 K	−196	86A	3200 K to 2360 K	111
78A	2360 K to 3200 K	−111	86B	2800 K to 2360 K	67
78B	2360 K to 2800 K	−67	86C	2500 K to 2360 K	24
78C	2360 K to 2500 K	−24	Dummy	For Setting 0°	
Note: See page 7 for color temperatures of practical light sources.					

if a selectively absorbing filter is placed on one side of the photometer head so that the difference in color between the two parts of the photometric field is eliminated, or reduced to such an extent that it no longer interferes with the precise judgment of brightness equality.

The transmittance of the selectively absorbing filter for light of the spectral quality which is incident upon it in the photometer must, of course, be determined. This calibration can be made by taking a sufficiently large number of observations to obtain the desired precision.

These filters are designed primarily for visual use with a photometer to reduce color differences between illuminants operating at different color temperatures. The No. 78 series consists of bluish filters designed, in general, to be placed on the standard-lamp side of the photometer or illuminometer to raise the color temperature from the first to the second value shown. The No. 86 series is yellowish and is designed to be placed on the test or comparison side of the photometric instrument to lower the color temperature from the first to the second value.

WRATTEN photometric filters are designed for the elimination of these disturbing color differences in all types of photometric work. In present-day photometric practice, the standard of luminous intensity is almost invariably an electric incandescent lamp standardized for candle power. In order that this standard will have a satisfactory, long life, it is necessary that it be operated at a relatively low filament temperature. This means that the light emitted by such standards is usually much "yellower" than the illumination which is to be measured, which may come from commercial tungsten incandescent lamps operating at much higher temperatures, arc lamps of various kinds, or from natural sources, such as the sun or sky.

In the table above, the color difference, which can be compensated for by the various photometric filters, is shown in terms of color-temperature differences. Since some standard lamps operate at a color temperature of approximately 2360 K, this value has been taken as the basis in showing the color difference for which each member of the photometric group will compensate.

It should be emphasized that the photometric filters are designed primarily for visual use to reduce the color differences between illuminants operating at different color temperatures. As a matter of fact, color temperature is a purely psychophysical term and is meaningless in any other than a visual sense.

Note: These filters are subject to the limitations of commercial production, even though the tolerances have been reduced to the minimum practical values; if they are to be used under circumstances where high precision is required, they should be calibrated individually.

FILTERS FOR USE WITH MERCURY-VAPOR LAMPS

WRATTEN Filter No.	*Principal Lines Transmitted*	*WRATTEN Filter No.*	*Principal Lines Transmitted*
22	577 and 578 mμ	77*	546 mμ (70%)
50	436 mμ	77A*	546 mμ (55%)
74	546 mμ	18A	310 to 390 mμ

*Filters No. 77 and 77A are available only as cemented glass filters.

The great intensity and wide separation of the mercury-vapor-lamp lines make the lamp well suited to use as a monochromatic light source. The No. 22 transmits the yellow lines, 577 and 578 mμ, and all longer wavelengths; the No. 50 transmits the 436-mμ violet line and, to a lesser extent, the 408-, 405-, and 398-mμ lines. On account of its great intensity, the line of wavelength 436 mμ completely overpowers the other lines. The No. 74 transmits about 10 percent of the green 546-mμ line and 0.2 percent of the yellow lines, 577 and 578 mμ.

For the transmission of the green line of the mercury-vapor lamp, two cemented filters, No. 77 and No. 77A, are available. No. 77 has an absorption band which almost completely absorbs the yellow lines. It transmits 74 percent of the green line and about 0.5 percent of the yellow line, an amount negligible for most purposes. Filter No. 77A transmits 68 percent of the green line and a negligible percent of the yellow lines. Where the red lines of the quartz lamp are objectionable and must be eliminated, Filter No. 58 should be superimposed on either the No. 77 or No. 77A.

For the isolation of the mercury line at 365 mμ, in the ultraviolet, filter No. 18A is suggested. This filter transmits approximately 60 percent of the 365-mμ line, and, when it is used with a light source giving a continuous spectrum, it affords a means of obtaining ultraviolet radiation of a fairly narrow band having its maximum at 360 mμ.

FILTERS FOR MICROSCOPY

These filters can be used singly or in pairs. By using them in pairs, the spectrum can be divided into approximately monochromatic portions.

Number	*Visual Color*	*Spectral Transmission*
25	Red	From 590 mμ into the infrared.
58	Green	From 480 mμ to 620 mμ.
47	Blue	From 370 mμ to 510 mμ.
35	Purple	From 320 mμ to 470 mμ and from 650 mμ into infrared.
22	Yellow-Orange	From 550 mμ into the infrared.
29	Deep Red	From 610 mμ into the infrared.
15	Deep Yellow	From 510 mμ into the infrared.
45	Blue	From 430 mμ to 540 mμ.
11	Yellowish-Green	For correct tone reproduction with tungsten light.

WRATTEN Visual M Filters

Number	*Color*	*Use*
78AA	Blue	A photometric filter which can be used to convert the color quality of light from incandescent tungsten lamps of the common type to that which is approximately visually equivalent to daylight. Often employed for viewing colored specimens with their commonly accepted standard daylight appearance.
38A	Blue	A filter for increasing the apparent contrast in faintly stained yellow or orange preparations. Helps in the resolution of fine detail.
45A	Blue-Green	Especially useful when the highest resolving power visually possible is required, as in the study of diatom structure. It has no red transmission and its dominant wavelength range is 470-480 mμ.
66	Light Green	A contrast filter for use with pink- and red-stained preparations. Preferred by some workers for general use in place of No. 78AA.
58	Green	A contrast filter for use with faintly stained pink or red preparations.
15 22	Deep Yellow Yellow-Orange	For increasing the contrast in blue preparations and for helping in the observation of detail in insect mounts by reducing the contrast between the preparation and the background.
25	Red	Contrast filter for use with preparations stained with Methylene Blue, Methyl Green, etc.
96	Neutral	A filter for reducing the intensity of the illumination. The density supplied (1.0) transmits ten percent of the incident light.

NARROW-BAND FILTERS

No. 70, 72B, 73, 74, 75, 76.

These filters isolate relatively narrow bands of the spectrum. With the exception of WRATTEN Filter No. 76, all are available as gelatin film filters or as cemented filters in "B" glass. The No. 76 filter is a compound filter and is available as a cemented-glass filter only.

Narrow-Band Viewing Filter No. 90

This filter, No. 90, of a pure yellow color, transmits a narrow region of the spectrum. Although it is possible to distinguish between a red and a green viewed through this filter, the difference between the colors is so dulled that they no longer materially affect judgment as to their relative luminosity.

NEUTRAL DENSITY FILTERS AND WEDGES

Neutral density filters and wedges are of use in many branches of optical work since they permit the reduction of light intensity in a known and definite manner. Those now made by the Eastman Kodak Company are for the visual region. The neutral density filters and wedges are made to have certain definite values of optical density which are measured as diffuse density upon approved types of photometers.

Experience has shown that the transmission of a neutral density filter may vary as much as 3 percent, depending on the optical system with which it is used. These variations are caused by interreflections and by scattering of the light. The KODAK WRATTEN Neutral Density Filter, No. 96, is supplied within an accuracy of ± 5 percent of the stated diffuse optical-density value for sizes less than 3 inches square (± 10 percent on 3-inch square or larger sizes). It is recommended for special work that such filters be calibrated by direct measurement under the conditions of use.

The Neutral Density Filter, No. 96, is supplied as gelatin film in thirteen standard densities and as a No. 0 plain gelatin filter (see table, page 15). It will be furnished in "B" glass only, on special order.

Special calibrated filters can be furnished on order. Requests for quotations on such filters should be accompanied by complete statements of size and precision required.

A neutral density filter (solid glass) for camera use is supplied in sizes for use with the KODAK Combination Lens Attachments. It is termed KODAK ND-3. The density of this filter is 0.90. The ND-3 filter reduces exposure by three lens stops.

Wedges are listed with or without calibration; calibrated wedges can be supplied with a balancing wedge which should be ordered at the same

STANDARD NEUTRAL DENSITIES			
Density	Percent Transmittance	Density	Percent Transmittance
Dummy*	90.0	0.70	20.0
0.10	80.0	0.80	16.0
0.20	63.0	0.90	13.0
0.30	50.0	1.00	10.0
0.40	40.0	2.00	1.0
0.50	32.0	3.00	0.10
0.60	25.0	4.00	0.010

*Undyed gelatin.

time as the wedge. Balancing wedges, which can be supplied to fit any wedge, are short wedges designed to give a uniform intensity across the field of view in any instrument in which the working wedge is employed. The balancing wedge is fixed with regard to the instrument. This wedge is identical with the lightest portion of the working wedge, and its wedging direction is opposite to that of the working wedge.

All wedges are supplied within an accuracy of $\pm$ 5 percent of the stated diffuse optical density at the dense end of the wedge. Calibrated wedges are supplied with the densities calibrated within an accuracy of $\pm$ 2 percent.

All wedges are larger than the size given, which is that of the darkened area. A margin of 2.54 cm of clear glass is left at the thick end of all wedges, 2.00 cm of clear glass at the thin end of large wedges, and 1 cm at the thin end of small wedges. Up to 2 mm wide clear area is maintained along both sides of standard wedges to insure edge seal and lengthen the life of wedges.

The absorption of filters and wedges may be defined in terms of their transmittance or of their density. The density is the logarithm of the reciprocal of the transmittance and may be expressed as follows:

$$\text{Density} = \log_{10} \frac{1}{\text{transmittance}}.$$

Sizes of Tinted Area of Neutral Density Wedges

10 x 1½ cm   15 x 2 cm   20 x 3 cm

Special Neutral Density Wedges can be made to order. Inquiries should be directed to the Special Sensitized Products Sales, Eastman Kodak Company, Rochester, N. Y. 14650.

SENSITIZING CLASSES AND TYPES

The negative materials supplied by the Eastman Kodak Company may be divided into classes and types for purposes of description and for convenience in the assignment of filter factors. Aside from certain special sensitizings, such as the infrared and those for scientific purposes, there are three general classes as follows:

Non-Color-Sensitized materials possess only the ultraviolet and blue-violet sensitivity inherent in any silver-halide emulsion.

Orthochromatic materials possess sensitivity to green, in addition to the ultraviolet and blue-violet.

Panchromatic materials are sensitive to red light as well as to the above colors. They thus respond to all visible colors and to ultraviolet. Panchromatic materials differ somewhat with respect to their relative sensitivities to blue, green, and red light.

The materials coming under these classes and types are described in other KODAK publications, such as the Data Book *Kodak Films in Rolls for Black-and-White Photography.* A wide range of plates sensitive to special regions of the spectrum is available for spectroscopic and astronomical work. Particulars are given in the booklets *Kodak Plates and Films for Science and Industry* and *Kodak Materials for Emission Spectrography.*

MULTIPLYING FACTORS OF FILTERS

Since a filter absorbs part of the light, its use in photography involves an increase in exposure corresponding to the proportion of effective light absorbed. The number of times by which the exposure must be increased for a given filter with a given material is called the multiplying factor of the filter or the filter factor, and this factor will depend both upon the photographic material and upon the light source used. A red filter, for instance, may require an increase in the exposure of thousands of times with a material having very little sensitivity to red, while with a very red-sensitive material the increase in exposure may be only three or four times. The same considerations apply to the use of different light sources. It is meaningless, therefore, to refer to filters as "two times" or "four times" filters.

The values in the tables and in the direction sheet included in each box of films or plates should be taken as approximate guides only. The factors apply strictly to the particular lighting conditions used in determining them in the laboratory. In practice, where the quality of light may be different, a slightly different factor may apply.

To determine the filter factor that applies to actual working conditions, choose a subject having a neutral-gray area, or place a KODAK Neutral

Test Card or a photographic gray scale in the scene. In photomicrography the illuminated field without a slide in place can be used. Make one exposure without a filter. Then, with the filter, make a series of exposures ranging by half-stops through a 2- to 4-stop range of greater exposure, depending on the filter. Match the density of the unfiltered shot to the comparable density of one of the filtered series either visually or with a densitometer. The filter factor can be figured from the difference in exposure between the two.

FILTER FACTORS FOR GENERAL CLASSES OF KODAK FILMS AND PLATES*

KODAK WRATTEN Filter Number	Color of Filter	Non-Color-Sensitized		Ortho-chromatic		Pan-chromatic	
		Sunl't	Tung.	Sunl't	Tung.	Sunl't	Tung.
3	Light Yellow	4	3	2	1.5	1.5	. . .
4	Yellow	8	5	2	1.5	1.5	1.5
6	K1—Light Yellow	4	3	2	1.5	1.5	1.5
8	K2—Yellow	12	10	2.5	2	2	1.5
9	K3—Deep Yellow	20	16	2.5	2	2	1.5
11	X1—Yellowish-Green	. . .	. . .	. . .	. . .	4	3
12	Yellow	. . .	. . .	3	2.5	2	1.5
13	X2—Dark Yellowish-Green	. . .	. . .	. . .	. . .	5	4
15	G—Deep Yellow	. . .	. . .	5	3	3	2
23A	Light Red	. . .	. . .	. . .	. . .	6	3
50	Very Dark Blue	. . .	. . .	. . .	. . .	20	40
25	A—Red	. . .	. . .	. . .	. . .	8	6
58	Green	. . .	. . .	8	5	8	8
47B	Blue	. . .	. . .	6	8	8	16
29	F—Deep Red	. . .	. . .	. . .	. . .	25	12
61	Green	. . .	. . .	. . .	. . .	12	12
47B	Blue	. . .	. . .	6	8	8	16
KODAK POLA-SCREEN	Gray	For darkened sky effects, use a factor of 2.5 (in addition to the exposure increase required for side lighting), or increase the exposure four times as compared to the exposure for the same subject with front lighting and without a KODAK POLA-SCREEN.					

*The filter factors for a specific film or plate may vary somewhat from this listing. See individual product instructions.

DESCRIPTIONS AND USES OF FILTERS

	Number	Description and Use
COLORLESS	0	For compensating thickness of other gelatin filters in optical systems
	1A	KODAK Skylight Filter—Reduces excess bluishness in outdoor color photographs in open shade under a clear, blue sky
YELLOWS	2A	Absorbs radiant energy below 405 mμ
	2B	Absorbs ultraviolet below 390 mμ
	2C	Absorbs ultraviolet below 385mμ
	2E	Absorbs radiant energy below 415 mμ
	3	Light yellow (Aero No. 1)
	3N5	No. 3 plus 0.5 neutral density
	4	Yellow—Approximate correction on panchromatic materials for outdoor scenes, including sky
	6	K1—Light yellow—Partial correction outdoors
	8	K2—Yellow—Full correction outdoors on Type B panchromatic materials. Widely used for proper sky, cloud, and foliage rendering
	8N5	No. 8 plus 0.5 neutral density
	9	K3—Deep yellow. Moderate contrast in outdoor photography (with black-and-white films)
	11	X1—Yellowish-green. Correction for tungsten light on Type B panchromatic materials; also for daylight correction with Type C panchromatic materials in making outdoor portraits, darkening skies, or lightening foliage
	12	Minus blue. Haze cutting in aerial photography
	13	X2—Dark yellowish-green. Correction for Type C panchromatic materials in tungsten light
	15	G—Deep yellow. Overcorrection in landscape photography. Contrast control in copying and in aerial infrared photography
	16	Blue absorption
	18A	Transmits ultraviolet and infrared only (glass)
ORANGES AND REDS	21	Blue and blue-green absorption
	22	Yellow-orange. For increasing contrast in blue preparations in microscopy. Mercury yellow
	23A	Light red. Two-color projection—contrast effects
	24	Red for two-color photography (daylight or tungsten). White-flame-arc tricolor projection
	25	A—Tricolor red for direct color separation. Contrast effects in commercial photography and in outdoor scenes. Two-color general viewing. Aerial infrared photography and haze cutting
	26	Stereo red
	29	F—Deep red. Red color separation from transparencies. Strong contrast effects. Copying blueprints. Tungsten tricolor projection
	92	Red. For densitometric measurement of color films and papers
MAGENTAS AND VIOLETS	30	Green absorption
	31	Green absorption
	32	Minus green
	33	Strong green absorption
	34	Violet
	34A	Blue separation
	35	Contrast in microscopy
	36	Dark violet

	Number	Description and Use
BLUES AND BLUE-GREENS	38	Red absorption
	38A	Red absorption. Increasing contrast in visual microscopy
	39	Contrast control in printing motion-picture duplicates (glass)
	40	Green for two-color photography (tungsten)
	44	Minus red—Two-color general viewing
	44A	Minus red
	45	Contrast in microscopy
	45A	Blue-green. Highest resolving power in visual microscopy
	46	Blue projection (experimental)
	47	C5—Tricolor blue for direct color separation and from KODAK EKTACOLOR Film for Dye Transfer. Contrast effects in commercial photography. Tungsten and white-flame-arc tricolor projection
	47A	Light blue. Used for medical photography
	47B	Tricolor blue for direct color separation, separation from transparencies and from KODAK EKTACOLOR Film for graphic arts
	48	Green and red absorption
	48A	Green and red absorption
	49	C4—Dark blue
	49B	Dark blue
	50	Very dark blue. Mercury violet
	94	Blue. For densitometric measurement of color films and papers
	98	Blue. For use with KODAK EKTACOLOR Paper—equivalent to a No. 47B plus a 2B filter
GREENS	52	Light green
	53	Medium green
	54	Very dark green
	55	Stereo green
	56	Very light green
	57	Green for two-color photography (daylight)
	57A	Light green
	58	B—Tricolor green for direct color separation. Contrast effects in commercial photography and microscopy
	59	Green for tricolor projection (white-flame-arc)
	59A	Very light green
	60	Green for two-color photography (tungsten)
	61	N—Green color separation from transparencies and KODAK EKTACOLOR Film. Tricolor projection (tungsten)
	64	Red absorption (light)
	65	Red absorption
	65A	Red absorption
	66	Light green. Contrast effects in microscopy and medical photography
	93	Green. For densitometric measurement of color films and papers
	99	Green. For use with KODAK EKTACOLOR Paper—equivalent to a No. 61 plus a No. 16 filter
NARROW-BAND	70	Dark red. For use with KODAK EKTACOLOR Paper and color separation from KODAK EKTACOLOR Film (with tungsten)
	72B	Dark orange-yellow
	73	Dark yellow-green
	74	Dark green. Mercury green
	75	Dark blue-green
	76	Dark violet (compound filter)
	77	Transmits 546 mμ mercury line (glass plus gelatin)
	77A	Transmits 546 mμ mercury line (glass plus gelatin)

	Number	Description and Use
PHOTOMETRICS	78	Bluish. Photometric filter (visual)
	78AA	Bluish. Photometric filter (visual)
	78A	Bluish. Photometric filter (visual)
	78B	Bluish. Photometric filter (visual)
	78C	Bluish. Photometric filter (visual)
	86	Yellowish. Photometric filter (visual)
	86A	Yellowish. Photometric filter (visual)
	86B	Yellowish. Photometric filter (visual)
	86C	Yellowish. Photometric filter (visual)
LIGHT BALANCING	80A	Blue. KODAK 3200 K filter for KODAK Daylight Type Color Films
	80B	Blue. KODAK Photoflood Filter for KODAK Daylight Type Color Films
	80C	Blue. KODAK Photoflash Filter for KODAK Daylight Type Color Films and clear flashbulbs
	80D	Blue. KODAK Photoflash Filter for Daylight Type Color Films and AG-1 (clear) flashbulbs
	81	Yellowish. For warmer color rendering
	81A	Yellowish. For KODAK Type B Color Films with photoflood lamps
	81B	Yellowish. For warmer color rendering
	81C	Yellowish. For KODAK Type A and Type B Color Films with clear flashbulbs
	81D	Yellowish
	81EF	Yellowish
	82	Bluish. For cooler color rendering
	82A	Bluish. For KODACHROME II Film, Type A, with 3200 K lamps
	82B	Bluish. For cooler color rendering
	82C	Bluish. For cooler color rendering
	85	Orange. KODAK Daylight Filter for KODAK Type A Color Films
	85B	Orange. KODAK Daylight Filter for KODAK Type B Color Films
	85C	Light orange. KODAK Daylight Filter for KODAK Type F Color Films
	85N3	For daylight exposure of EASTMAN Color Negative Film at relatively large apertures
	85N6	For daylight exposure of EASTMAN Color Negative Film at relatively large apertures
MISCELLANEOUS	79	Photographic sensitometry. Corrects 2360 K to 5500 K
	87	For infrared photography. Absorbs visual
	87A	Absorbs visual and near infrared, transmits infrared
	87B	Absorbs visual and near infrared, transmits infrared
	87C	Absorbs visual, transmits infrared
	88A	For infrared photography. Absorbs visual
	89B	For infrared photography
	90	Monochromatic Viewing Filter
	96	Neutral filters for controlling luminance
	97	Dichroic absorption
	102	Conversion filter for Barrier-layer photocell (to luminosity)
	106	Conversion filter for S-4 type photocell (to luminosity)

Spectrophotometric Absorption Curves

The absorption curves on pages 24 through 75 show density plotted against wavelength. Wavelengths are expressed in terms of millimicrons ($m\mu$), one $m\mu$ being equal to 0.000001 millimeter. Density is the common logarithm of 1/transmittance. A density of 1 corresponds to a transmittance of

10 percent, a density of 2 to a transmittance of 1 percent, and a density of 3 to a transmittance of 0.1 percent. See table on pages 76 and 77.

The curve of Filter No. 58 on page 43 shows a density of a little less than 0.3 at wavelength 520 mμ. This indicates a transmittance of a little more than half the incident light. This is confirmed by the table of transmittances on the same page. The transmittance at 520 mμ is 52.5 percent. At wavelengths of 494 and 579 mμ, the curve shows a density of 1, indicating a transmittance of 10 percent of the light at this point. Similarly, the transmittance drops to approximately 1 percent at wavelengths 478 and 604 mμ. Thus, from these curves the transmittance at any point can be seen, while the general shape of the curve gives a very good idea of the transmittance at a glance.

Where the spectra extend into the ultraviolet, the absorption has been determined either photographically or photoelectrically in a quartz spectrophotometer. Transmission in the ultraviolet at wavelengths less than 330 mμ will be eliminated in the case of cemented filters, as glass absorbs ultraviolet radiation of wavelengths shorter than about 330 mμ. This is shown in the first absorption curve (page 23).

Nearly all dyed gelatin film filters transmit freely in the infrared.

The absorption curves and transmittance data are given as representing standard unmounted samples of KODAK WRATTEN Filters. They are intended only for the information of users in choosing filters which will meet their requirements. Values read from the curves or taken from the tables of data should not be used by research workers as representing precisely the absorption characteristics of a particular filter. If such precise data are needed, they should be determined for the particular filter being used. If facilities are available, this can be done by the user of the filter. The Eastman Kodak Company will be pleased to quote prices on calibrated filters, or such calibrations can be obtained from commercial or national standardizing laboratories.

Colorimetric Specifications

In addition to spectral transmittance data at wavelength intervals of 10 mμ, the tables give dominant wavelength in millimicrons, percentage of excitation purity, percentage of luminous transmittance, and the colorimetric coordinates x and y, for both the standard source A (incandescent tungsten, 2854 K) and the standard source C (artificial daylight). Chromaticity diagrams showing the plots of the colorimetric coordinates are also included (see pages 60 through 63).

Values of wavelength followed by c indicate the complementary wavelengths of purple filters which do not have a dominant wavelength. In the case of the extreme red and near infrared filters No. 18A, 87, 88A, and 89B, dominant wavelength is indeterminate (because all wavelengths greater than 700 mμ are coincident at x = 0.7347, y = 0.2653). For these filters, the wavelength centroid, weighted according to luminosity, is given in place of dominant wavelength.

All of these colorimetric specifications are based on the 1931 CIE standard colorimetric and luminosity data. (Reference: *The Science of Color,* OSA Committee on Colorimetry, T. Y. Crowell, N. Y., 1953). The tabulated values were determined from the tabulated spectral transmittance data. Their accuracy and applicability to particular samples are subject to the limitations stated for the spectral transmittance data.

Filter Stability

For purposes of filter manufacture, it is necessary both to select a standard and to establish limits within which a filter coating will be acceptable for use. These limits, as well as the standard, are represented by material samples and also by spectrophotometric data taken from the actual samples. After the limits have been established, the physical data—the spectral-transmittance curves—become the permanent records of the characteristics of any given filter. In general, these curves represent a ± 5 percent variation in total transmittance from the standard.

The stability of a filter is arbitrarily related to the manufacturing tolerances. In establishing the stability classifications, each filter is exposed to a selected light source for a specific time interval. The extent of change is then expressed as a fraction or multiple of the difference between the light and dark limits that define acceptability in the spectral region from 400 mμ to 700 mμ.

Class A—Stable. The filter shows a change no greater than one-half the difference between the limits.

Class B—Relatively Stable. The filter shows a change which may be equal to but not greater than the difference between the limits.

Class C—Somewhat Unstable. The filter shows a change greater than the difference between the limits, but not more than twice this difference.

Class D—Unstable. The filter shows a change greater than twice the difference between the limits.

The filter-stability classification is shown under each spectrophotometric curve. The classification letters are given in the order of the following stability-tests:

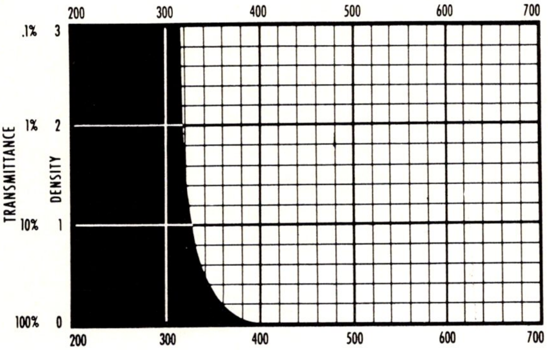
1. Two weeks' exposure to daylight in a south window.
2. Twenty-four hours' exposure to a "Fade-Ometer."
3. Two weeks' exposure at two feet from a 1000-watt tungsten lamp.

Example of Stability Rating: ABA means that the filter was stable to the daylight test, relatively stable to the Fade-Ometer test, and stable to the tungsten-lamp test.

Notice: The dyes used in filters, like other dyes, may, in time, change. Filters will therefore not be replaced or otherwise warranted against any change in transmittance.

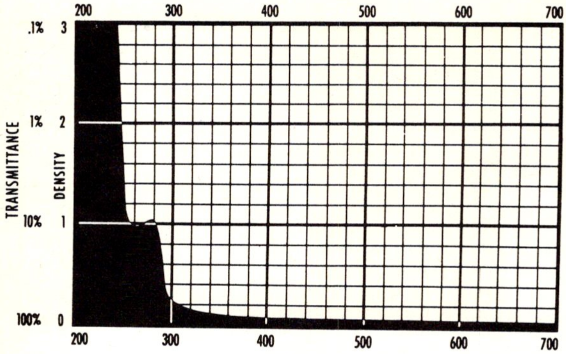
Thickness of WRATTEN Filters

KODAK WRATTEN Gelatin Filter film has a thickness of 0.1 mm plus or minus 0.01 mm. Because of its uniform thickness, the gelatin filter is desirable for precise work that can tolerate little effect on definition and no increase in length of the optical path. KODAK WRATTEN Filters cemented in "B" glass squares and circles are approximately 4.7 mm in thickness. The KODAK WRATTEN Filters in series sizes for use with KODAK Combination Lens Attachments are also cemented in "B" glass and vary in thickness according to the diameter or series designation. They range in thickness from 2.7 mm (Series IV) to 4.7 mm (Series IX).



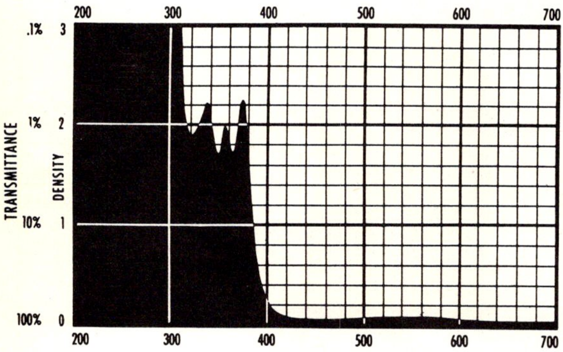
Wavelength λ (millimicrons)
Two pieces of "B" Glass cemented

0



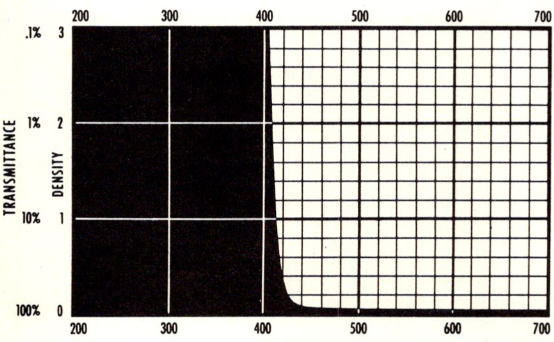
Stability: AAA

1A
(Skylight Filter)



Stability: ACA

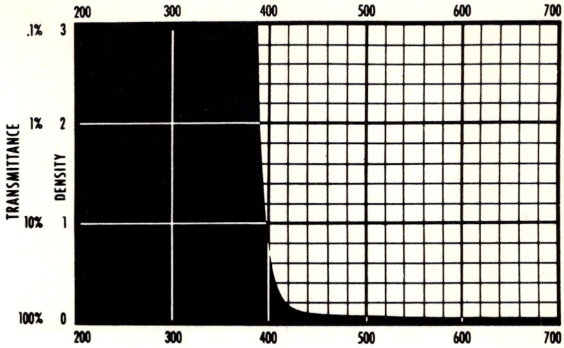
2A



Stability: AAA

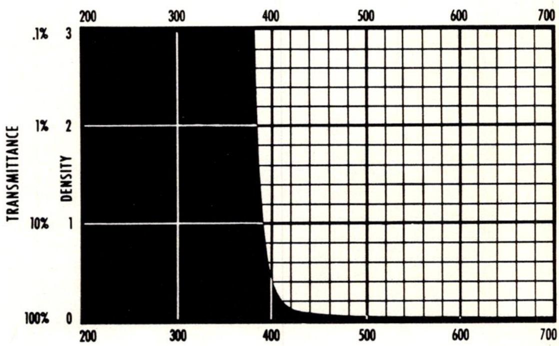
WAVE LENGTH		PERCENT TRANSMITTANCE No. 0	No. 1A	No. 2A
400		88.0	59.0	—
10		88.5	76.0	4.0
20		88.9	82.0	42.0
30		89.3	84.6	74.0
40		89.6	86.0	82.7
50		89.8	86.8	85.6
60		89.9	87.2	87.0
70		90.1	87.5	88.1
80		90.3	87.3	88.8
90		90.4	86.8	89.4
500		90.5	86.3	89.7
10		90.6	85.5	90.0
20		90.7	84.8	90.2
30		90.7	84.3	90.3
40		90.8	84.0	90.4
50		90.8	83.9	90.5
60		90.9	84.1	90.6
70		90.9	84.8	90.6
80		90.9	86.0	90.7
90		91.0	87.4	90.7
600		91.0	88.5	90.8
10		91.0	89.5	90.8
20		91.0	90.2	90.9
30		91.0	90.6	90.9
40		91.1	90.8	90.9
50		91.1	91.0	91.0
60		91.1	91.1	91.0
70		91.1	91.1	91.0
80		91.1	91.1	91.1
90		91.1	91.1	91.1
700		91.1	91.1	91.1
Dominant Wave Lgth.	(A)	578.5	507.5c	579.5
Excitation Purity	(A)	1.5	2.0	7.0
% Luminous Transmit.	(A)	90.9	86.5	90.5
x_A		0.4484	0.4524	0.4519
y_A		0.4080	0.4042	0.4131
Dominant Wave Lgth.	(C)	573.5	497.6c	568.6
Excitation Purity	(C)	0.7	1.2	6.0
% Luminous Transmit.	(C)	90.8	85.9	90.3
x_C		0.3112	0.3132	0.3177
y_C		0.3177	0.3147	0.3310

WAVE LENGTH	PERCENT TRANSMITTANCE No. 2B	No. 2C	No. 2E
400	19.0	38.0	—
10	48.0	60.5	—
20	67.0	74.2	8.7
30	75.3	79.8	51.1
40	80.0	83.1	75.8
50	83.0	85.1	82.2
60	85.2	86.5	84.8
70	86.7	87.8	86.4
80	88.1	88.5	87.6
90	88.8	89.2	88.4
500	89.5	89.8	89.0
10	89.9	90.0	89.4
20	90.3	90.2	89.7
30	90.5	90.4	89.9
40	90.6	90.5	90.1
50	90.7	90.6	90.2
60	90.8	90.7	90.4
70	90.9	90.8	90.5
80	90.9	90.9	90.6
90	91.0	91.0	90.6
600	91.1	91.1	90.7
10	91.2	91.2	90.8
20	91.3	91.3	90.9
30	91.3	91.4	90.9
40	91.4	91.5	91.0
50	91.4	91.5	91.0
60	91.5	91.6	91.1
70	91.5	91.6	91.2
80	91.6	91.7	91.3
90	91.7	91.7	91.4
700	91.8	91.7	91.4
Dominant Wave Lgth. (A)	581.0	581.0	580.2
Excitation Purity (A)	7.0	5.0	12.0
% Luminous Transmit. (A)	90.8	90.8	90.3
x_A	0.4526	0.4512	0.4557
y_A	0.4126	0.4113	0.4169
Dominant Wave Lgth. (C)	569.8	570.2	569.0
Excitation Purity (C)	5.6	4.1	10.7
% Luminous Transmit. (C)	90.5	90.5	89.9
x_C	0.3178	0.3158	0.3238
y_C	0.3298	0.3259	0.3426



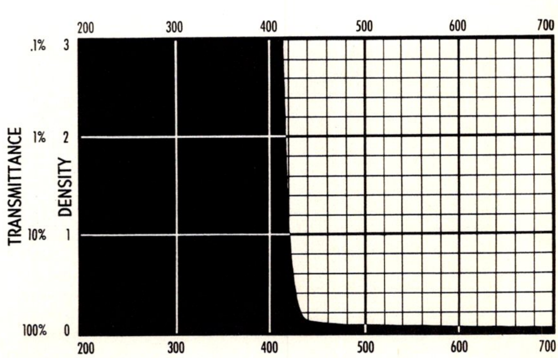
Stability: ACA

2B



Stability: AAA

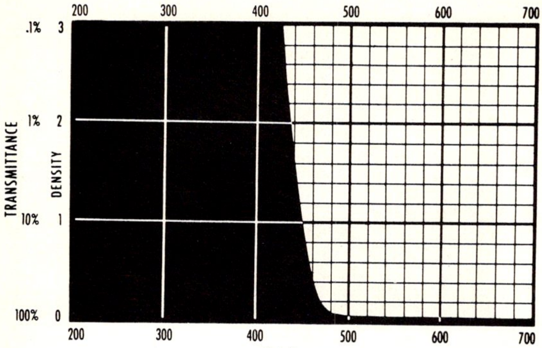
2C



Stability: BCA

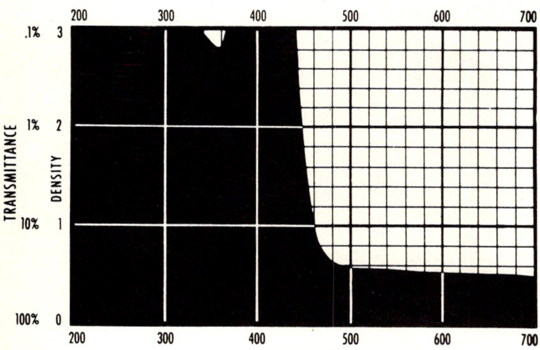
2E

3



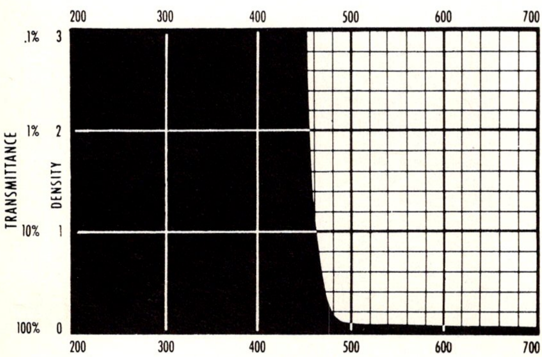
Stability: CCD

3N5



Stability: AAA

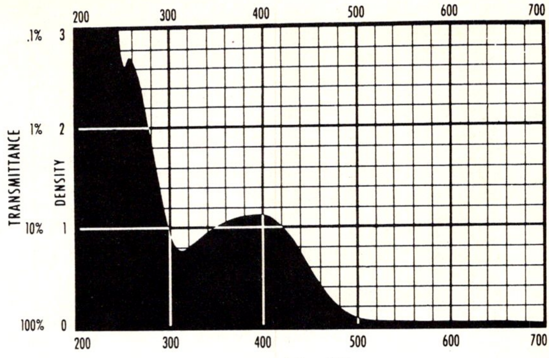
4



Stability: CCC

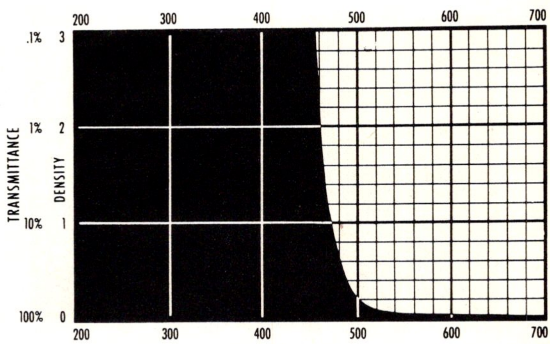
WAVE LENGTH		PERCENT TRANSMITTANCE No. 3	No. 3N5	No. 4
400		—	—	—
10		—	—	—
20		—	—	—
30		0.36	—	—
40		1.78	—	—
50		11.5	1.59	—
60		38.0	9.40	6.9
70		68.0	18.5	42.0
80		80.8	23.5	74.0
90		85.2	25.5	84.7
500		86.9	26.3	87.5
10		87.8	26.7	88.5
20		88.4	27.0	89.1
30		89.0	27.2	89.4
40		89.5	27.5	89.6
50		89.8	27.8	89.8
60		90.1	27.9	90.0
70		90.4	28.0	90.2
80		90.6	28.4	90.4
90		90.7	29.0	90.6
600		90.8	29.5	90.8
10		90.9	29.5	90.9
20		91.0	29.3	91.0
30		91.0	29.1	91.1
40		91.1	29.0	91.2
50		91.2	29.4	91.3
60		91.3	29.6	91.4
70		91.4	29.8	91.5
80		91.5	30.0	91.5
90		91.6	30.2	91.6
700		91.7	31.0	91.6
Dominant Wave Lgth.	**(A)**	580.0	581.2	580.0
Excitation Purity	**(A)**	50.0	52.0	64.0
% Luminous Transmit.	**(A)**	89.7	28.1	89.5
x_A		0.4803	0.4851	0.4887
y_A		0.4470	0.4447	0.4579
Dominant Wave Lgth.	**(C)**	569.4	570.5	569.6
Excitation Purity	**(C)**	50.3	56.3	65.1
% Luminous Transmit.	**(C)**	88.3	27.4	87.7
x_C		0.3752	0.3873	0.3955
y_C		0.4382	0.4485	0.4734

WAVE LENGTH		PERCENT TRANSMITTANCE No. 6	No. 8	No. 8N5
400		7.40	—	—
10		8.32	—	—
20		10.4	—	—
30		13.5	—	—
40		18.9	—	—
50		27.6	—	—
60		39.0	0.25	0.16
70		52.3	5.50	2.0
80		65.8	19.0	6.3
90		76.8	41.0	13.2
500		83.5	63.5	20.0
10		87.0	78.0	24.3
20		88.4	84.1	26.7
30		89.0	86.5	28.0
40		89.4	87.7	28.6
50		89.7	88.4	29.0
60		89.9	88.8	29.3
70		90.1	89.2	29.5
80		90.3	89.5	29.6
90		90.5	89.8	29.8
600		90.6	90.1	29.9
10		90.7	90.3	29.6
20		90.8	90.5	29.4
30		90.9	90.7	29.1
40		91.0	90.9	28.8
50		91.1	91.0	28.9
60		91.2	91.1	29.2
70		91.2	91.2	29.4
80		91.3	91.3	29.5
90		91.4	91.4	29.7
700		91.5	91.5	30.2
Dominant Wave Lgth.	**(A)**	580.3	581.2	581.1
Excitation Purity	**(A)**	47.5	83.5	84.0
% Luminous Transmit.	**(A)**	89.2	86.6	28.3
x_A		0.4796	0.5078	0.5077
y_A		0.4444	0.4670	0.4673
Dominant Wave Lgth.	**(C)**	570.2	571.8	572.0
Excitation Purity	**(C)**	44.7	85.2	85.2
% Luminous Transmit.	**(C)**	87.5	82.7	27.0
x_C		0.3704	0.4353	0.4362
y_C		0.4225	0.5088	0.5079



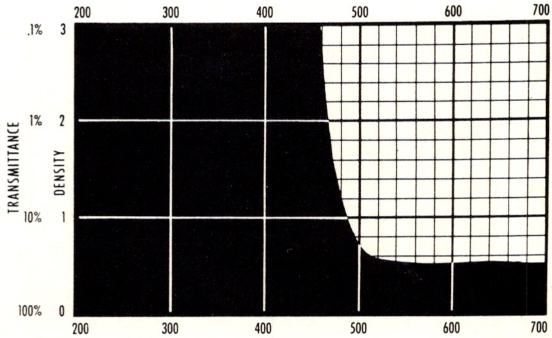
Stability: BBA

6
(K1)



Stability: AAA

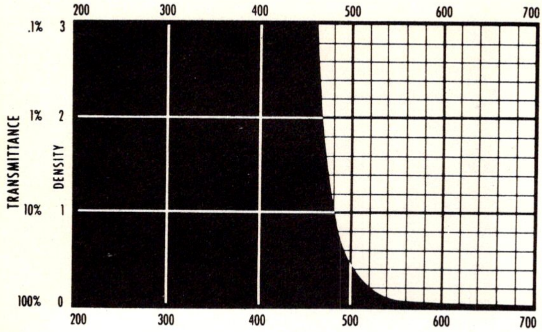
8
(K2)



Stability: AAA

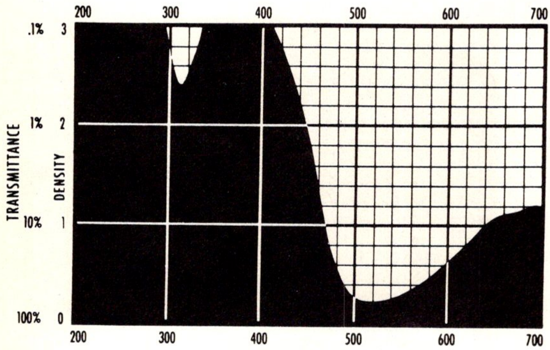
8N5

9
(K3)



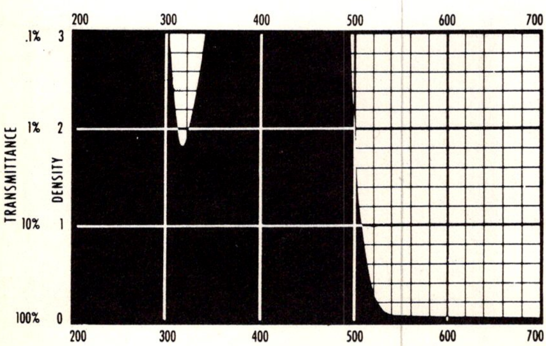
Stability: AAA

11
(X1)



Stability: AAA

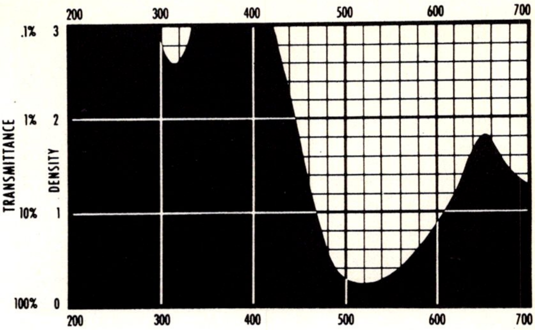
12



Stability: AAA

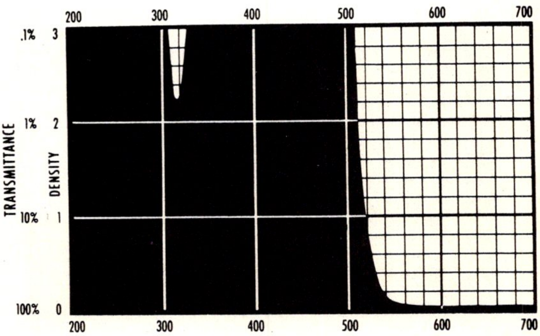
WAVE LENGTH		PERCENT TRANSMITTANCE No. 9	No. 11	No. 12
400		—	—	—
10		—	—	—
20		—	0.16	—
30		—	0.29	—
40		—	0.56	—
50		—	1.32	—
60		—	4.00	—
70		1.78	12.0	—
80		8.31	26.0	—
90		20.7	43.7	—
500		34.5	55.0	1.50
10		48.8	60.0	17.3
20		62.0	60.2	55.0
30		76.0	57.8	77.8
40		83.8	54.2	86.0
50		87.0	50.0	88.4
60		88.3	44.8	89.4
70		88.8	38.9	89.7
80		89.1	33.1	90.1
90		89.3	27.6	90.3
600		89.5	22.7	90.4
10		89.7	19.0	90.5
20		89.8	14.9	90.7
30		89.9	11.4	90.8
40		90.0	9.10	90.9
50		90.1	8.05	91.0
60		90.1	7.50	91.1
70		90.2	7.05	91.2
80		90.2	6.50	91.2
90		90.3	6.10	91.2
700		90.3	6.20	91.3
Dominant Wave Lgth.	(A)	582.8	552.5	583.6
Excitation Purity	(A)	90.5	50.0	96.5
% Luminous Transmit.	(A)	82.4	36.3	81.2
x_A		0.5223	0.3833	0.5331
y_A		0.4623	0.5421	0.4610
Dominant Wave Lgth.	(C)	574.4	550.3	576.3
Excitation Purity	(C)	91.5	60.7	97.7
% Luminous Transmit.	(C)	76.6	40.2	73.8
x_C		0.4605	0.3063	0.4825
y_C		0.5068	0.5435	0.5083

WAVE LENGTH	PERCENT TRANSMITTANCE No. 13	No. 15	No. 16
400	—	—	—
10	—	—	—
20	—	—	—
30	0.18	—	—
40	0.50	—	—
50	1.35	—	—
60	4.08	—	—
70	11.0	—	—
80	23.5	—	—
90	39.0	—	—
500	50.8	—	—
10	55.2	1.0	—
20	56.5	19.4	3.00
30	55.0	56.2	22.0
40	51.0	77.6	48.0
50	46.0	85.6	69.5
60	39.2	88.2	79.5
70	32.0	89.3	84.0
80	25.1	89.8	86.3
90	18.2	90.1	87.8
600	13.5	90.4	89.0
10	9.60	90.5	89.6
20	6.40	90.6	90.0
30	3.66	90.7	90.2
40	2.20	90.8	90.3
50	1.58	90.9	90.4
60	1.74	91.0	90.5
70	2.62	91.1	90.6
80	3.55	91.1	90.7
90	4.48	91.1	90.8
700	5.25	91.1	90.8
Dominant Wave Lgth. (A)	537.1	585.9	588.7
Excitation Purity (A)	46.0	98.0	99.0
% Luminous Transmit. (A)	30.0	75.5	67.9
x_A	0.3381	0.5485	0.5667
y_A	0.5741	0.4481	0.4314
Dominant Wave Lgth. (C)	542.0	579.2	582.7
Excitation Purity (C)	57.6	99.0	99.4
% Luminous Transmit. (C)	34.5	66.6	57.7
x_C	0.2723	0.5048	0.5289
y_C	0.5618	0.4905	0.4684



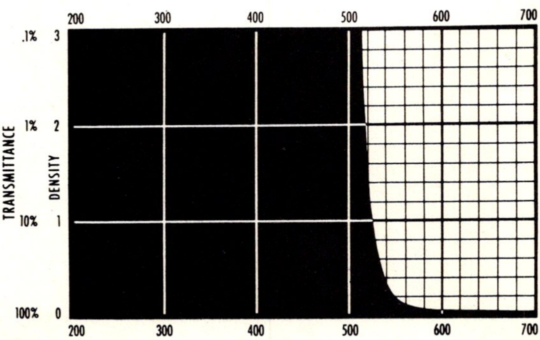
Stability: ABA

13 (X2)



Stability: AAA

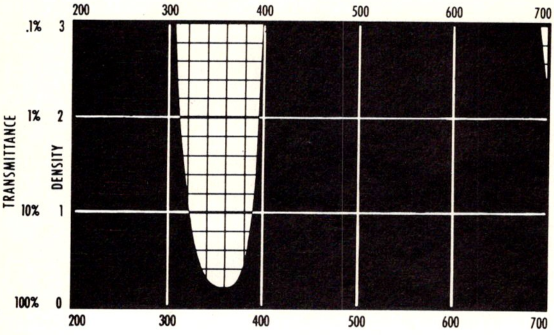
15 (G)



Stability: AAB

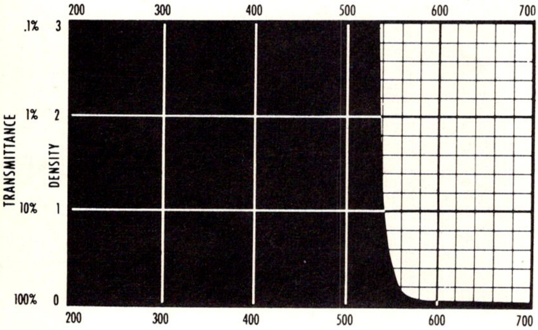
16

18A
(Glass)



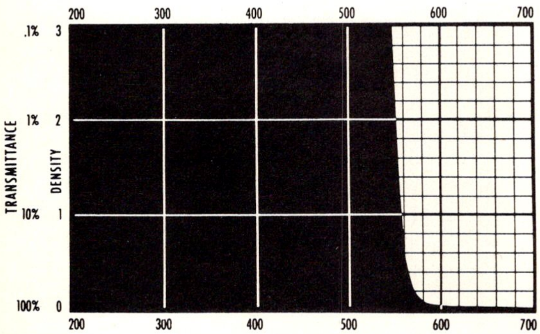
Stability: AAA

21



Stability: CBB

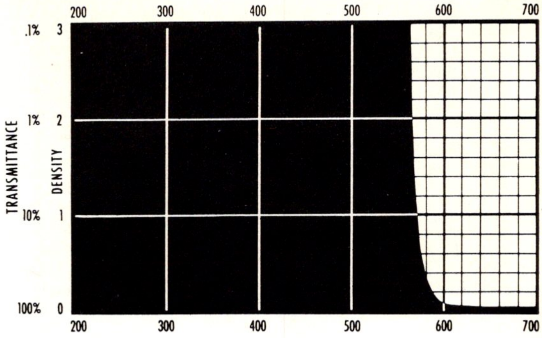
22



Stability: BAC

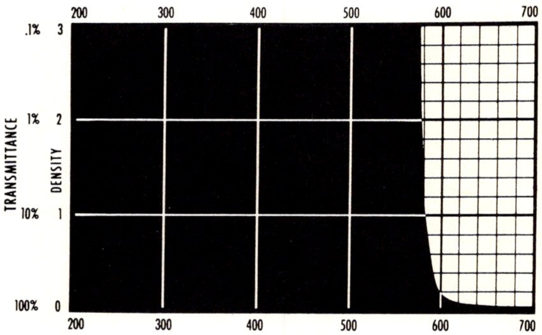
WAVE LENGTH		PERCENT TRANSMITTANCE No. 18A	No. 21	No. 22
400		—	—	—
10		—	—	—
20		—	—	—
30		—	—	—
40		—	—	—
50		—	—	—
60		—	—	—
70		—	—	—
80		—	—	—
90		—	—	—
500		—	—	—
10		—	—	—
20		—	—	—
30		—	—	—
40		—	2.50	—
50		—	29.0	0.25
60		—	65.0	19.0
70		—	80.6	60.0
80		—	85.4	81.0
90		—	87.3	87.0
600		—	88.1	88.5
10		—	88.7	89.0
20		—	89.0	89.5
30		—	89.5	89.8
40		—	89.9	90.0
50		—	90.2	90.1
60		—	90.4	90.2
70		—	90.5	90.3
80		—	90.5	90.4
90		—	90.6	90.5
700		0.36	90.6	90.6
Dominant Wave Lgth.	(A)	720.0	593.7	598.8
Excitation Purity	(A)	100.0	100.0	100.0
% Luminous Transmit.	(A)	0.0011	57.4	48.2
x_A		0.7347	0.5955	0.6214
y_A		0.2653	0.4037	0.3780
Dominant Wave Lgth.	(C)	720.0	588.9	595.1
Excitation Purity	(C)	100.0	99.9	99.9
% Luminous Transmit.	(C)	0.0004	45.6	35.8
x_C		0.7347	0.5686	0.6030
y_C		0.2653	0.4304	0.3964

WAVE LENGTH		PERCENT TRANSMITTANCE No. 23A	No. 24	No. 25
400		—	—	—
10		—	—	—
20		—	—	—
30		—	—	—
40		—	—	—
50		—	—	—
60		—	—	—
70		—	—	—
80		—	—	—
90		—	—	—
500		—	—	—
10		—	—	—
20		—	—	—
30		—	—	—
40		—	—	—
50		—	—	—
60		—	—	—
70		11.0	—	—
80		47.0	4.55	—
90		69.6	37.3	12.6
600		82.7	72.3	50.0
10		85.8	82.9	75.0
20		87.2	86.4	82.6
30		87.9	87.8	85.5
40		88.5	88.5	86.7
50		89.0	89.0	87.6
60		89.4	89.3	88.2
70		89.6	89.7	88.5
80		89.8	89.9	89.0
90		90.0	90.2	89.3
700		90.2	90.3	89.5
Dominant Wave Lgth.	**(A)**	605.5	612.5	617.2
Excitation Purity	**(A)**	100.0	100.0	100.0
% Luminous Transmit.	**(A)**	36.3	27.5	22.5
x_A		0.6498	0.6735	0.6850
y_A		0.3498	0.3263	0.3147
Dominant Wave Lgth.	**(C)**	602.6	610.6	615.3
Excitation Purity	**(C)**	99.9	99.9	100.0
% Luminous Transmit.	**(C)**	25.0	17.7	14.0
x_C		0.6386	0.6675	0.6808
y_C		0.3610	0.3322	0.3190



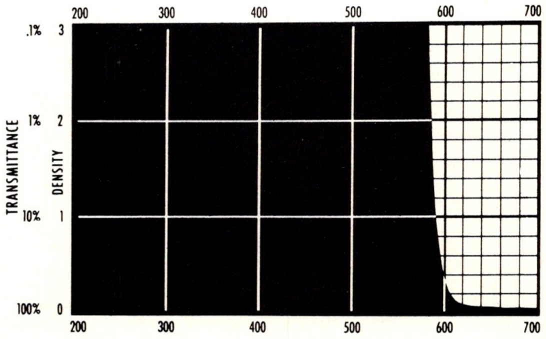
Stability: BAB

23A



Stability: AAB

24

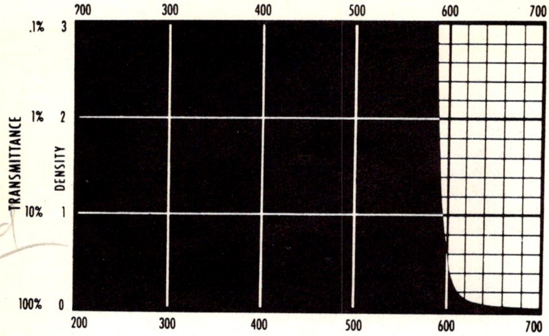


Stability: AAA

25
(A)

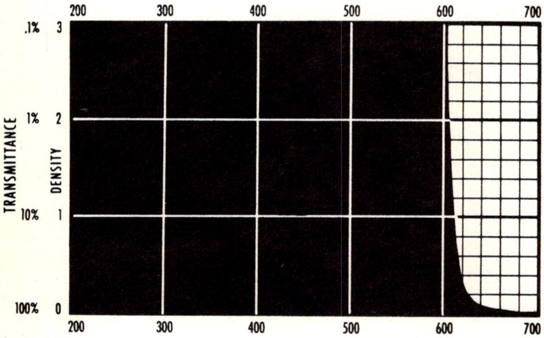
26

Red



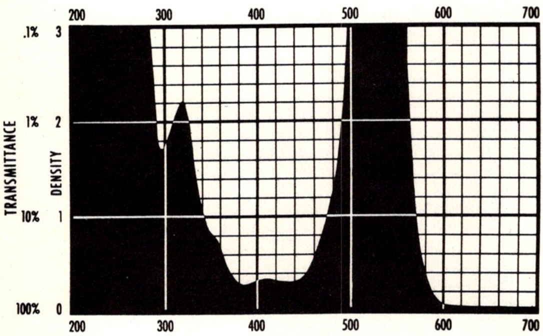
Stability: AAA

29
(F)



Stability: AAA

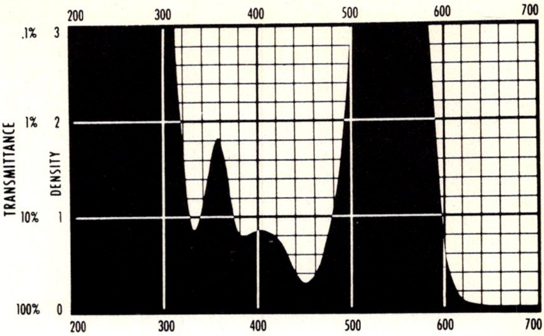
30



Stability:BBC

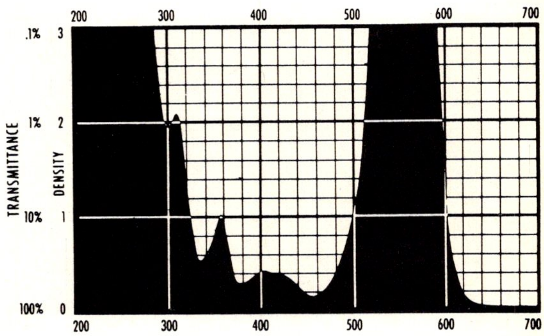
WAVE LENGTH	PERCENT TRANSMITTANCE No. 26	No. 29	No. 30
400	—	—	50.5
10	—	—	48.8
20	—	—	49.2
30	—	—	50.6
40	—	—	49.7
50	—	—	45.2
60	—	—	26.8
70	—	—	12.6
80	—	—	4.73
90	—	—	0.62
500	—	—	—
10	—	—	—
20	—	—	—
30	—	—	—
40	—	—	—
50	—	—	—
60	—	—	—
70	—	—	15.0
80	—	—	53.8
90	2.90	—	79.5
600	30.0	—	87.2
10	63.2	10.5	89.2
20	78.9	45.0	89.9
30	84.0	73.5	90.3
40	86.1	84.2	90.5
50	87.2	87.8	90.6
60	88.1	89.2	90.8
70	88.5	89.8	90.9
80	88.9	90.3	91.0
90	89.2	90.4	91.0
700	89.5	90.5	91.1
Dominant Wave Lgth. (A)	620.6	632.7	505.5c
Excitation Purity (A)	100.0	100.0	58.5
% Luminous Transmit. (A)	19.1	11.0	37.8
x_A	0.6926	0.7116	0.6023
y_A	0.3073	0.2883	0.3175
Dominant Wave Lgth. (C)	618.9	631.6	498.6c
Excitation Purity (C)	100.0	100.0	62.5
% Luminous Transmit. (C)	11.6	6.3	26.6
x_C	0.6894	0.7102	0.4520
y_C	0.3105	0.2898	0.2270

WAVE LENGTH	PERCENT TRANSMITTANCE No. 31	No. 32	No. 33
400	13.8	38.0	0.85
10	14.5	37.9	0.71
20	16.4	40.0	1.17
30	25.5	43.0	1.69
40	42.7	55.5	5.36
50	50.2	66.0	14.3
60	40.4	66.0	12.4
70	22.6	57.0	5.00
80	8.20	40.0	0.50
90	1.85	21.0	—
500	0.12	9.56	—
10	—	2.51	—
20	—	0.13	—
30	—	—	—
40	—	—	—
50	—	—	—
60	—	—	—
70	—	—	—
80	—	—	—
90	0.63	—	—
600	26.0	6.04	—
10	67.2	41.0	0.80
20	84.0	75.0	24.9
30	88.1	86.1	60.8
40	89.8	89.0	78.0
50	90.2	90.0	85.0
60	90.4	90.6	87.5
70	90.5	90.7	88.7
80	90.7	90.8	89.4
90	90.8	90.9	89.8
700	91.0	91.0	90.0
Dominant Wave Lgth. (A)	512.6c	546.8c	506.6c
Excitation Purity (A)	80.0	77.0	90.0
% Luminous Transmit. (A)	19.8	16.9	8.9
x_A	0.6095	0.5410	0.6733
y_A	0.2623	0.2281	0.2641
Dominant Wave Lgth. (C)	513.2c	551.8c	498.0c
Excitation Purity (C)	81.8	79.5	88.3
% Luminous Transmit. (C)	12.9	12.5	5.2
x_C	0.4044	0.3079	0.5198
y_C	0.1572	0.1179	0.1947



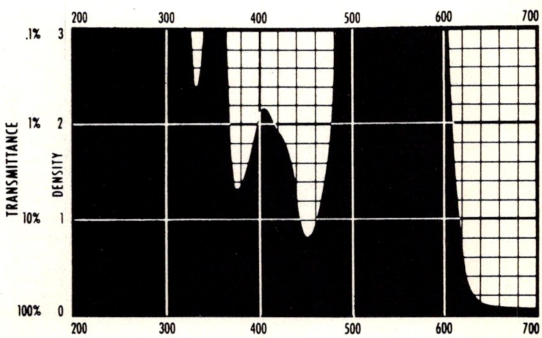
Stability: CCA

31



Stability: CCD

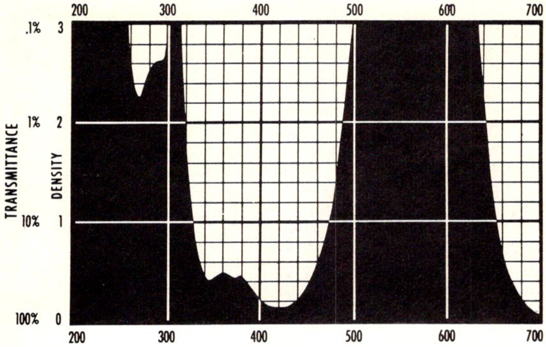
32



Stability: CCB

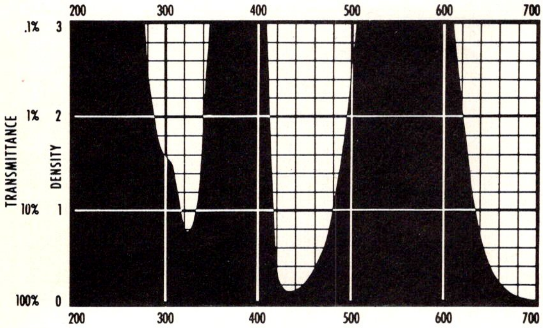
33

34



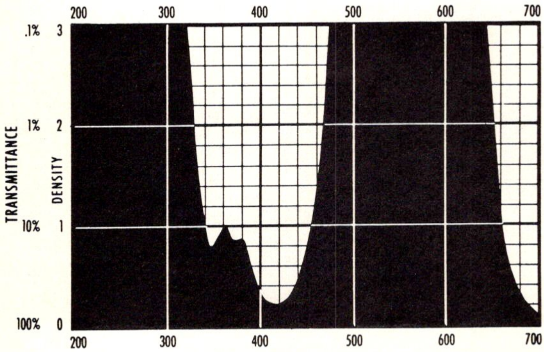
Stability: DDD

34A



Stability: DCC

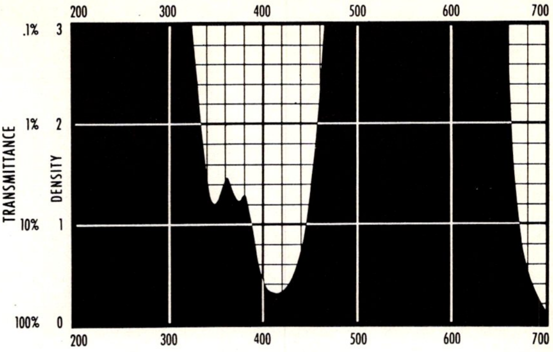
35



Stability: CDD

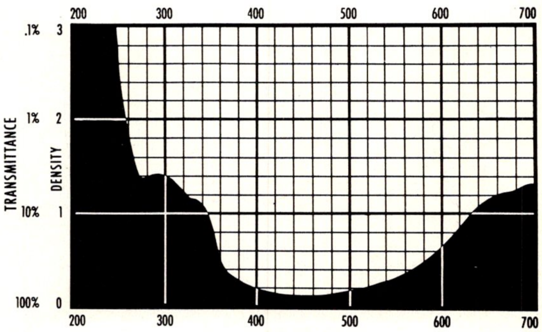
WAVE LENGTH		PERCENT TRANSMITTANCE No. 34	No. 34A	No. 35
400		64.0	—	48.0
10		70.1	4.5	57.0
20		72.0	40.0	57.6
30		68.4	69.7	47.5
40		58.2	68.7	29.5
50		42.3	56.2	12.3
60		25.2	40.5	3.5
70		12.1	23.8	0.25
80		2.7	9.2	—
90		0.2	2.3	—
500		—	0.33	—
10		—	—	—
20		—	—	—
30		—	—	—
40		—	—	—
50		—	—	—
60		—	—	—
70		—	—	—
80		—	—	—
90		—	—	—
600		—	—	—
10		—	0.13	—
20		—	1.0	—
30		—	6.3	—
40		0.4	22.0	—
50		4.0	45.0	0.1
60		20.7	65.0	3.0
70		45.2	77.3	19.0
80		66.5	85.0	43.5
90		78.8	88.2	66.0
700		85.0	89.8	77.7
Dominant Wave Lgth.	**(A)**	577.5c	574.0c	577.2c
Excitation Purity	**(A)**	94.0	91.5	97.0
% Luminous Transmit.	**(A)**	1.12	3.5	0.47
x_A		0.2764	0.3917	0.2863
y_A		0.0692	0.1286	0.0650
Dominant Wave Lgth.	**(C)**	427.0	565.6c	566.9c
Excitation Purity	**(C)**	94.7	90.6	96.6
% Luminous Transmit.	**(C)**	1.24	2.9	0.43
x_C		0.1772	0.2060	0.1813
y_C		0.0230	0.0432	0.0168

WAVE LENGTH		PERCENT TRANSMITTANCE No. 36	No. 38	No. 38A
400		36.5	60.5	33.9
10		45.5	66.5	43.5
20		45.5	72.5	53.1
30		32.7	75.3	57.5
40		15.2	76.2	58.1
50		3.7	75.9	56.7
60		0.35	74.8	54.2
70		—	73.4	51.0
80		—	71.6	47.5
90		—	69.5	43.8
500		—	66.7	39.7
10		—	63.9	35.7
20		—	60.8	31.8
30		—	57.0	27.7
40		—	52.6	22.8
50		—	48.0	18.2
60		—	42.8	13.7
70		—	37.0	9.6
80		—	30.6	6.3
90		—	25.5	3.9
600		—	20.9	2.6
10		—	16.8	1.6
20		—	12.9	1.0
30		—	10.0	0.5
40		—	7.79	0.2
50		—	6.68	—
60		0.21	6.20	—
70		7.5	5.91	—
80		29.0	5.41	—
90		55.0	4.90	—
700		71.3	5.00	—
Dominant Wave Lgth.	**(A)**	576.9c	494.3	489.3
Excitation Purity	**(A)**	98.0	33.5	63.5
% Luminous Transmit.	**(A)**	0.29	36.1	12.6
x_A		0.2969	0.3062	0.1934
y_A		0.0673	0.4038	0.3263
Dominant Wave Lgth.	**(C)**	566.6c	483.5	478.8
Excitation Purity	**(C)**	97.6	41.7	69.7
% Luminous Transmit.	**(C)**	0.23	42.5	17.3
x_C		0.1837	0.2122	0.1606
y_C		0.0154	0.2583	0.1796



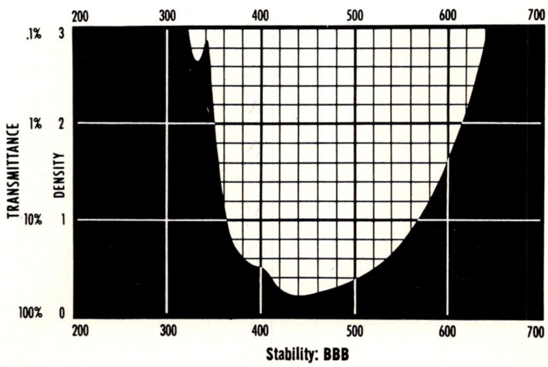
Stability: CCC

36



Stability: BCA

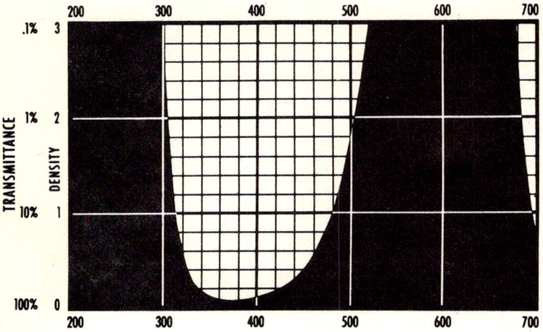
38



Stability: BBB

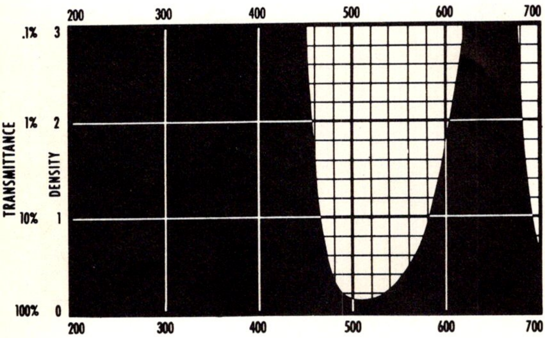
38A

39
(Glass)



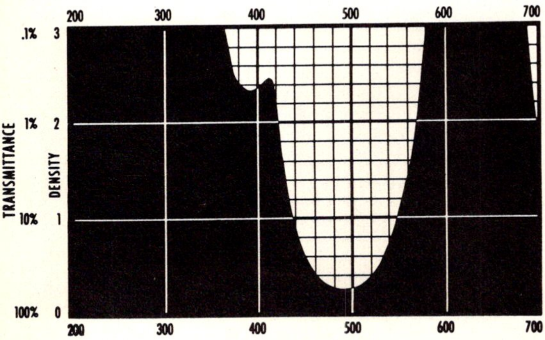
Stability: AAA

40



Stability. CBC

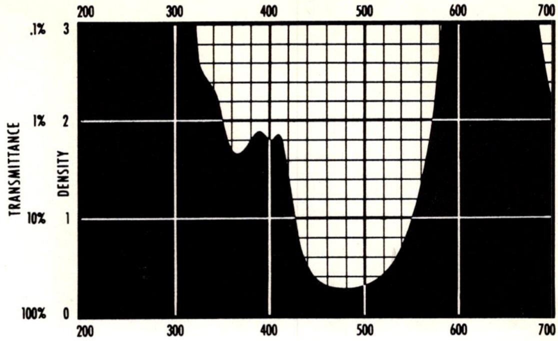
44



Stability: DDD

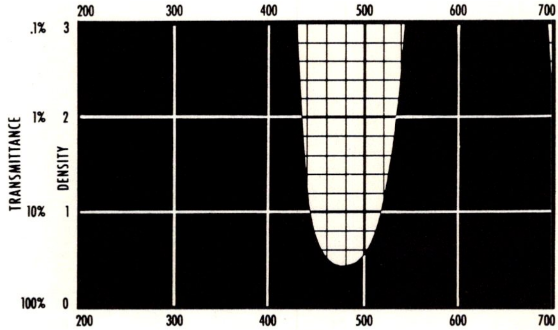
WAVE LENGTH	PERCENT TRANSMITTANCE No. 39	No. 40	No. 44
400	85.2	—	0.43
10	78.2	—	0.27
20	70.5	—	0.40
30	63.3	—	3.24
40	53.6	—	13.1
50	42.5	—	24.7
60	28.5	3.16	35.7
70	17.3	21.6	45.5
80	10.2	44.7	53.3
90	4.00	61.4	56.7
500	1.33	70.2	55.4
10	0.35	72.4	49.9
20	—	70.5	41.0
30	—	64.8	29.3
40	—	55.5	17.0
50	—	44.2	7.58
60	—	32.5	2.40
70	—	20.3	0.36
80	—	9.56	—
90	—	3.20	—
600	—	1.10	—
10	—	0.32	—
20	—	—	—
30	—	—	—
40	—	—	—
50	—	—	—
60	—	—	—
70	—	—	—
80	0.50	0.80	—
90	4.06	6.99	0.32
700	17.8	23.5	2.48
Dominant Wave Lgth. (A)	454.5	513.4	495.1
Excitation Purity (A)	98.0	53.5	76.5
% Luminous Transmit. (A)	0.39	26.2	10.3
x_A	0.1570	0.2229	0.1236
y_A	0.0287	0.6165	0.4126
Dominant Wave Lgth. (C)	450.8	516.2	488.7
Excitation Purity (C)	98.9	48.6	73.4
% Luminous Transmit. (C)	1.15	33.6	15.6
x_C	0.1574	0.1823	0.1200
y_C	0.0216	0.5611	0.2807

WAVE LENGTH	PERCENT TRANSMITTANCE No. 44A	No. 45	No. 45A
400	1.55	—	—
10	1.41	—	—
20	3.39	—	—
30	13.5	—	1.00
40	30.7	4.20	8.81
50	43.0	18.2	17.4
60	49.5	30.2	20.9
70	52.3	35.9	21.6
80	53.3	37.2	20.5
90	52.3	35.1	18.0
500	49.1	28.8	14.4
10	44.3	18.8	10.1
20	37.6	8.9	5.60
30	28.9	2.35	2.52
40	19.1	0.33	0.64
50	10.7	—	0.10
60	4.68	—	—
70	1.38	—	—
80	0.19	—	—
90	—	—	—
600	—	—	—
10	—	—	—
20	—	—	—
30	—	—	—
40	—	—	—
50	—	—	—
60	—	—	—
70	—	—	—
80	—	—	—
90	0.21	—	0.20
700	0.71	0.49	2.24
Dominant Wave Lgth. (A)	491.9	486.6	483.5
Excitation Purity (A)	76.0	90.0	90.5
% Luminous Transmit. (A)	10.1	2.8	1.5
x_A	0.1348	0.0998	0.1122
y_A	0.3549	0.2451	0.1996
Dominant Wave Lgth. (C)	484.2	481.5	477.6
Excitation Purity (C)	75.2	88.6	89.6
% Luminous Transmit. (C)	15.2	5.2	2.8
x_C	0.1314	0.1108	0.1222
y_C	0.2199	0.1692	0.1305



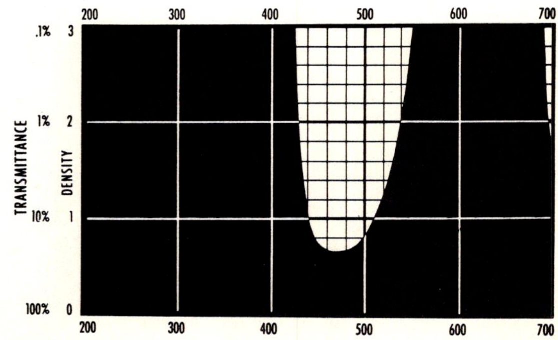
Stability: DDD

44A



Stability: DDD

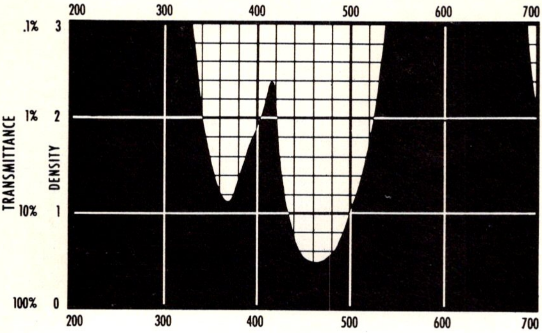
45



Stability: CCB

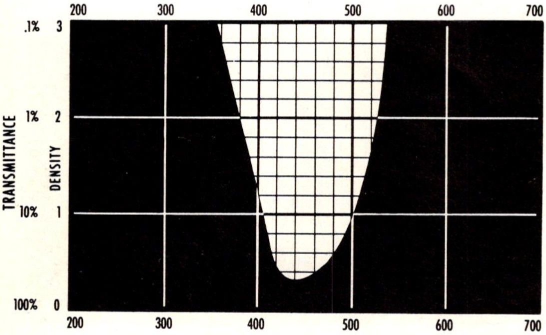
45A

46



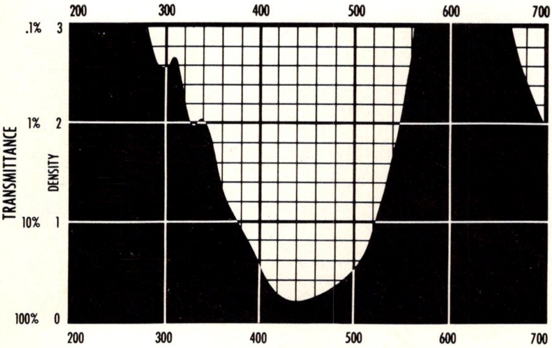
Stability: DDD

47
(C5)



Stability: BBB

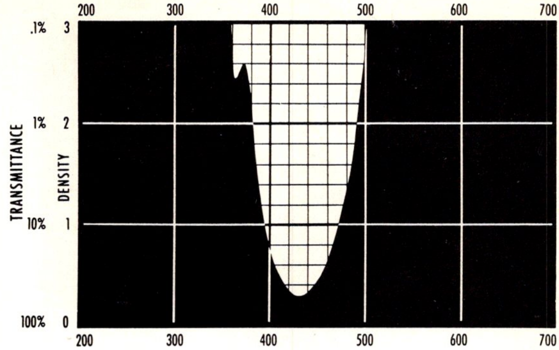
47A



Stability: AAA

WAVE LENGTH	PERCENT TRANSMITTANCE No. 46	No. 47	No. 47A
400	1.20	7.80	26.4
10	0.60	17.4	40.3
20	0.80	34.0	54.5
30	5.98	47.0	62.1
40	19.0	50.3	63.5
50	30.1	48.3	61.8
60	33.8	43.4	58.2
70	32.1	36.2	53.0
80	27.0	28.5	46.4
90	20.2	19.6	38.6
500	11.1	11.3	29.5
10	4.39	5.64	20.3
20	1.66	1.91	11.9
30	0.35	0.36	5.44
40	—	—	1.95
50	—	—	0.58
60	—	—	0.18
70	—	—	—
80	—	—	—
90	—	—	—
600	—	—	—
10	—	—	—
20	—	—	—
30	—	—	—
40	—	—	—
50	—	—	—
60	—	—	—
70	—	—	0.16
80	—	—	0.33
90	0.25	—	0.59
700	0.85	—	0.96
Dominant Wave Lgth. (A)	475.1	470.1	477.5
Excitation Purity (A)	95.5	96.0	91.7
% Luminous Transmit. (A)	1.05	1.2	3.4
x_A	0.1245	0.1371	0.1322
y_A	0.1014	0.0724	0.1361
Dominant Wave Lgth. (C)	470.4	463.8	469.7
Excitation Purity (C)	94.9	95.7	91.8
% Luminous Transmit. (C)	2.4	2.8	6.6
x_C	0.1327	0.1451	0.1410
y_C	0.0727	0.0485	0.0790

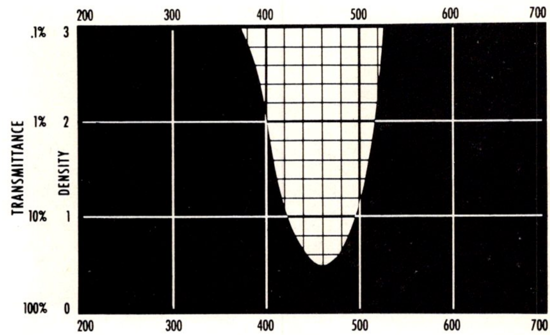
WAVE LENGTH		PERCENT TRANSMITTANCE No. 47B	No. 48	No. 48A
400		16.0	0.96	4.51
10		29.5	3.16	9.32
20		43.6	8.25	16.9
30		50.0	15.0	22.4
40		47.2	22.6	25.9
50		36.0	30.3	27.1
60		25.0	33.2	23.2
70		13.2	29.6	16.6
80		4.5	22.4	9.78
90		1.3	14.1	4.57
500		0.17	7.30	1.62
10		—	2.64	0.26
20		—	0.50	—
30		—	—	—
40		—	—	—
50		—	—	—
60		—	—	—
70		—	—	—
80		—	—	—
90		—	—	—
600		—	—	—
10		—	—	—
20		—	—	—
30		—	—	—
40		—	—	—
50		—	—	—
60		—	—	—
70		—	—	—
80		—	—	—
90		—	—	—
700		—	—	—
Dominant Wave Lgth.	(A)	452.7	471.1	462.5
Excitation Purity	(A)	99.0	96.5	98.0
% Luminous Transmit.	(A)	0.23	0.75	0.31
x_A		0.1554	0.1320	0.1453
y_A		0.0220	0.0743	0.0407
Dominant Wave Lgth.	(C)	449.4	466.5	458.0
Excitation Purity	(C)	99.4	96.1	98.2
% Luminous Transmit.	(C)	0.79	1.86	0.88
x_C		0.1579	0.1393	0.1499
y_C		0.0187	0.0547	0.0318



Stability: BBB

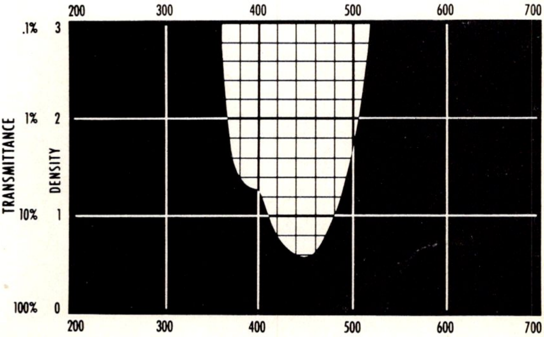
47B

Blue



Stability: CBC

48

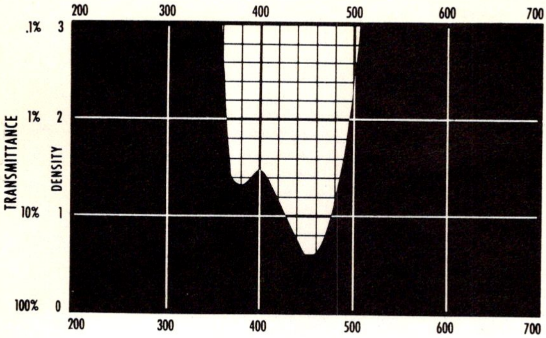


Stability: AAA

48A

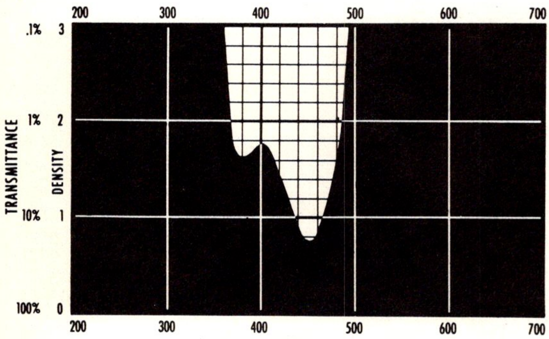
49

(C4)



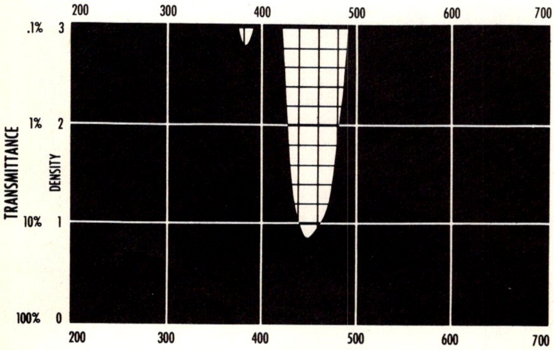
Stability: BCB

49B



Stability: AAA

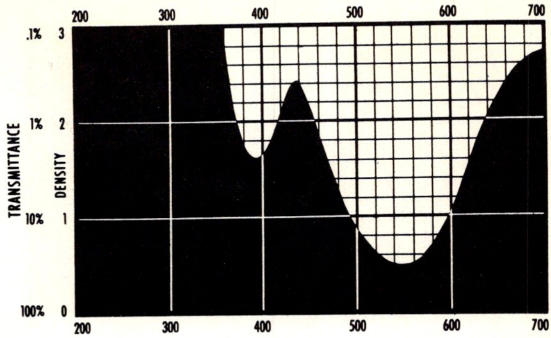
50



Stability: CCB

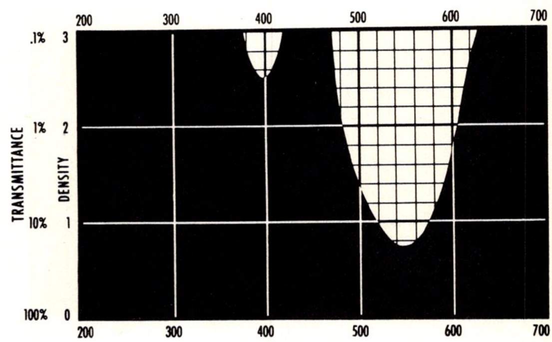
WAVE LENGTH		PERCENT TRANSMITTANCE No. 49	No. 49B	No. 50
400		3.30	1.5	–
10		4.28	2.5	–
20		6.93	4.1	–
30		11.2	7.8	1.6
40		18.9	14.1	8.2
50		25.6	18.2	13.7
60		24.0	14.8	10.5
70		15.7	7.2	4.2
80		6.93	2.2	0.9
90		2.14	0.23	–
500		0.46	–	–
10		–	–	–
20		–	–	–
30		–	–	–
40		–	–	–
50		–	–	–
60		–	–	–
70		–	–	–
80		–	–	–
90		–	–	–
600		–	–	–
10		–	–	–
20		–	–	–
30		–	–	–
40		–	–	–
50		–	–	–
60		–	–	–
70		–	–	–
80		–	–	–
90		–	–	–
700		–	–	–
Dominant Wave Lgth.	(A)	461.0	457.7	457.7
Excitation Purity	(A)	98.5	99.0	99.5
% Luminous Transmit.	(A)	0.23	0.11	0.079
x_A		0.1457	0.1492	0.1488
y_A		0.0353	0.0285	0.0279
Dominant Wave Lgth.	(C)	457.8	455.3	455.7
Excitation Purity	(C)	98.8	99.2	99.4
% Luminous Transmit.	(C)	0.69	0.36	0.26
x_C		0.1491	0.1517	0.1509
y_C		0.0299	0.0252	0.0254

WAVE LENGTH	PERCENT TRANSMITTANCE No. 52	No. 53	No. 54
400	2.18	0.30	—
10	1.51	0.22	—
20	0.80	0.09	—
30	0.44	—	—
40	0.41	—	—
50	0.69	—	—
60	1.45	—	—
70	2.70	0.10	—
80	4.90	0.71	—
90	8.50	2.14	—
500	13.3	4.47	—
10	18.2	7.24	0.10
20	23.7	10.7	0.31
30	28.5	14.0	0.64
40	32.1	16.6	0.89
50	33.1	17.3	0.93
60	31.0	15.4	0.62
70	25.6	11.4	0.21
80	19.1	6.90	—
90	12.6	3.60	—
600	7.78	1.41	—
10	4.17	0.40	—
20	2.34	0.15	—
30	1.38	—	—
40	0.80	—	—
50	0.54	—	—
60	0.36	—	—
70	0.27	—	—
80	0.23	—	—
90	0.19	—	—
700	0.17	—	—
Dominant Wave Lgth. (A)	554.9	552.0	545.8
Excitation Purity (A)	71.0	82.5	94.0
% Luminous Transmit. (A)	18.3	8.1	0.027
x_A	0.3684	0.3382	0.2829
y_A	0.5875	0.6327	0.6997
Dominant Wave Lgth. (C)	553.2	551.0	546.1
Excitation Purity (C)	77.2	89.2	97.1
% Luminous Transmit. (C)	20.1	9.0	0.032
x_C	0.3213	0.3090	0.2746
y_C	0.5902	0.6459	0.7060



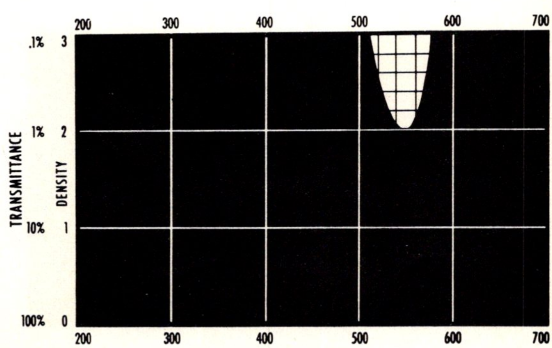
Stability: AAB

52



Stability: AAB

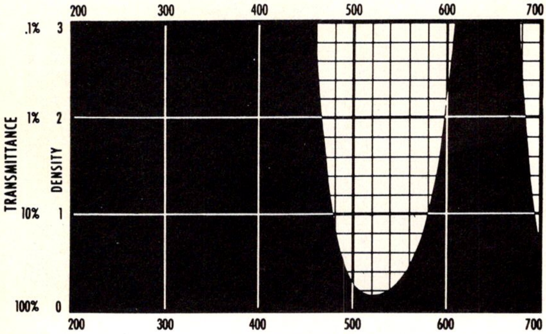
53



Stability: AAA

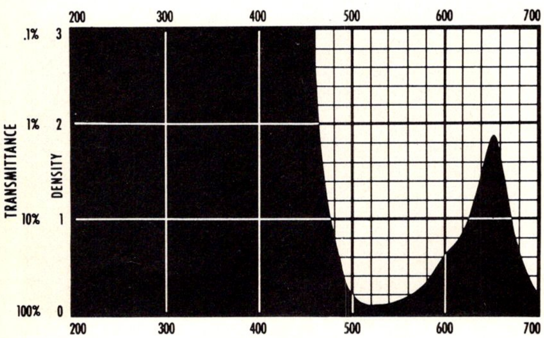
54

55



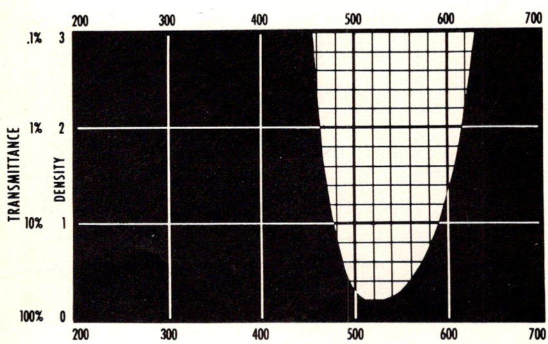
Stability: BBC

56



Stability: BCB

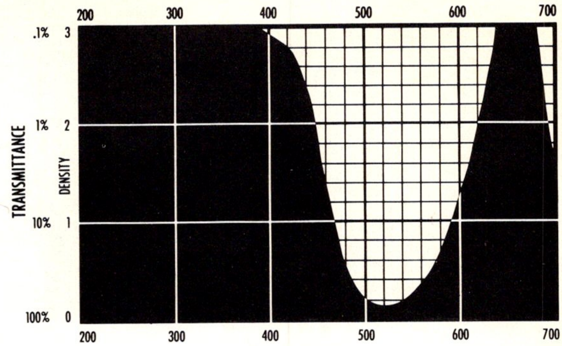
57



Stability: BBC

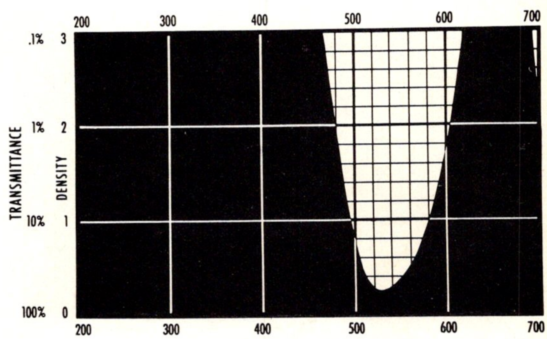
WAVE LENGTH		PERCENT TRANSMITTANCE No. 55	No. 56	No. 57
400		–	–	–
10		–	–	–
20		–	–	–
30		–	–	–
40		–	–	–
50		–	–	–
60		0.20	0.36	0.44
70		2.90	2.9	3.10
80		13.1	12.5	13.1
90		34.2	32.2	31.9
500		56.0	55.2	50.5
10		67.0	71.5	60.6
20		69.3	78.8	63.3
30		65.1	80.3	61.0
40		56.7	77.6	55.0
50		45.0	72.4	47.1
60		33.1	65.7	37.3
70		20.7	56.9	26.5
80		9.00	44.7	16.6
90		2.70	32.0	8.69
600		0.40	23.1	3.70
10		–	18.1	1.60
20		–	12.9	0.49
30		–	7.0	–
40		–	2.9	–
50		–	1.7	–
60		–	2.3	–
70		–	6.7	–
80		0.66	20.0	–
90		6.90	42.2	–
700		27.8	63.3	–
Dominant Wave Lgth.	**(A)**	524.1	555.5	530.5
Excitation Purity	**(A)**	61.5	68.5	59.0
% Luminous Transmit.	**(A)**	25.2	47.7	26.9
x_A		0.2379	0.3746	0.2772
y_A		0.6669	0.5777	0.6413
Dominant Wave Lgth.	**(C)**	530.1	552.2	536.3
Excitation Purity	**(C)**	68.4	78.3	69.2
% Luminous Transmit.	**(C)**	31.5	52.8	32.5
x_C		0.2043	0.3164	0.2355
y_C		0.6512	0.5988	0.6339

WAVE LENGTH		PERCENT TRANSMITTANCE No. 57A	No. 58	No. 59
400		0.12	—	—
10		0.14	—	—
20		0.16	—	—
30		0.25	—	—
40		0.47	—	—
50		1.17	—	0.40
60		3.63	—	1.90
70		11.1	0.23	7.70
80		25.7	1.38	21.0
90		44.7	4.90	41.5
500		59.4	17.7	59.0
10		67.5	38.8	67.7
20		69.7	52.2	69.8
30		67.2	53.6	67.2
40		60.9	47.6	61.5
50		52.0	38.4	54.0
60		41.7	27.8	45.0
70		30.0	17.4	35.0
80		18.8	9.0	24.0
90		9.8	3.50	14.0
600		4.69	1.50	7.95
10		2.22	0.41	4.90
20		0.92	—	2.70
30		0.29	—	1.00
40		—	—	0.17
50		—	—	—
60		—	—	—
70		—	—	0.63
80		—	—	4.00
90		0.32	—	12.0
700		1.80	0.53	22.6
Dominant Wave Lgth.	**(A)**	526.8	538.2	532.3
Excitation Purity	**(A)**	53.5	77.0	52.5
% Luminous Transmit.	**(A)**	30.8	19.8	32.6
x_A		0.2774	0.2693	0.3028
y_A		0.6277	0.6831	0.6118
Dominant Wave Lgth.	**(C)**	533.8	540.3	538.3
Excitation Purity	**(C)**	61.8	86.2	63.9
% Luminous Transmit.	**(C)**	37.2	23.7	38.7
x_C		0.2325	0.2425	0.2507
y_C		0.6076	0.6923	0.6023



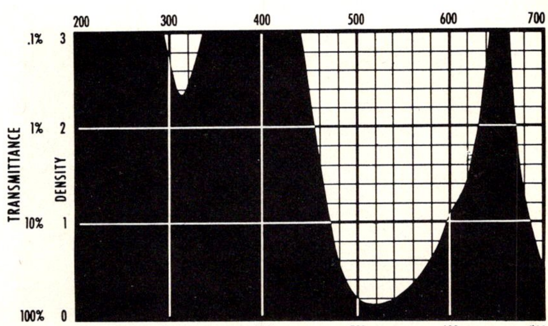
Stability: BBC

57A



Stability: BBC

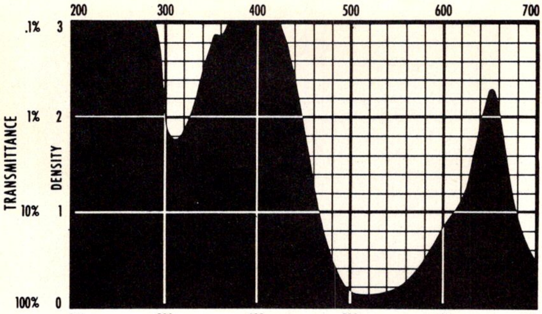
58
(B)



Stability: BBB

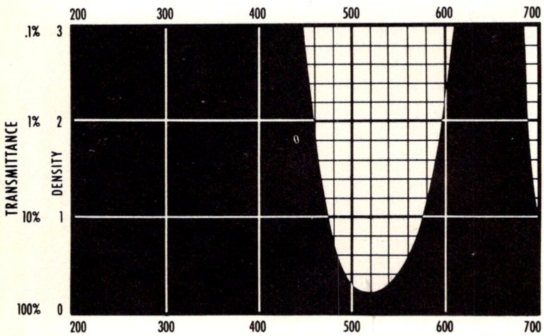
59

59A



Stability: BBB

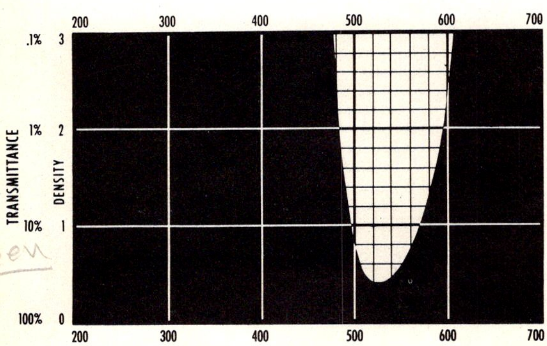
60



Stability: BDC

61
(N)

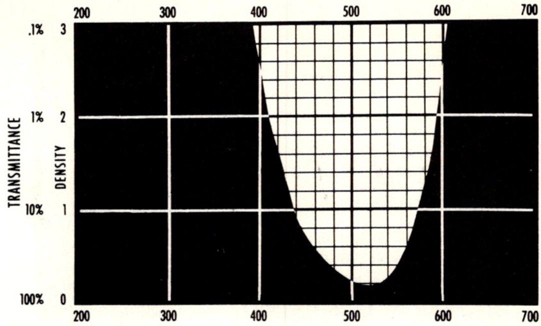
Green



Stability: ABC

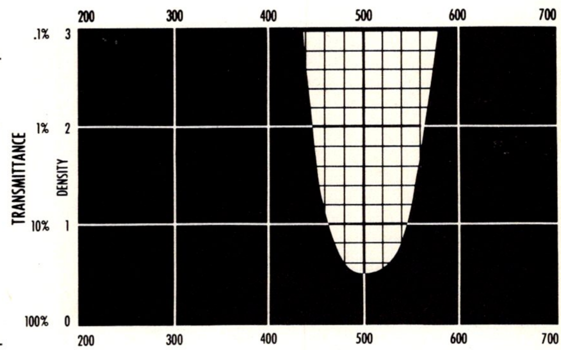
WAVE LENGTH		PERCENT TRANSMITTANCE No. 59A	No. 60	No. 61
400		0.13	—	—
10		0.15	—	—
20		0.22	—	—
30		0.39	—	—
40		0.95	—	—
50		2.37	0.19	—
60		6.39	1.38	—
70		15.9	5.38	—
80		32.5	15.0	0.33
90		52.1	32.0	4.00
500		66.2	48.4	16.6
10		73.6	57.2	32.3
20		75.5	59.2	40.0
30		73.6	55.5	39.6
40		69.1	47.5	34.5
50		62.7	36.8	26.3
60		55.2	25.2	17.3
70		46.1	14.4	9.70
80		34.4	6.3	4.40
90		23.3	1.82	1.66
600		16.6	0.48	0.38
10		12.2	0.10	—
20		8.3	—	—
30		4.3	—	—
40		1.62	—	—
50		0.74	—	—
60		1.29	—	—
70		3.98	—	—
80		10.8	—	—
90		21.3	2.10	—
700		31.1	8.70	—
Dominant Wave Lgth.	**(A)**	536.2	520.0	533.8
Excitation Purity	**(A)**	48.0	59.5	76.5
% Luminous Transmit.	**(A)**	39.5	20.7	13.7
x_A		0.3300	0.2249	0.2457
y_A		0.5838	0.6616	0.6989
Dominant Wave Lgth.	**(C)**	541.5	525.7	536.8
Excitation Purity	**(C)**	59.5	62.4	85.3
% Luminous Transmit.	**(C)**	45.8	26.1	16.8
x_C		0.2685	0.1917	0.2213
y_C		0.5718	0.6328	0.7053

WAVE LENGTH	PERCENT TRANSMITTANCE No. 64	No. 65	No. 65A
400	0.30	—	—
10	1.50	—	—
20	3.30	—	—
30	6.40	—	0.16
40	11.5	0.20	1.32
50	17.8	2.04	5.50
60	26.3	9.0	13.0
70	36.5	19.1	24.9
80	47.1	27.3	36.6
90	55.7	31.9	45.1
500	61.5	33.6	45.8
10	63.1	32.4	39.7
20	60.2	28.1	29.7
30	53.7	21.3	17.8
40	44.4	13.3	7.90
50	29.8	6.6	2.40
60	15.7	1.82	0.32
70	7.90	0.43	—
80	3.70	—	—
90	1.20	—	—
600	—	—	—
10	—	—	—
20	—	—	—
30	—	—	—
40	—	—	—
50	—	—	—
60	—	—	—
70	—	—	—
80	—	—	—
90	—	—	0.20
700	—	—	2.18
Dominant Wave Lgth. (A)	503.0	501.3	497.3
Excitation Purity (A)	62.6	74.0	82.0
% Luminous Transmit. (A)	18.0	6.6	6.2
x_A	0.1682	0.1215	0.0952
y_A	0.5344	0.5266	0.4584
Dominant Wave Lgth. (C)	497.2	496.6	492.7
Excitation Purity (C)	55.7	67.8	77.5
% Luminous Transmit. (C)	24.6	9.6	9.8
x_C	0.1451	0.1116	0.0953
y_C	0.4041	0.4090	0.3483



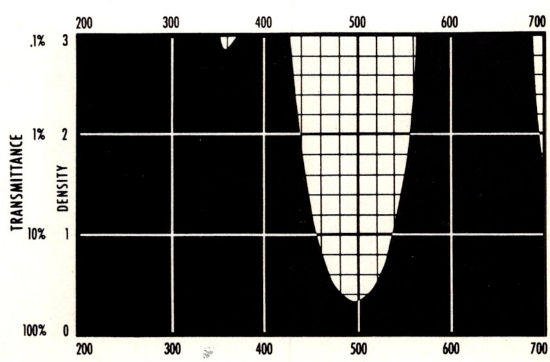
Stability: CDA

64



Stability: BDB

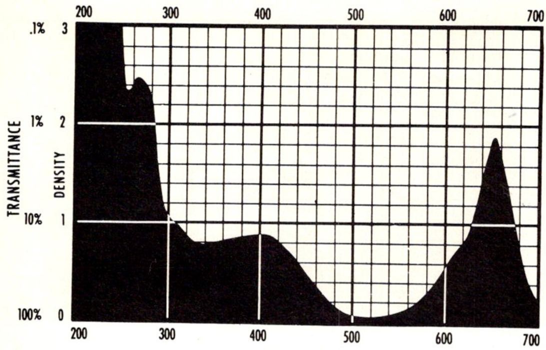
65



Stability: CDD

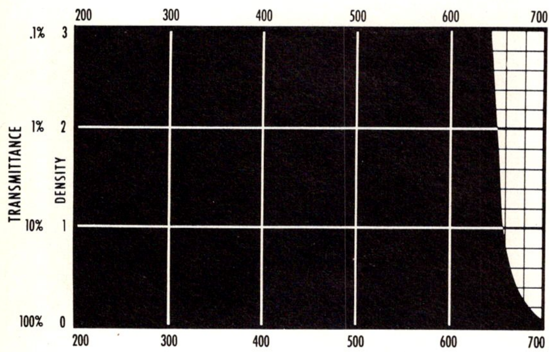
65A X cyan

66



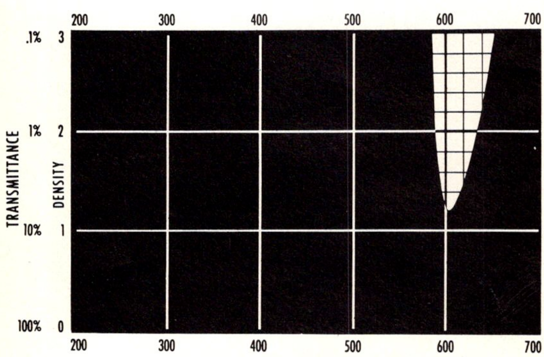
Stability. DDC

70



Stability: ABB

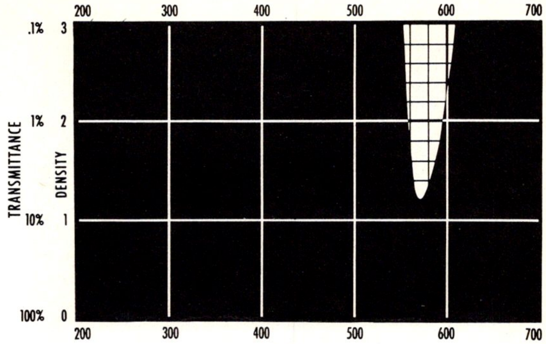
72B



Stability: CCC

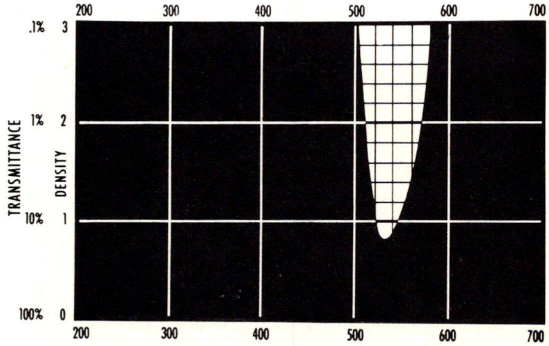
WAVE LENGTH		PERCENT TRANSMITTANCE No. 66	No. 70	No. 72B
400		13.2	—	—
10		13.4	—	—
20		14.8	—	—
30		17.9	—	—
40		22.8	—	—
50		30.1	—	—
60		41.2	—	—
70		54.5	—	—
80		67.0	—	—
90		76.4	—	—
500		81.9	—	—
10		84.2	—	—
20		84.7	—	—
30		83.3	—	—
40		79.7	—	—
50		74.6	—	—
60		67.6	—	—
70		58.6	—	—
80		46.7	—	—
90		33.8	—	1.26
600		24.6	—	5.89
10		19.4	—	5.25
20		13.7	—	2.88
30		7.3	—	1.26
40		2.92	—	0.48
50		1.36	0.63	0.14
60		1.94	10.5	—
70		8.4	35.0	—
80		26.5	55.2	—
90		49.7	70.0	—
700		68.1	79.0	—
Dominant Wave Lgth.	**(A)**	511.5	678.0	605.7
Excitation Purity	**(A)**	26.5	100.0	100.0
% Luminous Transmit.	**(A)**	50.6	0.68	1.09
x_A		0.3333	0.7331	0.6506
y_A		0.5050	0.2668	0.3490
Dominant Wave Lgth.	**(C)**	512.3	676.0	605.0
Excitation Purity	**(C)**	21.5	100.0	99.9
% Luminous Transmit.	**(C)**	58.3	0.31	0.74
x_C		0.2486	0.7328	0.6481
y_C		0.4169	0.2672	0.3515

WAVE LENGTH		PERCENT TRANSMITTANCE No. 73	No. 74	No. 75
400		—	—	—
10		—	—	—
20		—	—	—
30		—	—	—
40		—	—	—
50		—	—	—
60		—	—	1.97
70		—	—	10.0
80		—	—	17.4
90		—	—	18.0
500		—	—	13.0
10		—	0.96	7.35
20		—	7.95	3.20
30		—	14.6	0.83
40		—	12.9	0.14
50		—	7.60	—
60		2.24	3.06	—
70		5.97	0.83	—
80		4.56	0.12	—
90		2.00	—	—
600		0.56	—	—
10		0.10	—	—
20		—	—	—
30		—	—	—
40		—	—	—
50		—	—	—
60		—	—	—
70		—	—	—
80		—	—	—
90		—	—	—
700		—	—	0.14
Dominant Wave Lgth.	(A)	576.0	538.0	490.5
Excitation Purity	(A)	100.0	93.5	92.5
% Luminous Transmit.	(A)	1.41	3.34	1.01
x_A		0.4853	0.2301	0.0732
y_A		0.5134	0.7421	0.3139
Dominant Wave Lgth.	(C)	574.9	538.6	487.7
Excitation Purity	(C)	100.0	96.7	90.6
% Luminous Transmit.	(C)	1.3	4.0	1.9
x_C		0.4780	0.2227	0.0801
y_C		0.5208	0.7473	0.2542



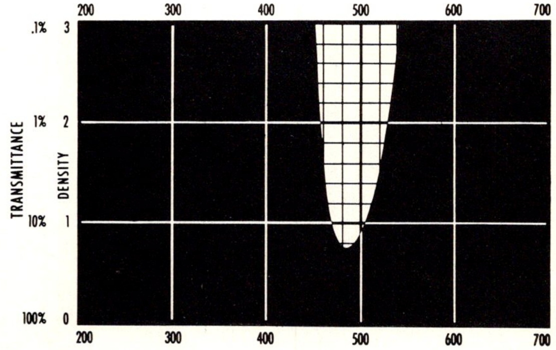
Stability: ABB

73



Stability: BBC

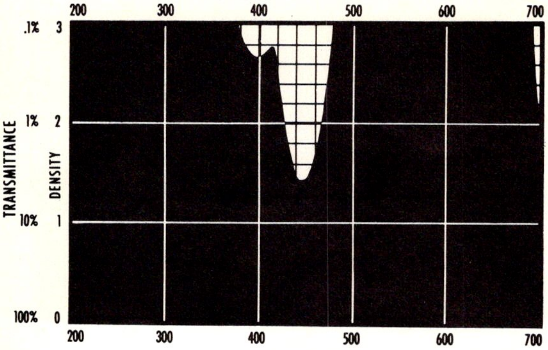
74



Stability: ACC

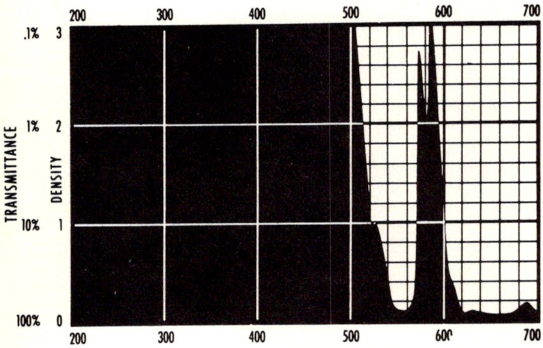
75

76



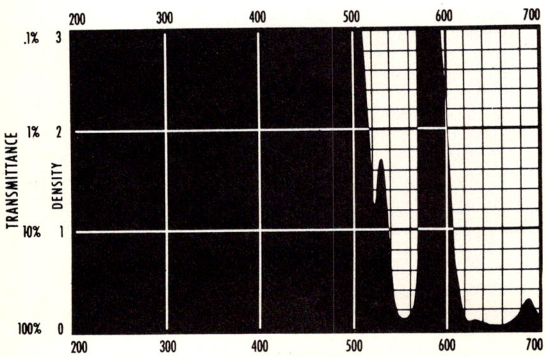
Stability: DDD

77
(Glass Plus Gelatin)



Stability: AAA

77A
(Glass Plus Gelatin)

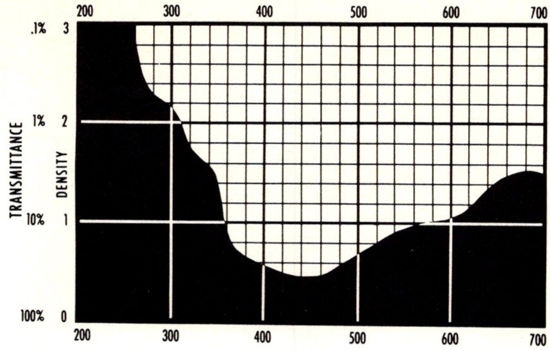


Stability: AAA

WAVE LENGTH		PERCENT TRANSMITTANCE No. 76	No. 77	No. 77A
400		0.22	—	—
10		0.18	—	—
20		0.29	—	—
30		1.38	—	—
40		3.50	—	—
50		3.50	—	—
60		1.92	—	—
70		0.51	—	—
80		—	—	—
90		—	—	—
500		—	—	—
10		—	0.30	0.10
20		—	9.10	5.35
30		—	13.5	1.90
40		—	46.1	35.0
50		—	78.0	71.8
60		—	75.8	63.1
70		—	8.00	—
80		—	1.00	—
90		—	0.32	—
600		—	16.2	1.60
10		—	52.1	32.1
20		—	83.0	78.0
30		—	84.9	79.5
40		—	88.1	86.5
50		—	89.8	89.2
60		—	89.8	89.0
70		—	85.5	79.5
80		—	76.1	62.5
90		0.13	75.0	62.4
700		1.24	86.5	83.0
Dominant Wave Lgth.	(A)	448.0	589.8	591.7
Excitation Purity	(A)	98.0	98.0	98.5
% Luminous Transmit.	(A)	0.015	36.8	29.4
x_A		0.1628	0.5715	0.5832
y_A		0.0220	0.4254	0.4143
Dominant Wave Lgth.	(C)	449.3	579.9	581.5
Excitation Purity	(C)	98.6	98.9	99.1
% Luminous Transmit.	(C)	0.046	32.3	25.5
x_C		0.1578	0.5099	0.5208
y_C		0.0181	0.4854	0.4753

WAVE LENGTH	PERCENT TRANSMITTANCE No. 79
400	24.0
10	26.0
20	29.0
30	31.0
40	32.2
50	32.7
60	31.4
70	28.8
80	25.6
90	22.2
500	19.3
10	16.8
20	14.2
30	12.7
40	11.8
50	11.0
60	9.76
70	8.81
80	8.50
90	8.29
600	7.56
10	6.45
20	5.13
30	4.17
40	3.47
50	3.16
60	3.09
70	3.16
80	3.16
90	3.16
700	3.31

Dominant Wave Lgth.	(A)	485.9
Excitation Purity	(A)	36.5
% Luminous Transmit.	(A)	9.6
x_A		0.3085
y_A		0.3378
Dominant Wave Lgth.	(C)	474.8
Excitation Purity	(C)	52.7
% Luminous Transmit.	(C)	11.3
x_C		0.2047
y_C		0.1949



Stability: AAA

79

Filters 78, 78AA, 78A, 78B, 78C **78**

See page 54

Filters 80A, 80B, 80C, 80D **80**

See page 56

Filters 81, 81A, 81B, 81C, 81D, 81EF **81**

See page 58

Filters 82, 82A, 82B, 82C **82**

See page 58

Filters 85 ,85B, 85C, 85N3, 85N6 **85**

See page 56

Filters 86, 86A, 86B, 86C **86**

See page 54

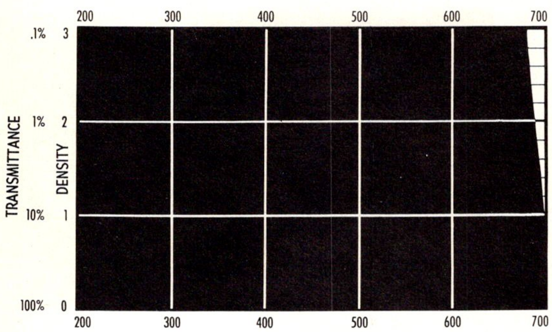
87
88A

Filters 87
87A
87B
87C
88A

No Transmittance 400-700

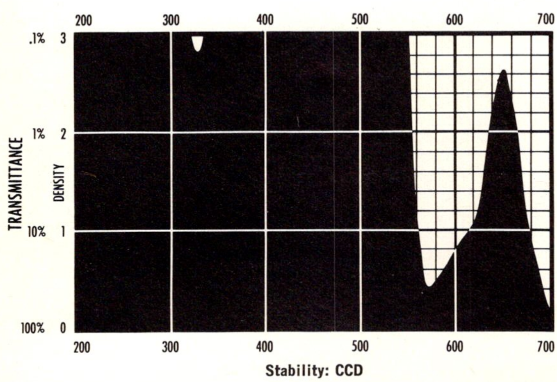
See page 70

89B



Stability: AAA

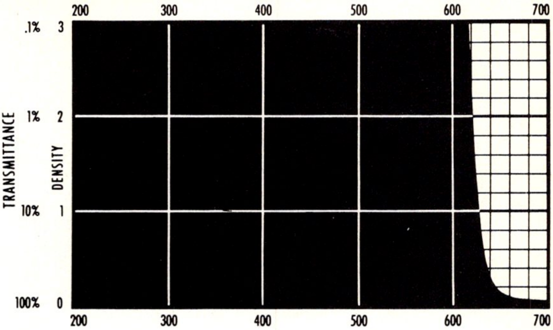
90



Stability: CCD

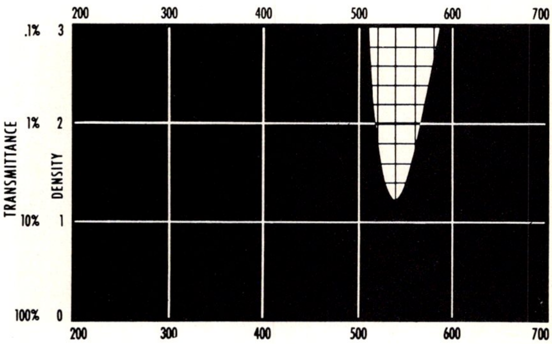
WAVE LENGTH		PERCENT TRANSMITTANCE No. 89B	No. 90
400		—	—
10		—	—
20		—	—
30		—	—
40		—	—
50		—	—
60		—	—
70		—	—
80		—	—
90		—	—
500		—	—
10		—	—
20		—	—
30		—	—
40		—	—
50		—	—
60		—	9.00
70		—	30.5
80		—	34.3
90		—	25.2
600		—	16.1
10		—	11.3
20		—	7.40
30		—	2.94
40		—	0.76
50		—	0.29
60		—	0.41
70		—	2.30
80		0.10	9.52
90		1.58	28.5
700		11.2	51.9
Dominant Wave Lgth.	**(A)**	**See**	585.6
Excitation Purity	**(A)**	**page**	100.0
% Luminous Transmit.	**(A)**	**70**	11.6
x_A			0.5484
y_A			0.4507
Dominant Wave Lgth.	**(C)**		583.2
Excitation Purity	**(C)**		99.9
% Luminous Transmit.	**(C)**		9.8
x_C			0.5329
y_C			0.4662

WAVE LENGTH	PERCENT TRANSMITTANCE No. 92	No. 93	No. 94
400	—	—	—
10	—	—	—
20	—	—	—
30	—	—	1.2
40	—	—	4.9
50	—	—	8.5
60	—	—	8.3
70	—	—	4.7
80	—	—	1.4
90	—	—	0.3
500	—	—	—
10	—	—	—
20	—	1.05	—
30	—	4.07	—
40	—	6.02	—
50	—	4.37	—
60	—	2.00	—
70	—	0.68	—
80	—	0.24	—
90	—	—	—
600	—	—	—
10	—	—	—
20	0.40	—	—
30	17.4	—	—
40	51.2	—	—
50	72.2	—	—
60	80.7	—	—
70	84.8	—	—
80	86.5	—	—
90	87.4	—	—
700	88.0	—	—
Dominant Wave Lgth. (A)	646.2	544.8	460.2
Excitation Purity (A)	100.0	95.5	99.3
% Luminous Transmit. (A)	4.8	1.4	0.06
x_A	0.7237	0.2729	0.1459
y_A	0.2763	0.7110	0.0324
Dominant Wave Lgth. (C)	645.2	544.8	458.0
Excitation Purity (C)	99.9	98.0	99.3
% Luminous Transmit. (C)	2.6	1.6	0.19
x_C	0.7231	0.2655	0.1483
y_C	0.2768	0.7173	0.0289



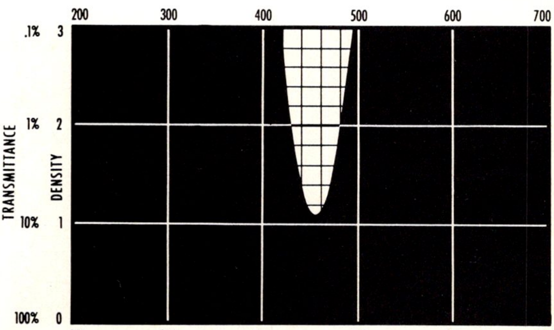
Stability: **ABB**

92



Stability: **ABB**

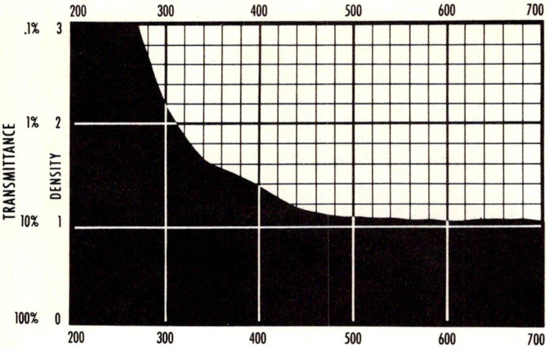
93



Stability: **AAA**

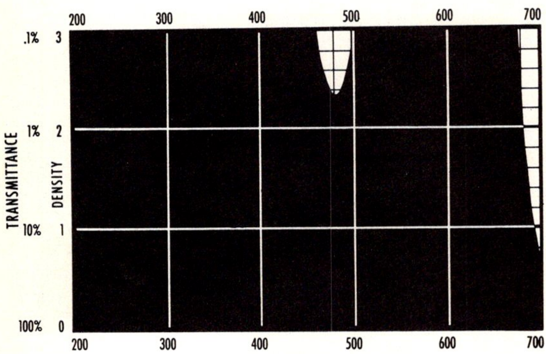
94

96
(Density =1.0)



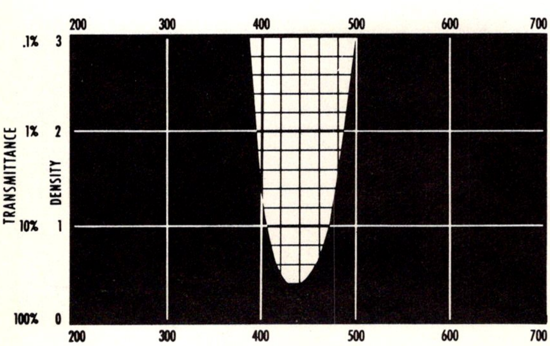
Stability: AAB

97



Stability: AAA

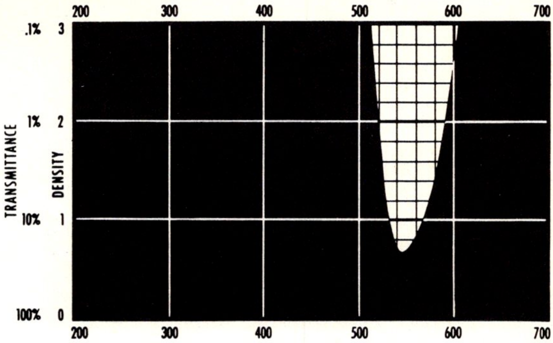
98



Stability: ACB

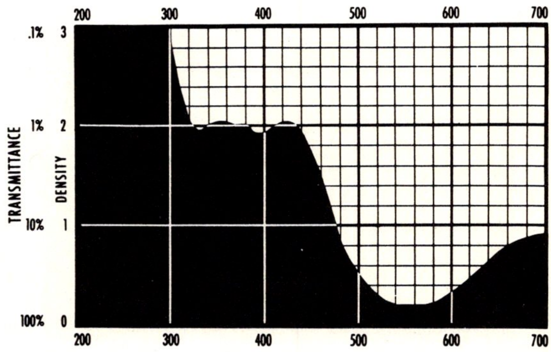
WAVE LENGTH		PERCENT TRANSMITTANCE No. 96	No. 97	No. 98
400		4.28	–	6.1
10		4.91	–	17.2
20		5.50	–	31.7
30		6.17	–	40.0
40		6.92	–	39.7
50		7.50	–	32.5
60		7.81	–	21.7
70		8.15	0.22	11.2
80		8.47	0.43	3.8
90		8.60	0.39	0.7
500		8.73	0.15	–
10		8.85	–	–
20		8.90	–	–
30		9.01	–	–
40		9.07	–	–
50		9.20	–	–
60		9.30	–	–
70		9.20	–	–
80		9.19	–	–
90		9.54	–	–
600		9.64	–	–
10		9.73	–	–
20		9.56	–	–
30		9.27	–	–
40		9.10	–	–
50		9.07	–	–
60		9.00	–	–
70		9.13	–	–
80		9.08	0.44	–
90		9.21	5.02	–
700		9.52	18.7	–
Dominant Wave Lgth.	**(A)**	582.5	516.0c	452.0
Excitation Purity	**(A)**	15.5	83.0	99.4
% Luminous Transmit.	**(A)**	9.2	0.06	0.19
x_A		0.4602	0.60	0.1553
y_A		0.4170	0.25	0.0216
Dominant Wave Lgth.	**(C)**	572.7	540.0c	449.7
Excitation Purity	**(C)**	12.1	46.0	99.3
% Luminous Transmit.	**(C)**	9.1	0.04	0.66
x_C		0.3286	0.33	0.1577
y_C		0.3430	0.21	0.0187

WAVE LENGTH		PERCENT TRANSMITTANCE No. 99	No. 102	No. 106
400		—	2.0	—
10		—	1.6	—
20		—	1.3	0.10
30		—	1.4	0.20
40		—	1.7	0.35
50		—	2.5	0.58
60		—	4.3	0.98
70		—	7.6	1.5
80		—	12.6	2.3
90		—	19.5	3.5
500		—	28.7	5.2
10		—	39.4	7.7
20		1.12	50.3	10.7
30		7.95	59.2	15.1
40		18.6	64.8	20.2
50		19.9	67.2	25.7
60		15.1	66.8	31.0
70		8.7	63.6	35.6
80		3.80	58.2	43.2
90		1.12	51.6	53.8
600		0.22	43.9	65.6
10		—	36.5	77.0
20		—	29.8	82.8
30		—	24.3	86.0
40		—	19.8	87.6
50		—	16.7	88.7
60		—	14.3	89.5
70		—	13.0	90.0
80		—	12.0	90.5
90		—	11.4	90.8
700		—	11.0	91.0
Dominant Wave Lgth.	**(A)**	554.6	571.5	596.1
Excitation Purity	**(A)**	96.5	77.5	96.5
% Luminous Transmit.	**(A)**	6.4	50.2	43.2
x_A		0.3384	0.4534	0.6019
y_A		0.6530	0.5132	0.3916
Dominant Wave Lgth.	**(C)**	553.6	564.9	589.3
Excitation Purity	**(C)**	98.7	79.9	95.1
% Luminous Transmit.	**(C)**	7.0	50.8	34.4
x_C		0.3268	0.3882	0.5583
y_C		0.6637	0.5355	0.4228



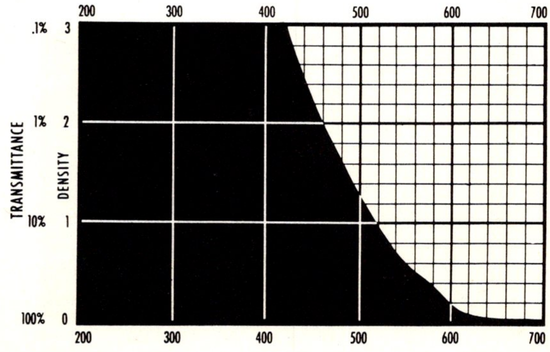
Stability: ABC

99



Stability: AAA

102



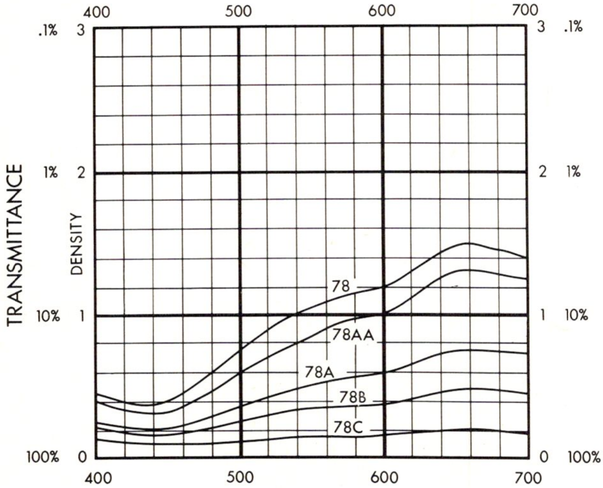
Stability: AAA

106

WAVE LENGTH		No. 78	No. 78AA	No. 78A	No. 78B	No. 78C	No. 86	No. 86A	No. 86B	No. 86C
		PERCENT TRANSMITTANCE								
400		36.5	42.7	57.5	68.9	79.1	0.50	8.00	20.0	44.0
10		40.4	46.1	60.2	70.9	80.2	0.81	12.2	26.1	55.0
20		43.6	49.4	62.6	72.5	81.2	1.55	16.7	31.6	62.0
30		44.1	50.0	63.3	72.9	81.6	2.88	21.5	37.5	66.6
40		43.2	49.4	63.1	72.8	81.8	5.50	27.8	44.0	70.8
50		40.9	47.4	61.5	71.8	81.6	9.10	34.2	50.1	74.3
60		36.7	43.6	58.5	69.8	80.9	13.5	40.4	55.4	76.8
70		31.6	38.5	54.6	67.0	79.7	17.8	45.0	59.5	78.7
80		26.4	33.1	50.5	63.9	78.5	21.3	48.7	62.5	80.2
90		21.7	28.4	46.1	60.8	76.9	24.5	51.2	64.6	81.2
500		18.0	24.4	42.4	57.7	75.4	26.8	52.8	66.0	81.7
10		14.9	21.1	38.6	54.9	73.9	27.9	53.4	66.4	81.9
20		12.6	18.2	35.4	52.2	72.6	28.6	53.7	66.6	82.0
30		11.0	16.2	33.3	50.2	71.7	30.4	55.0	67.6	82.4
40		10.0	15.1	31.9	49.0	71.1	32.5	56.5	69.0	83.0
50		9.1	13.8	30.5	47.7	70.5	35.0	58.5	70.2	83.5
60		8.1	12.6	28.9	46.1	69.7	41.2	63.0	73.0	84.6
70		7.4	11.6	27.6	44.9	69.0	53.0	70.9	78.1	86.8
80		7.2	11.1	27.3	44.4	68.8	67.5	79.0	84.0	88.9
90		6.9	10.8	27.0	44.1	68.9	76.5	85.2	87.5	89.9
600		6.2	10.0	26.0	43.0	68.2	85.0	88.1	89.3	90.6
10		5.2	8.8	24.2	41.2	67.0	88.1	89.8	90.3	91.0
20		4.2	7.4	22.0	38.9	65.5	89.6	90.5	90.7	91.1
30		3.4	6.0	19.9	36.7	64.0	90.4	90.8	90.9	91.2
40		2.9	5.1	18.4	35.2	63.1	90.7	91.1	91.1	91.3
50		2.6	4.8	17.7	34.6	62.8	91.0	91.2	91.2	91.4
60		2.6	4.9	17.8	34.8	62.8	91.1	91.3	91.3	91.5
70		2.7	5.0	18.1	35.1	63.0	91.2	91.4	91.4	91.6
80		2.7	4.9	18.2	35.2	63.0	91.3	91.4	91.5	91.6
90		2.6	4.8	18.0	35.4	63.2	91.3	91.5	91.6	91.6
700		2.8	5.0	18.4	36.4	64.1	91.3	91.5	91.6	91.6
Dominant Wave Lgth.	**(A)**	482.0	484.6	486.8	488.5	491.1	593.6	590.7	589.0	587.7
Excitation Purity	**(A)**	45.0	37.0	19.5	11.5	3.5	76.0	46.0	31.5	13.0
% Luminous Transmit.	**(A)**	8.8	13.5	29.1	44.4	69.2	57.8	72.2	78.9	86.8
x_A		0.2836	0.3083	0.3715	0.4029	0.4330	0.5607	0.5083	0.4859	0.4618
y_A		0.2953	0.3288	0.3736	0.3916	0.4044	0.4045	0.4132	0.4145	0.4112
Dominant Wave Lgth.	**(C)**	471.0	473.6	476.4	477.3	479.8	585.8	580.7	579.5	577.7
Excitation Purity	**(C)**	63.1	54.4	33.7	20.7	6.7	69.6	36.0	24.2	9.0
% Luminous Transmit.	**(C)**	10.7	15.8	31.6	46.7	70.4	49.6	67.1	75.5	85.4
x_C		0.1911	0.2035	0.2418	0.2670	0.2954	0.4773	0.3849	0.3584	0.3270
y_C		0.1563	0.1857	0.2406	0.2725	0.3039	0.4093	0.3757	0.3582	0.3330

KODAK WRATTEN PHOTOMETRIC FILTERS

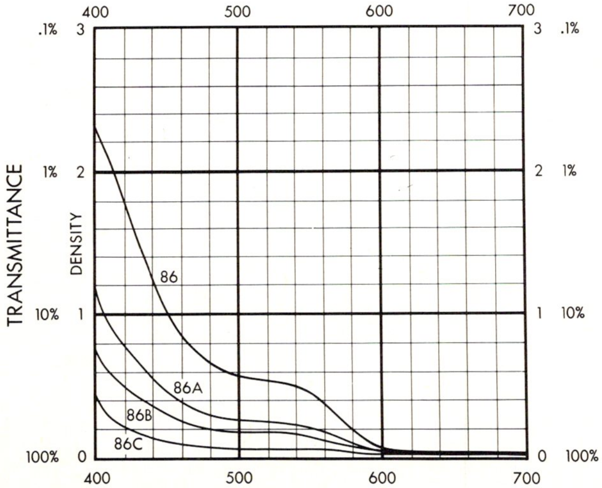
78 Series (Bluish)



78

Stability:
78—BAB
78AA—BAA
78A—AAA
78B—AAA
78C—BAA

86 Series (Yellowish)



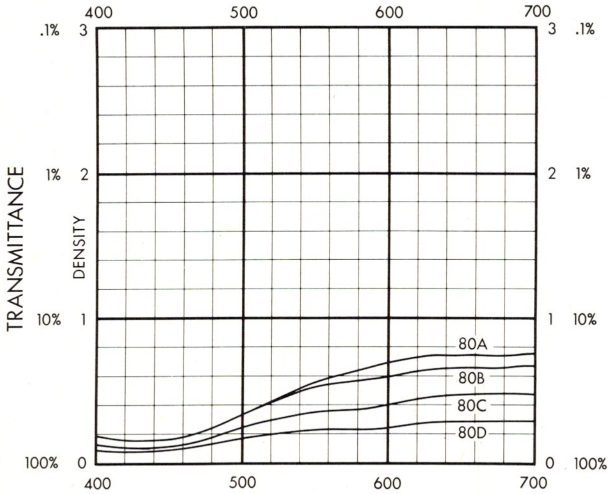
86

Stability:
86—BBA
86A—AAA
86B—BCA
86C—AAA

WAVE LENGTH	PERCENT TRANSMITTANCE No. 80A	No. 80B	No. 80C	No. 80D	No. 85	No. 85B	No. 85C	No. 85N3	No. 85N6
400	63.6	65.6	71.0	77.8	6.0	1.59	18.0	1.78	1.01
10	68.9	70.2	74.6	79.9	18.0	9.32	35.5	7.5	3.9
20	72.6	73.7	77.1	81.2	28.4	15.5	44.1	12.3	6.5
30	73.5	74.5	77.7	81.6	33.4	19.0	47.3	14.8	8.0
40	72.4	73.6	76.9	81.2	36.2	20.8	49.2	16.4	9.0
50	70.2	71.2	75.2	80.2	38.1	22.1	50.6	17.6	9.8
60	66.9	68.0	72.7	78.8	40.4	24.3	52.5	19.0	10.6
70	62.8	64.1	69.6	77.0	43.0	27.5	55.3	21.0	11.8
80	58.0	59.2	65.7	74.8	45.3	30.9	57.0	22.7	12.8
90	53.0	54.0	61.7	72.3	47.2	34.3	58.6	24.4	13.9
500	47.7	48.8	57.6	69.7	48.9	38.3	60.5	26.2	14.9
10	42.5	43.7	53.4	66.9	49.2	40.7	60.6	27.0	15.5
20	38.2	39.4	50.2	64.6	48.2	40.6	60.0	27.1	15.6
30	34.6	36.3	47.7	63.0	48.3	40.7	60.6	27.4	15.9
40	31.3	33.5	45.7	61.5	49.2	41.6	61.6	28.1	16.4
50	28.4	31.2	43.6	60.0	51.0	43.2	63.0	29.0	17.0
60	26.5	29.9	42.6	59.2	55.8	47.1	67.0	31.1	18.2
70	25.2	29.4	42.4	59.3	64.5	56.0	74.1	35.2	20.3
80	23.7	28.9	42.0	59.0	75.0	68.1	81.6	39.9	22.7
90	22.2	27.9	40.6	58.0	83.0	78.1	86.4	43.3	24.4
600	20.8	26.8	38.8	56.7	87.2	85.0	88.8	45.0	25.1
10	20.1	25.9	37.4	55.5	88.9	88.0	89.9	45.5	25.0
20	19.3	24.8	35.8	54.4	90.0	89.6	90.3	45.3	24.5
30	18.5	23.5	34.5	53.6	90.5	90.3	90.6	45.0	24.0
40	17.9	22.5	33.4	53.2	90.7	90.7	90.8	44.8	23.8
50	17.9	22.2	33.1	53.2	90.9	90.9	90.9	44.9	23.7
60	18.3	22.4	33.1	53.5	91.0	91.0	91.0	45.0	23.8
70	18.6	22.5	33.2	53.3	91.0	91.2	91.1	45.0	23.8
80	18.2	21.9	32.7	52.7	91.0	91.3	91.1	45.0	23.7
90	17.5	21.2	31.9	52.6	91.0	91.3	91.1	45.3	23.9
700	17.7	21.4	32.1	53.8	91.0	91.3	91.1	46.2	24.9
Dominant Wave Lgth. (A)	486.0	483.0	486.0	487.0	595.0	593.8	593.2	590.9	589.2
Excitation Purity (A)	27.4	21.3	12.9	6.7	41.5	58.5	30.0	45.5	45.5
% Luminous Transmit. (A)	26.9	30.4	43.6	59.7	68.0	62.3	75.3	36.1	20.4
x_A	0.3472	0.3690	0.3971	0.4215	0.5120	0.5353	0.4913	0.5081	0.5034
y_A	0.3554	0.3605	0.3829	0.3957	0.4030	0.4047	0.4070	0.4126	0.4172
Dominant Wave Lgth. (C)	475.0	474.0	475.0	476.0	587.3	585.7	585.3	582.5	580.7
Excitation Purity (C)	43.3	37.2	25.2	13.8	30.5	48.0	21.0	35.6	36.2
% Luminous Transmit. (C)	30.2	33.1	45.8	61.5	62.5	55.5	71.1	33.5	19.1
x_C	0.2237	0.2367	0.2608	0.2820	0.3860	0.4247	0.3600	0.3881	0.3850
y_C	0.2170	0.2259	0.2586	0.2857	0.3542	0.3805	0.3450	0.3712	0.3762

KODAK LIGHT BALANCING FILTERS

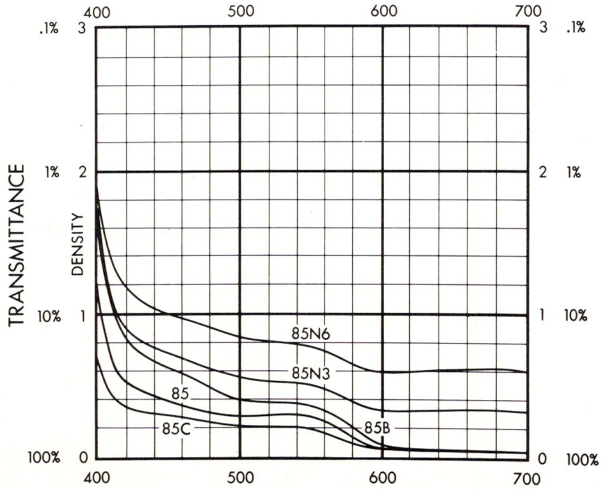
80 Series (Bluish)



80

Stability:
80A—AAA
80B—AAA
80C—AAA
80D—AAA

85 Series (Yellowish)



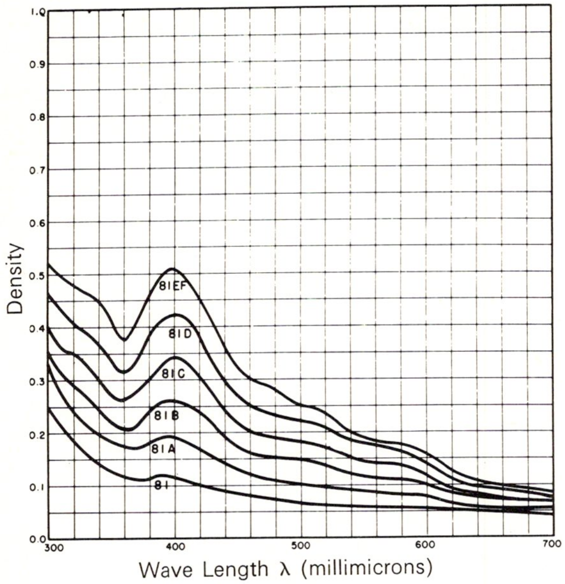
85

Stability:
85—BAA
85B—BAB
85C—ABA
85N3—AAA
85N6—AAA

WAVE LENGTH		PERCENT TRANSMITTANCE No. 81	No. 81A	No. 81B	No. 81C	No. 81D	No. 81EF	No. 82	No. 82A	No. 82B	No. 82C
400		77.7	65.1	55.1	46.1	38.2	30.7	83.0	80.1	76.7	73.4
10		78.1	65.9	55.8	46.6	38.4	31.5	83.7	80.8	78.0	75.0
20		79.0	67.6	57.7	49.0	41.0	34.3	84.6	81.6	79.2	76.4
30		80.5	70.2	61.0	52.5	45.5	38.6	85.1	82.2	79.7	77.2
40		81.9	72.8	64.5	57.2	50.0	43.2	85.4	82.4	79.7	77.2
50		83.0	74.8	67.2	60.5	53.9	47.4	85.4	82.4	79.2	76.6
60		83.7	76.0	69.1	63.0	56.5	50.2	85.0	81.7	78.0	75.2
70		84.3	77.1	70.6	64.2	58.1	52.0	84.6	80.7	76.3	73.2
80		84.6	77.8	71.3	65.0	59.0	53.0	84.0	79.3	74.4	70.7
90		84.9	78.3	71.8	65.7	60.0	54.0	83.3	78.0	72.1	68.1
500		85.3	78.6	72.6	66.4	60.8	55.4	82.6	76.6	70.2	65.7
10		85.4	79.0	72.9	66.5	61.1	56.2	82.0	75.3	68.3	63.5
20		85.5	79.5	73.2	67.0	61.6	57.0	81.4	74.0	66.5	61.5
30		86.0	80.4	74.5	68.8	63.5	59.5	81.0	73.1	65.5	59.9
40		86.5	81.5	76.0	71.0	66.1	62.7	80.8	72.7	65.0	59.1
50		86.8	82.3	77.0	72.0	67.3	64.5	80.6	72.4	64.5	58.3
60		87.0	82.6	77.6	72.5	68.0	65.3	80.4	71.8	63.8	57.2
70		87.1	82.7	77.8	72.7	68.3	65.8	80.2	71.5	63.2	56.2
80		87.1	82.8	78.0	73.0	68.5	66.0	80.2	71.5	63.2	56.1
90		87.4	83.1	78.2	74.0	69.5	66.5	80.3	71.7	63.4	56.0
600		87.6	84.0	79.1	75.6	72.0	68.1	80.2	71.5	63.0	55.0
10		88.1	85.0	81.0	78.5	75.0	71.6	79.3	70.3	61.5	53.0
20		88.8	86.1	83.1	80.8	78.0	74.7	78.4	68.5	59.0	50.2
30		89.2	87.0	84.2	82.1	79.8	77.0	77.5	66.9	56.9	47.4
40		89.4	87.4	85.1	83.0	80.8	78.4	76.8	65.5	55.0	45.2
50		89.5	87.7	85.6	83.5	81.5	79.2	76.5	64.8	54.1	44.1
60		89.8	88.0	86.0	84.1	82.1	80.1	76.2	64.6	53.7	43.6
70		90.0	88.2	86.5	84.8	83.0	80.9	76.1	64.5	53.7	43.5
80		90.1	88.5	87.0	85.5	83.7	81.8	76.1	64.4	53.5	43.1
90		90.3	89.0	87.5	86.1	84.6	82.9	76.2	64.2	53.4	42.8
700		90.5	89.2	88.0	86.8	85.5	84.0	77.1	64.6	54.1	43.5
Dominant Wave Lgth.	**(A)**	587.2	587.5	588.0	589.0	589.4	588.4	490.8	489.6	488.6	489.4
Excitation Purity	**(A)**	4.0	9.0	12.0	16.0	20.5	26.0	1.5	3.0	5.0	7.5
% Luminous Transmit.	**(A)**	87.2	82.9	78.1	73.6	69.4	66.1	80.1	71.5	63.3	56.2
x_A		0.4522	0.4573	0.4620	0.4675	0.4729	0.4778	0.4416	0.4350	0.4275	0.4171
y_A		0.4089	0.4102	0.4108	0.4110	0.4116	0.4142	0.4061	0.4035	0.4003	0.3981
Dominant Wave Lgth.	**(C)**	577.2	577.5	578.0	579.0	579.4	578.7	477.8	476.6	476.0	477.3
Excitation Purity	**(C)**	2.9	6.0	8.7	11.5	14.7	18.9	2.9	6.3	10.1	14.3
% Luminous Transmit.	**(C)**	86.8	82.0	76.9	72.0	67.4	63.9	80.6	72.5	64.6	58.1
x_C		0.3154	0.3213	0.3266	0.3329	0.3393	0.3468	0.3041	0.2970	0.2894	0.2803
y_C		0.3218	0.3275	0.3322	0.3367	0.3418	0.3501	0.3107	0.3028	0.2941	0.2863

Kodak LIGHT BALANCING FILTERS

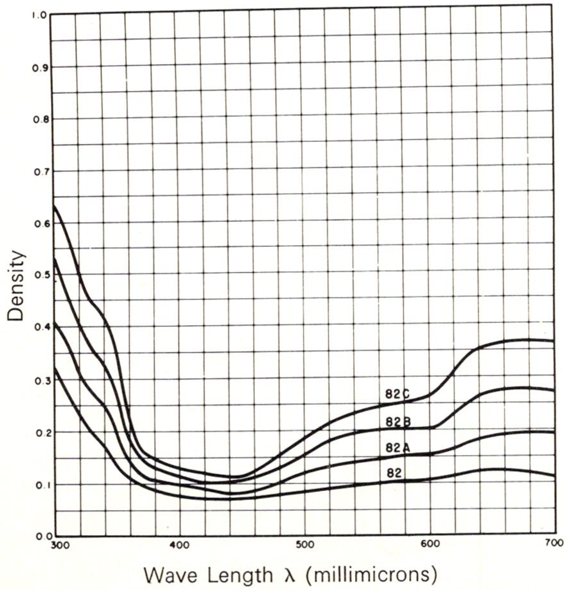
81 Series (Yellowish)



81

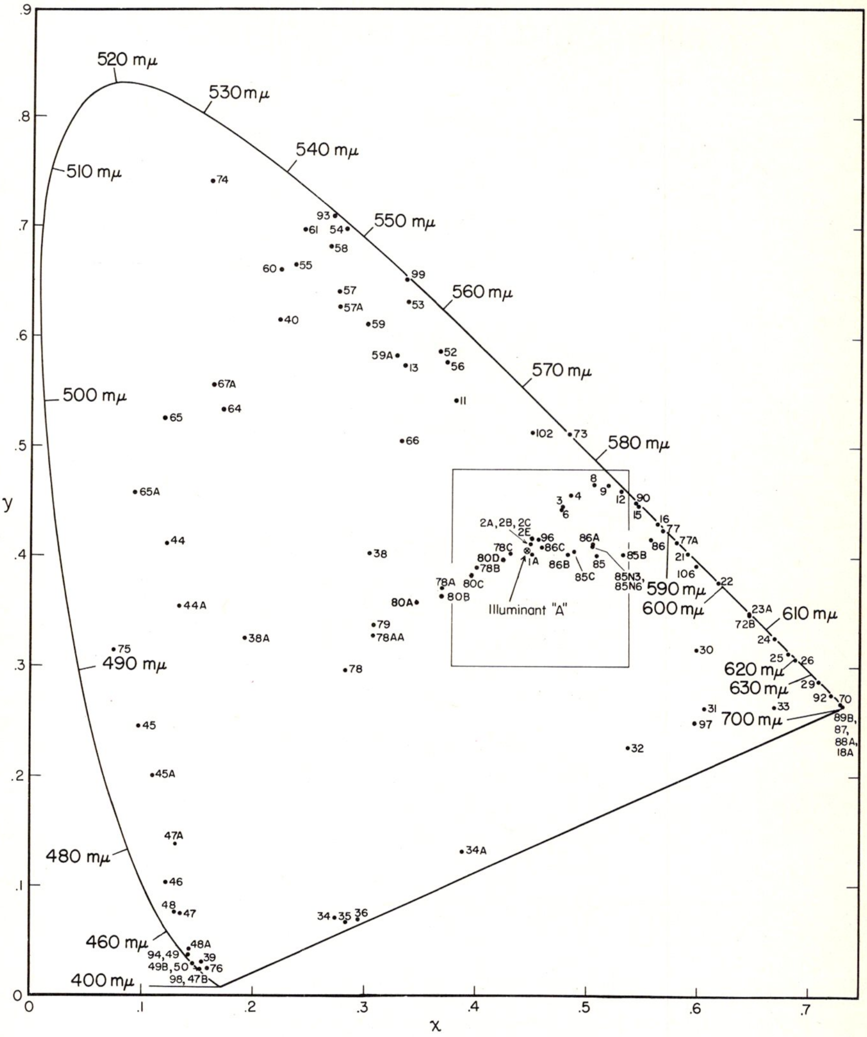
Stability:
81—AAA
81A—AAA
81B—ABA
81C—BBA
81D—BBA
81EF—BBA

82 Series (Bluish)

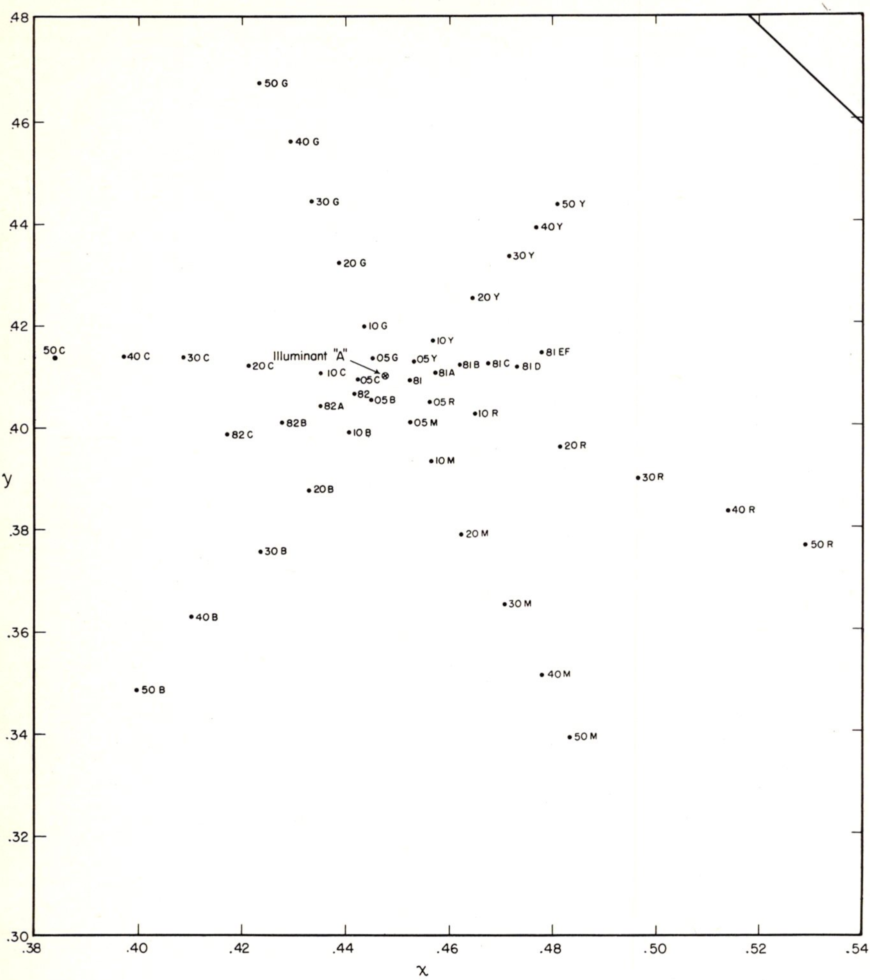


82

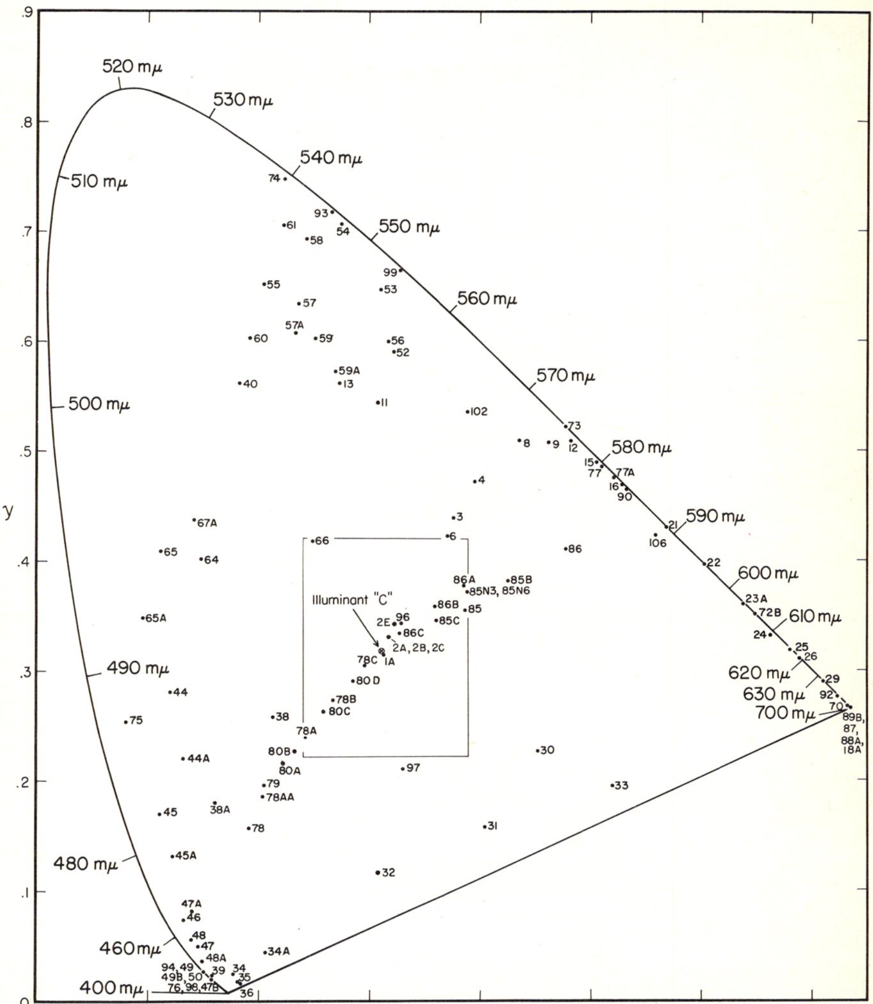
Stabiilty:
82—AAA
82A—AAA
82B—BBA
82C—BAA



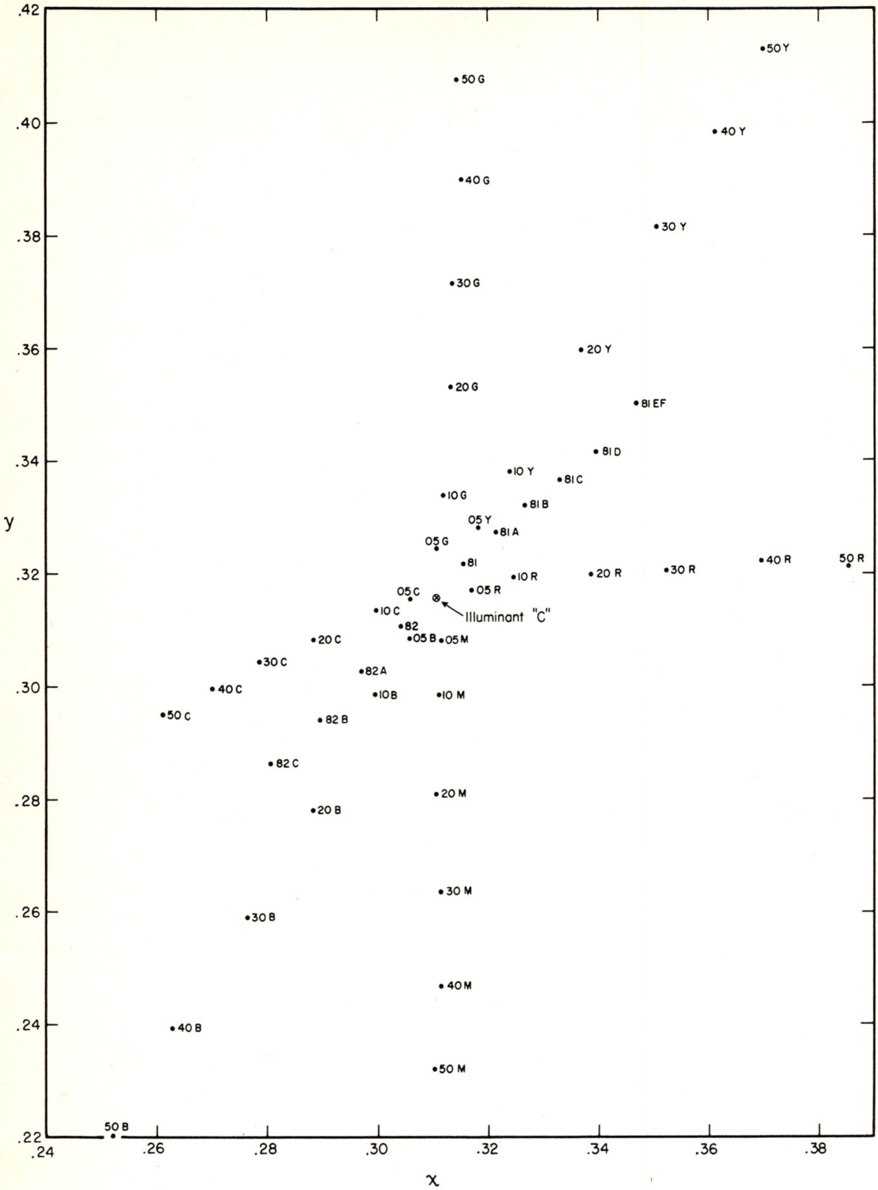
Chromaticity diagram for Standard Source "A" (tungsten light). This diagram shows the colors of various WRATTEN filters when they are illuminated by the Standard Source "A" specified by the International Commission on Illumination (CIE). The Standard Source "A" has a color temperature of 2854 K, equivalent to high-wattage tungsten light. The coordinates x_A and y_A for each filter are given in the data tables on pages 24 through 71. The rectangular outlined portion in the middle of the diagram shows the area covered by the enlarged section on page 61.



Chromaticity diagram for Standard Source "A" (enlarged section). This diagram is an enlargement of the portion indicated by the small rectangle in the diagram on page 60. It shows the colors of certain filters which are grouped closely together near white. Filters of this nature, such as KODAK Color Compensating Filters and KODAK Light Balancing Filters, are frequently used in color photography and photometry.



Chromaticity diagram for Standard Source "C" (artificial daylight). This shows the colors of various WRATTEN filters when they are illuminated by the Standard Source "C" specified by the International Commission on Illumination (CIE). The Standard Source "C" is approximately equivalent to average daylight, having a color temperature of 6750 K. The coordinates x_C and y_C for each filter are given in the data tables on pages 24 through 71. The rectangular outlined portion in the middle of the diagram shows the area covered by the enlarged section on page 63.

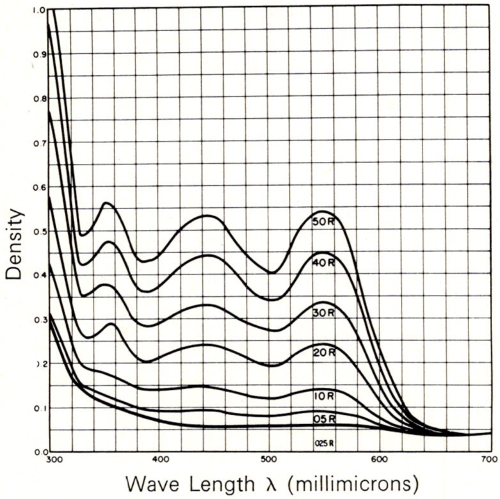


Chromaticity diagram for Standard Source "C" (enlarged section). This diagram is an enlargement of the portion indicated by the small rectangle in the diagram on page 62. It shows the colors of certain filters which are grouped closely together near white. Filters of this nature, such as KODAK Color Compensating Filters and KODAK Light Balancing Filters, are frequently used in color photography and photometry.

WAVE LENGTH	PERCENT TRANSMITTANCE											
	CC05R	CC10R	CC20R	CC30R	CC40R	CC50R	CC05B	CC10B	CC20B	CC30B	CC40B	CC50B
400	79.2	72.0	58.1	47.1	38.1	30.4	87.0	85.5	82.2	80.2	77.0	74.1
10	79.2	71.6	57.3	46.0	36.7	29.1	87.5	86.4	84.0	82.5	80.3	78.4
20	79.3	71.4	56.6	45.0	35.5	28.2	87.7	87.2	85.0	84.0	82.2	80.7
30	79.4	71.3	56.3	44.5	34.7	27.8	88.0	87.5	85.3	84.3	82.5	81.1
40	79.5	71.5	56.3	44.4	34.4	27.7	88.1	87.5	85.0	83.5	81.3	79.8
50	79.6	71.6	56.5	44.6	34.5	28.0	88.1	87.2	83.9	81.9	78.7	76.6
60	79.9	71.9	57.2	45.2	35.2	28.9	87.9	86.4	82.5	79.5	75.9	72.9
70	80.5	72.9	58.7	47.0	37.2	31.1	87.5	85.3	80.3	76.2	72.0	67.9
80	81.3	74.4	61.2	50.2	40.7	34.7	87.0	84.0	77.8	72.5	67.5	62.7
90	82.1	75.9	63.4	53.0	44.0	37.6	86.2	82.4	74.2	68.3	62.3	56.6
500	82.2	76.2	64.0	53.7	45.0	38.0	85.2	80.5	71.2	63.8	56.7	50.1
10	81.7	75.4	62.6	52.0	43.5	35.8	84.4	78.6	67.7	58.7	51.0	44.5
20	81.0	74.1	60.5	49.3	40.7	32.7	83.5	77.0	64.0	54.4	46.0	38.6
30	80.4	72.8	58.4	46.8	38.0	29.7	82.6	75.2	61.5	50.7	41.6	34.1
40	80.0	72.1	57.1	45.2	36.3	27.9	82.1	73.9	59.5	48.3	39.0	31.3
50	79.9	71.9	56.7	44.7	35.8	27.3	81.5	73.0	58.0	46.6	36.9	29.5
60	80.4	72.6	57.6	45.7	36.9	28.2	81.4	72.7	57.5	45.9	35.9	28.6
70	81.3	74.3	60.5	48.9	40.3	31.4	81.4	73.0	57.9	46.3	36.1	28.7
80	83.2	77.3	65.1	54.5	46.3	37.6	81.9	73.9	59.3	47.9	37.8	30.5
90	85.2	80.7	71.2	62.4	54.9	47.1	82.7	75.1	61.6	50.3	40.8	33.4
600	87.0	84.0	77.6	70.7	64.5	58.0	83.4	76.3	63.5	53.0	43.5	36.0
10	88.4	86.7	82.6	78.0	73.3	68.8	83.6	76.7	64.5	54.6	44.7	37.8
20	89.5	88.6	86.2	83.3	80.5	77.7	83.5	76.5	64.3	54.4	44.3	37.5
30	90.1	89.7	88.4	86.9	84.9	83.4	83.2	75.6	63.1	53.2	42.5	35.6
40	90.4	90.4	89.7	88.9	87.7	86.8	82.8	74.5	61.6	51.5	40.2	33.7
50	90.7	90.6	90.4	89.9	89.2	88.7	82.5	74.0	60.6	50.3	39.0	32.4
60	90.8	90.7	90.6	90.4	89.9	89.7	82.5	73.8	60.1	49.5	38.4	31.8
70	90.9	90.9	90.7	90.6	90.3	90.2	82.3	73.3	59.6	49.0	37.7	31.0
80	91.0	91.0	90.9	90.8	90.5	90.4	82.0	72.8	58.6	48.2	36.5	30.0
90	91.1	91.0	91.0	90.9	90.7	90.6	81.9	72.5	58.1	47.2	35.4	29.0
700	91.1	91.1	91.0	91.0	90.9	90.8	82.2	73.0	58.5	47.5	35.6	29.0
Dominant Wave Lgth. (A)	610.0	607.0	611.0	613.5	613.5	615.5	478.9	460.0	443.0	448.0	463.0	461.0
Excitation Purity (A)	4.0	8.0	15.0	21.5	29.0	34.5	1.0	2.5	5.0	8.5	12.0	16.0
% Luminous Transmit. (A)	84.6	78.7	68.1	59.6	51.7	46.1	81.1	75.0	61.5	50.9	41.3	34.1
x_A	0.4562	0.4649	0.4813	0.4965	0.5140	0.5290	0.4449	0.4404	0.4328	0.4235	0.4100	0.3995
y_A	0.4044	0.4021	0.3956	0.3895	0.3830	0.3764	0.4053	0.3985	0.3871	0.3751	0.3624	0.3481
Dominant Wave Lgth. (C)	604.0	598.0	604.0	605.8	605.5	608.5	458.0	462.5	460.5	461.0	464.0	462.8
Excitation Purity (C)	2.1	4.7	8.6	12.4	17.4	21.4	2.7	6.3	13.2	20.1	27.6	34.2
% Luminous Transmit. (C)	83.7	77.0	65.3	55.9	47.3	41.2	82.8	75.5	62.3	52.0	42.8	35.7
x_C	0.3170	0.3246	0.3385	0.3522	0.3695	0.3851	0.3057	0.2994	0.2881	0.2763	0.2626	0.2519
y_C	0.3171	0.3194	0.3199	0.3206	0.3222	0.3213	0.3087	0.2987	0.2789	0.2592	0.2393	0.2201

Kodak COLOR COMPENSATING FILTERS

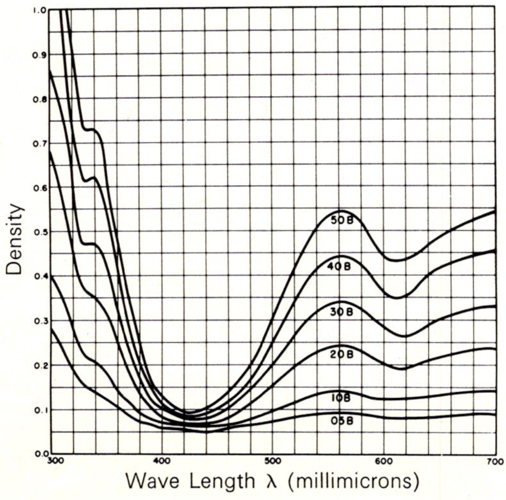
RED



Stability:
CC025R—AAA
CC05R—AAA
CC10R—AAA
CC20R—AAA
CC30R—ABA
CC40R—ABA
CC50R—ABA

CC
R

BLUE



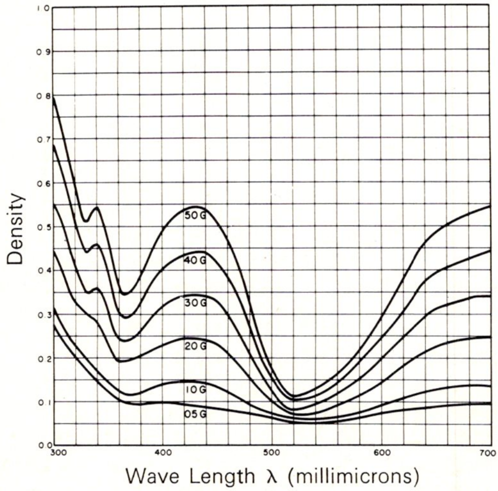
Stability:
CC05B—AAA
CC10B—AAA
CC20B—AAA
CC30B—ABA
CC40B—ABA
CC50B—ABA

CC
B

WAVE LENGTH	PERCENT TRANSMITTANCE												
		CC05G	CC10G	CC20G	CC30G	CC40G	CC50G	CC05Y	CC10Y	CC20Y	CC30Y	CC40Y	CC50Y
400		79.6	71.3	57.4	45.2	36.1	29.4	78.8	72.3	58.2	47.1	38.3	31.3
10		79.7	71.5	56.4	44.8	35.5	28.9	78.6	71.6	56.8	45.3	36.3	29.2
20		79.9	71.8	55.9	45.0	35.5	29.0	78.6	71.4	55.9	44.3	35.3	27.9
30		80.1	72.2	55.6	45.6	35.7	29.6	78.8	71.6	55.7	44.2	35.0	27.5
40		80.6	72.8	55.9	46.6	36.6	30.8	79.2	72.4	56.3	44.9	35.7	27.9
50		81.1	73.7	57.1	48.3	38.1	32.5	79.7	73.3	57.4	45.3	37.3	29.2
60		81.8	74.9	59.9	51.0	40.8	35.5	80.6	74.7	59.7	49.0	40.2	31.8
70		83.1	77.1	64.3	55.8	46.2	41.1	82.2	77.2	63.9	54.1	45.9	37.2
80		84.8	80.1	69.2	62.9	54.5	49.9	84.4	80.4	70.6	62.2	55.6	47.1
90		86.6	83.1	74.8	70.3	64.0	60.0	86.6	84.1	77.4	71.5	66.6	59.7
500		87.7	85.4	80.6	76.2	71.5	68.1	88.1	86.8	82.9	79.4	76.6	71.8
10		88.4	86.6	83.7	79.2	75.6	72.7	89.1	88.4	86.3	84.3	82.6	80.0
20		88.7	87.0	84.8	80.4	77.1	74.5	89.6	89.3	88.1	86.9	85.9	84.4
30		88.6	87.0	84.4	80.2	77.1	74.2	89.9	89.9	89.0	88.3	87.5	86.7
40		88.5	86.7	83.4	79.1	75.8	72.4	90.2	90.1	89.6	89.0	88.4	87.9
50		88.2	86.1	82.2	77.6	73.8	70.2	90.4	90.3	89.9	89.5	89.0	88.6
60		87.9	85.4	80.6	75.3	71.3	66.9	90.6	90.5	90.0	89.8	89.4	89.2
70		87.4	84.4	78.8	72.4	68.3	63.0	90.7	90.6	90.4	90.0	89.7	89.6
80		86.8	83.2	76.5	69.4	64.6	58.6	90.8	90.7	90.5	90.3	89.9	89.9
90		86.2	81.9	74.0	66.2	61.1	54.6	90.9	90.8	90.6	90.5	90.1	90.0
600		85.6	80.6	71.7	63.2	57.3	50.4	90.9	90.8	90.6	90.6	90.3	90.2
10		84.8	79.3	69.1	59.8	53.7	46.2	91.0	90.9	90.7	90.6	90.4	90.4
20		83.8	77.7	66.2	55.9	49.6	41.5	91.0	90.9	90.8	90.7	90.5	90.5
30		82.9	76.1	63.4	52.3	45.7	37.4	91.0	91.0	90.8	90.7	90.5	90.5
40		82.3	74.1	61.1	49.8	42.5	34.3	91.1	91.0	90.9	90.8	90.6	90.6
50		82.0	73.8	59.5	48.2	40.5	32.6	91.1	91.0	90.9	90.9	90.7	90.7
60		81.7	73.4	58.8	47.3	39.5	31.7	91.2	91.1	91.0	91.0	90.8	90.8
70		81.5	73.0	58.3	46.6	38.8	30.8	91.2	91.1	91.0	91.0	90.9	90.9
80		81.1	72.5	57.5	45.5	37.7	29.7	91.3	91.2	91.1	91.1	91.0	91.0
90		81.1	72.1	56.7	44.7	36.6	28.8	91.3	91.2	91.2	91.1	91.1	91.1
700		81.4	72.5	56.9	45.6	36.5	29.3	91.4	91.3	91.3	91.2	91.1	91.1
Dominant Wave Lgth.	**(A)**	554.6	559.0	559.0	558.0	558.5	557.0	581.6	581.4	581.0	580.8	580.7	580.7
Excitation Purity	**(A)**	2.5	5.5	10.5	15.5	21.0	24.5	7.5	13.0	23.5	34.5	42.0	48.0
% Luminous Transmit.	**(A)**	86.8	83.7	76.3	70.2	65.3	60.5	90.9	90.7	90.3	89.8	89.4	89.1
x_A		0.4451	0.4434	0.4386	0.4333	0.4292	0.4232	0.4531	0.4567	0.4643	0.4716	0.4767	0.4808
y_A		0.4131	0.4193	0.4319	0.4439	0.4556	0.4670	0.4125	0.4166	0.4249	0.4332	0.4388	0.4432
Dominant Wave Lgth.	**(C)**	553.0	555.5	555.0	554.0	554.4	553.3	572.0	571.5	571.2	571.2	571.2	571.2
Excitation Purity	**(C)**	2.3	5.2	10.8	15.8	21.2	25.9	5.4	9.5	18.8	28.4	35.6	42.0
% Luminous Transmit.	**(C)**	87.2	84.5	77.8	72.2	67.7	63.3	90.4	90.1	89.1	88.2	87.4	86.9
x_C		0.3105	0.3117	0.3131	0.3134	0.3151	0.3143	0.3181	0.3239	0.3369	0.3506	0.3610	0.3699
y_C		0.3245	0.3340	0.3533	0.3716	0.3900	0.4078	0.3283	0.3382	0.3597	0.3816	0.3985	0.4131

KODAK COLOR COMPENSATING FILTERS

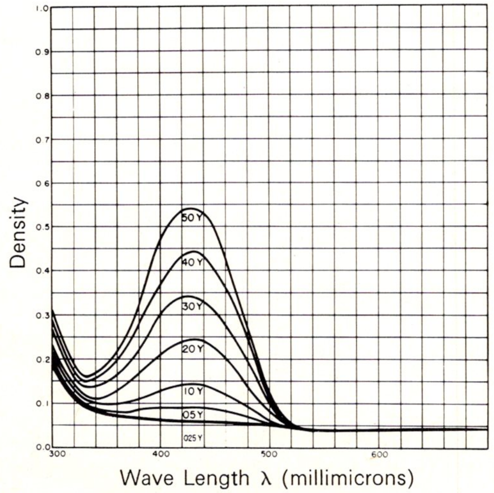
GREEN



CC G

Stability:
CC05G—AAA
CC10G—AAA
CC20G—ABA
CC30G—ABA
CC40G—ABB
CC50G—ABB

YELLOW



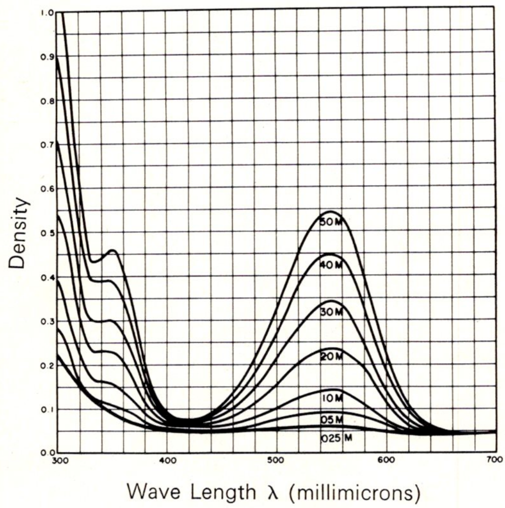
CC Y

Stability:
CC025Y—AAA
CC05Y—AAA
CC10Y—AAA
CC20Y—AAA
CC30Y—AAA
CC40Y—AAA
CC50Y—AAA

WAVE LENGTH	PERCENT TRANSMITTANCE											
	CC05M	CC10M	CC20M	CC30M	CC40M	CC50M	CC05C	CC10C	CC20C	CC30C	CC40C	CC50C
400	87.6	86.6	85.6	84.2	82.3	80.9	87.3	86.0	83.9	82.3	80.4	78.8
10	88.2	87.7	86.6	85.7	84.6	83.6	88.2	87.5	85.2	84.5	83.4	82.7
20	88.6	88.0	87.0	85.9	85.2	84.4	88.7	88.1	86.5	86.0	85.3	84.8
30	88.7	88.0	86.9	85.6	84.4	83.6	89.0	88.6	87.5	87.0	86.3	85.9
40	88.7	87.9	86.0	84.7	82.5	81.4	89.3	89.0	87.7	87.3	86.6	86.1
50	88.6	87.5	84.9	82.8	80.0	78.1	89.5	89.1	87.8	87.5	86.6	86.0
60	88.4	86.5	83.1	80.0	76.1	73.7	89.6	89.1	87.7	87.3	86.4	85.7
70	87.8	85.2	80.8	76.4	71.3	68.0	89.7	89.0	87.5	87.0	85.8	85.2
80	87.0	83.6	77.9	72.1	65.8	61.7	89.7	89.0	87.2	86.5	85.3	84.3
90	86.0	81.8	74.4	67.0	60.0	55.0	89.7	89.0	87.0	86.0	84.4	83.4
500	85.0	79.7	70.5	61.7	53.7	48.1	89.6	89.0	86.5	85.2	83.5	82.3
10	83.8	77.5	66.7	56.5	47.7	41.6	89.6	88.7	86.0	84.4	82.4	80.8
20	82.7	75.3	63.4	52.0	42.8	36.3	89.5	88.5	85.2	83.5	81.1	79.2
30	81.8	73.7	60.5	48.6	39.0	31.9	89.4	88.0	84.3	82.4	79.6	77.3
40	81.3	72.5	58.6	46.6	36.7	29.8	89.2	87.5	83.4	81.0	77.7	75.0
50	81.2	72.2	58.0	46.0	36.0	29.1	88.9	87.0	82.3	79.0	75.3	72.2
60	81.5	72.8	58.3	46.5	36.7	29.7	88.5	86.1	80.5	76.7	72.7	69.0
70	82.5	74.6	60.5	49.8	40.2	32.3	88.0	85.0	78.5	74.0	69.3	65.0
80	84.0	77.3	64.9	55.6	46.2	39.0	87.5	83.8	76.1	70.9	65.4	60.5
90	85.8	80.8	70.6	63.3	54.9	48.7	87.0	82.5	73.9	67.5	61.6	55.8
600	88.0	84.5	77.1	71.6	64.9	59.9	86.4	81.0	71.2	64.1	57.6	51.3
10	89.3	87.0	82.2	79.2	74.9	70.7	85.5	79.5	68.5	60.4	53.4	46.2
20	90.2	88.9	86.1	84.1	81.4	79.2	84.5	77.9	65.5	56.7	49.2	42.3
30	90.6	90.0	88.7	87.4	86.0	84.5	83.8	76.3	62.7	53.1	45.0	38.0
40	90.8	90.5	90.0	89.3	88.7	87.6	83.3	75.1	60.8	50.4	42.0	34.9
50	91.0	90.7	90.5	90.2	90.0	89.7	82.8	74.4	59.5	48.8	40.2	32.9
60	91.1	91.0	90.8	90.8	90.4	90.4	82.5	74.0	58.5	48.0	39.4	32.0
70	91.2	91.2	91.0	91.0	90.7	90.7	82.4	73.6	57.9	47.2	38.6	31.0
80	91.3	91.3	91.2	91.1	91.0	91.0	82.0	73.0	57.5	46.0	37.5	29.9
90	91.4	91.4	91.4	91.3	91.3	91.3	82.0	72.8	57.4	45.5	36.7	29.1
700	91.5	91.5	91.5	91.5	91.5	91.5	82.5	74.0	58.5	46.4	37.3	29.8
Dominant Wave Lgth. (A)	535.4c	543.0c	549.0c	547.5c	548.0c	549.0c	499.7	498.6	497.6	497.4	496.9	496.7
Excitation Purity (A)	3.5	7.0	13.0	19.5	25.5	31.0	1.0	3.0	6.0	9.0	12.0	14.5
% Luminous Transmit. (A)	84.9	79.1	69.0	60.8	53.2	47.5	87.4	83.8	76.4	71.4	66.4	61.9
x_A	0.4524	0.4563	0.4628	0.4706	0.4779	0.4833	0.4422	0.4350	0.4211	0.4084	0.3970	0.3846
y_A	0.4004	0.3929	0.3787	0.3647	0.3509	0.3387	0.4090	0.4102	0.4117	0.4133	0.4137	0.4141
Dominant Wave Lgth. (C)	541.0c	547.5c	551.2c	550.0c	550.3c	551.2c	489.0	487.5	486.4	486.3	485.8	485.6
Excitation Purity (C)	3.5	7.4	14.5	21.4	28.2	33.9	1.7	4.1	8.8	12.8	16.4	20.2
% Luminous Transmit. (C)	84.2	77.9	67.1	58.0	49.9	44.0	88.0	85.1	78.9	74.8	70.5	66.7
x_C	0.3114	0.3114	0.3104	0.3112	0.3112	0.3101	0.3058	0.2997	0.2882	0.2786	0.2699	0.2609
y_C	0.3082	0.2986	0.2808	0.2634	0.2467	0.2320	0.3156	0.3135	0.3084	0.3044	0.2997	0.2950

KODAK COLOR COMPENSATING FILTERS

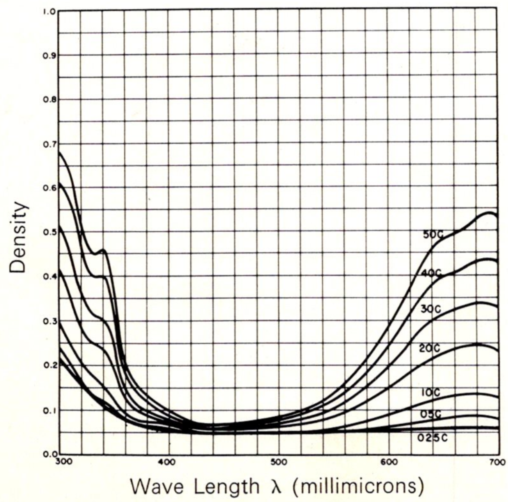
MAGENTA



CC
M

Stability:
CC025M—AAA
CC05M—AAA
CC10M—AAA
CC20M—ABA
CC30M—BBA
CC40M—BCB
CC50M—ACA

CYAN



CC
C

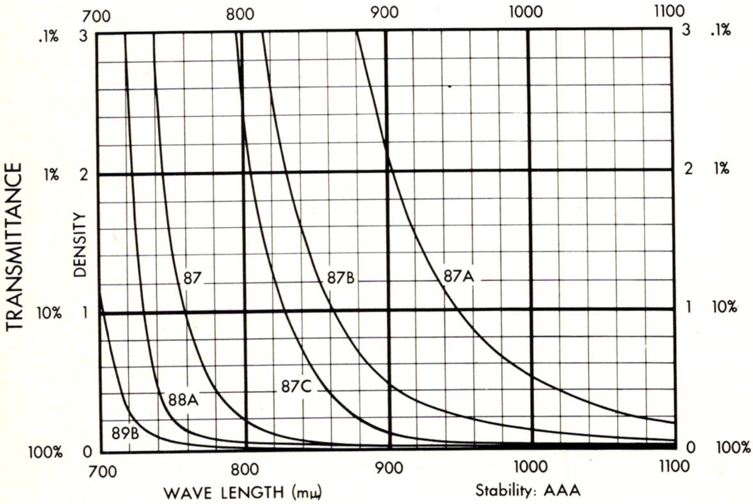
Stability:
CC025C—AAA
CC05C—AAA
CC10C—ABA
CC20C—ABA
CC30C—ACA
CC40C—ACA
CC50C—BDA

WAVE LENGTH	PERCENT TRANSMITTANCE No. 87	No. 87A	No. 87B	No. 87C	No. 88A	No. 89B*
700	—	—	—	—	—	11.2
10	—	—	—	—	—	32.4
20	—	—	—	—	—	57.6
30	—	—	—	—	3.16	69.1
40	0.10	—	—	—	19.0	77.6
50	2.37	—	—	—	37.8	83.1
60	8.82	—	—	—	55.2	85.0
70	21.0	—	—	—	69.5	86.1
80	36.2	—	—	—	78.4	87.0
90	52.0	—	—	—	81.5	87.7
800	63.8	—	—	0.32	82.6	88.1
10	72.2	—	—	3.20	83.0	88.4
20	78.0	—	0.10	8.90	83.8	88.6
30	82.2	—	0.60	17.8	84.5	88.8
40	84.5	—	1.86	28.2	85.0	89.0
50	86.2	—	4.07	41.0	85.4	89.2
60	87.7	—	7.58	53.8	85.8	89.4
70	88.7	—	12.7	61.6	86.2	89.6
80	89.5	0.10	18.0	69.2	86.5	89.8
90	90.0	0.28	24.5	74.1	86.8	89.9
900	90.4	0.73	31.2	78.5	87.0	90.0
10	90.6	1.55	38.0	81.5	87.2	90.1
20	90.8	2.95	44.1	83.6	87.4	90.2
30	91.0	4.89	49.5	85.1	87.5	90.3
40	91.1	7.33	53.7	86.0	87.6	90.4
50	91.2	10.2	58.2	87.0	87.7	90.5
60	—	14.0	61.7	—	—	—
70	—	17.8	64.6	—	—	—
80	—	21.8	67.6	—	—	—
90	—	26.3	70.0	—	—	—
1000	—	30.2	73.3	—	—	—
10	—	33.8	75.8	—	—	—
20	—	38.0	78.5	—	—	—
30	—	42.1	80.2	—	—	—
40	—	46.7	82.2	—	—	—
50	—	50.6	84.1	—	—	—
60	—	54.3	87.2	—	—	—
70	—	58.3	88.1	—	—	—
80	—	60.9	88.2	—	—	—
90	—	63.1	89.1	—	—	—
1100	—	64.5	89.1	—	—	—

*For transmittance below 700 mμ, see page 50.

60
25

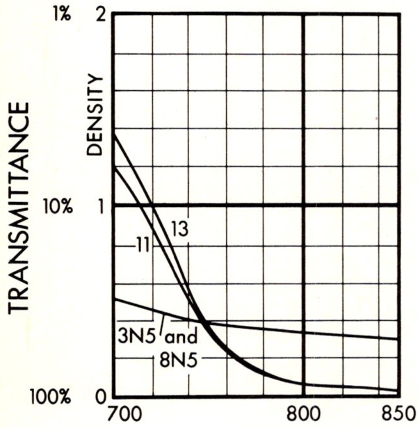
INFRARED ABSORPTION CURVES

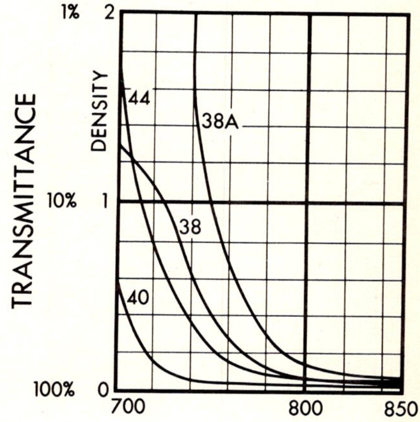


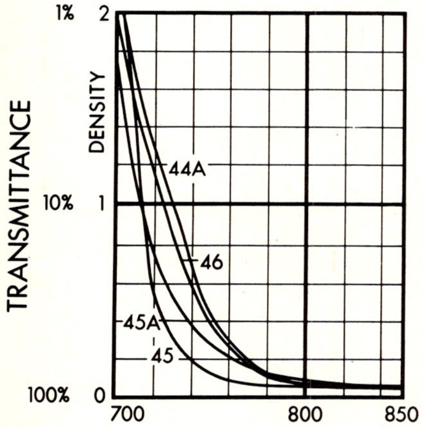
87
88A

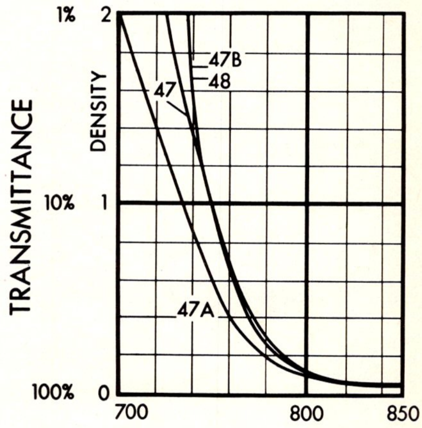
		No. 87	No. 87A	No. 87B	No. 87C	No. 88A	No. 89B
Dominant Wave Lgth.	**(A)**	757.0	None	None	None	746.0	718.0
Excitation Purity	**(A)**	100.0	None	None	None	100.0	100.0
% Luminous Transmit.	**(A)**	0.0002	None	None	None	0.005	0.034
x_A		0.7347	None	None	None	0.7347	0.7347
y_A		0.2653	None	None	None	0.2653	0.2653
Dominant Wave Lgth.	**(C)**	757.0	None	None	None	748.0	718.0
Excitation Purity	**(C)**	100.0	None	None	None	100.0	100.0
% Luminous Transmit.	**(C)**	0.0001	None	None	None	0.002	0.013
x_C		0.7347	None	None	None	0.7347	0.7347
y_C		0.2653	None	None	None	0.2653	0.2653

INFRARED ABSORPTION CURVES









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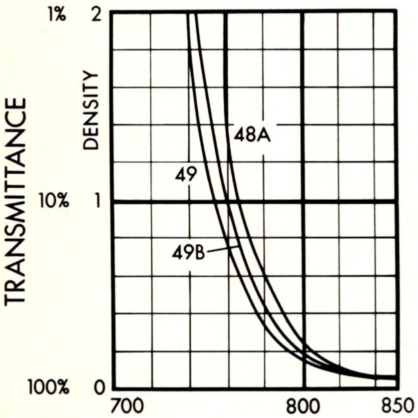

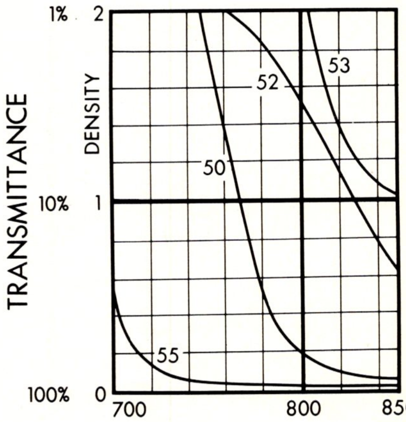

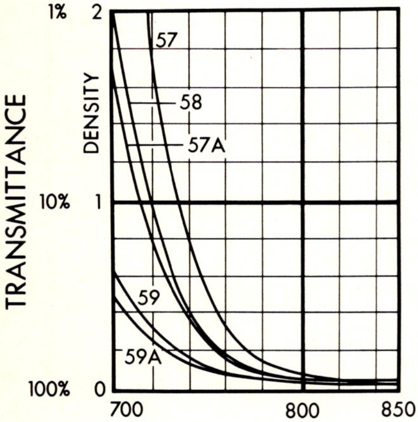

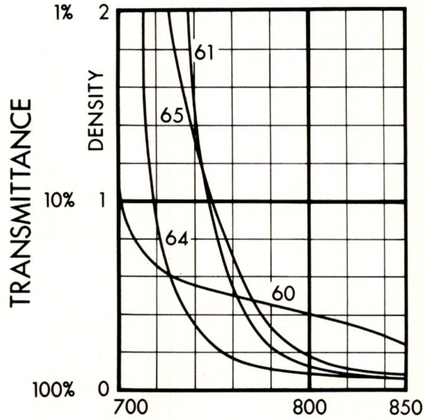

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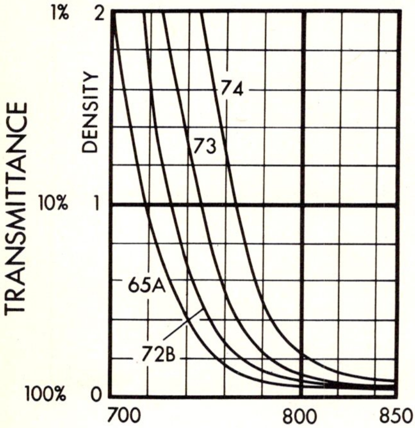

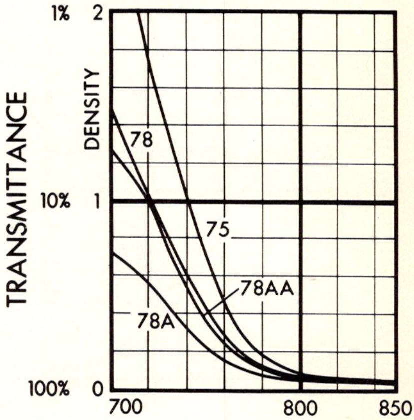

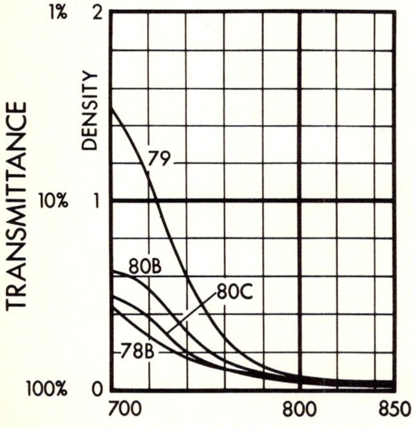

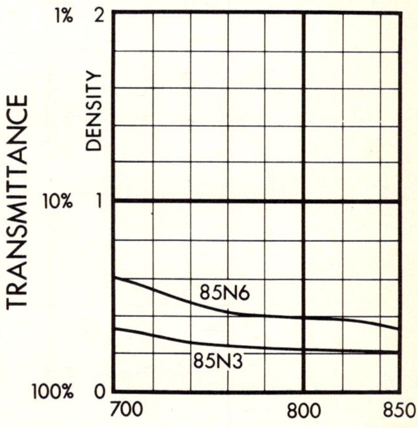

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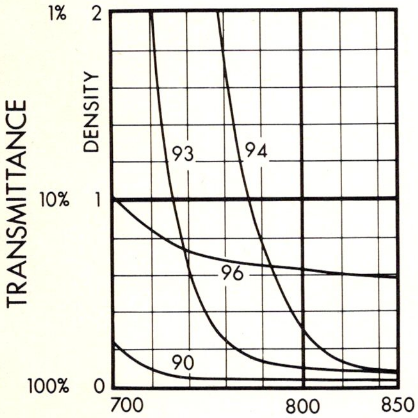
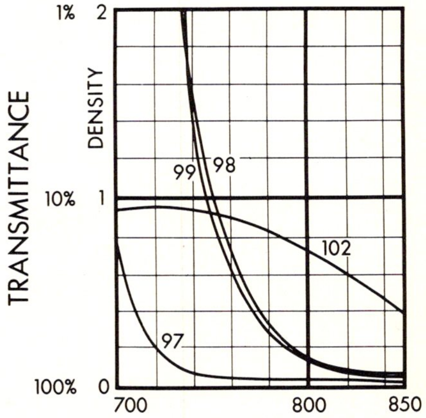




DENSITY-TRANSMITTANCE TABLE

DENSITY

TRANS. (%)	0	.1	.2	.3	.4	.5	.6	.7	.8	.9
0		3.00	2.70	2.52	2.40	2.30	2.22	2.15	2.10	2.05
1	2.00	1.96	1.92	1.89	1.85	1.82	1.80	1.77	1.74	1.72
2	1.70	1.68	1.66	1.64	1.62	1.60	1.59	1.57	1.55	1.54
3	1.52	1.51	1.50	1.48	1.47	1.46	1.44	1.43	1.42	1.41
4	1.40	1.39	1.38	1.37	1.36	1.35	1.34	1.33	1.32	1.31
5	1.30	1.29	1.28	1.28	1.27	1.26	1.25	1.24	1.24	1.23
6	1.22	1.21	1.21	1.20	1.19	1.19	1.18	1.17	1.17	1.16
7	1.15	1.15	1.14	1.14	1.13	1.13	1.12	1.11	1.11	1.10
8	1.10	1.09	1.09	1.08	1.08	1.07	1.07	1.06	1.06	1.05
9	1.05	1.04	1.04	1.03	1.03	1.02	1.02	1.01	1.01	1.00
10	1.00	1.00	.99	.99	.98	.98	.97	.97	.97	.96
11	.96	.95	.95	.95	.94	.94	.93	.93	.93	.92
12	.92	.92	.91	.91	.91	.90	.90	.90	.89	.89
13	.89	.88	.88	.88	.87	.87	.87	.86	.86	.86
14	.85	.85	.85	.84	.84	.84	.84	.83	.83	.83
15	.82	.82	.82	.82	.81	.81	.81	.80	.80	.80
16	.80	.79	.79	.79	.78	.78	.78	.78	.77	.77
17	.77	.77	.76	.76	.76	.76	.75	.75	.75	.75
18	.74	.74	.74	.74	.73	.73	.73	.73	.73	.72
19	.72	.72	.72	.71	.71	.71	.71	.71	.70	.70
20	.70	.70	.69	.69	.69	.69	.69	.68	.68	.68
21	.68	.68	.67	.67	.67	.67	.67	.66	.66	.66
22	.66	.66	.65	.65	.65	.65	.65	.64	.64	.64
23	.64	.64	.63	.63	.63	.63	.63	.63	.62	.62
24	.62	.62	.62	.61	.61	.61	.61	.61	.60	.60
25	.60	.60	.60	.60	.59	.59	.59	.59	.59	.59
26	.58	.58	.58	.58	.58	.58	.57	.57	.57	.57
27	.57	.57	.57	.57	.56	.56	.56	.56	.56	.56
28	.55	.55	.55	.55	.55	.54	.54	.54	.54	.54
29	.54	.54	.53	.53	.53	.53	.53	.53	.53	.52
30	.52	.52	.52	.52	.52	.52	.51	.51	.51	.51
31	.51	.51	.51	.50	.50	.50	.50	.50	.50	.50
32	.49	.49	.49	.49	.49	.49	.49	.49	.48	.48
33	.48	.48	.48	.48	.48	.47	.47	.47	.47	.47
34	.47	.47	.47	.46	.46	.46	.46	.46	.46	.46
35	.46	.45	.45	.45	.45	.45	.45	.45	.45	.44
36	.44	.44	.44	.44	.44	.44	.44	.44	.43	.43
37	.43	.43	.43	.43	.43	.43	.42	.42	.42	.42
38	.42	.42	.42	.42	.42	.41	.41	.41	.41	.41
39	.41	.41	.41	.41	.40	.40	.40	.40	.40	.40
40	.40	.40	.40	.40	.39	.39	.39	.39	.39	.39
41	.39	.39	.39	.38	.38	.38	.38	.38	.38	.38
42	.38	.38	.38	.37	.37	.37	.37	.37	.37	.37
43	.37	.37	.37	.36	.36	.36	.36	.36	.36	.36
44	.36	.36	.35	.35	.35	.35	.35	.35	.35	.35
45	.35	.35	.34	.34	.34	.34	.34	.34	.34	.34
46	.34	.34	.33	.33	.33	.33	.33	.33	.33	.33
47	.33	.33	.33	.32	.32	.32	.32	.32	.32	.32
48	.32	.32	.32	.32	.32	.31	.31	.31	.31	.31
49	.31	.31	.31	.31	.31	.31	.30	.30	.30	.30
50	.30	.30	.30	.30	.30	.30	.29	.29	.29	.29
	0	**.1**	**.2**	**.3**	**.4**	**.5**	**.6**	**.7**	**.8**	**.9**

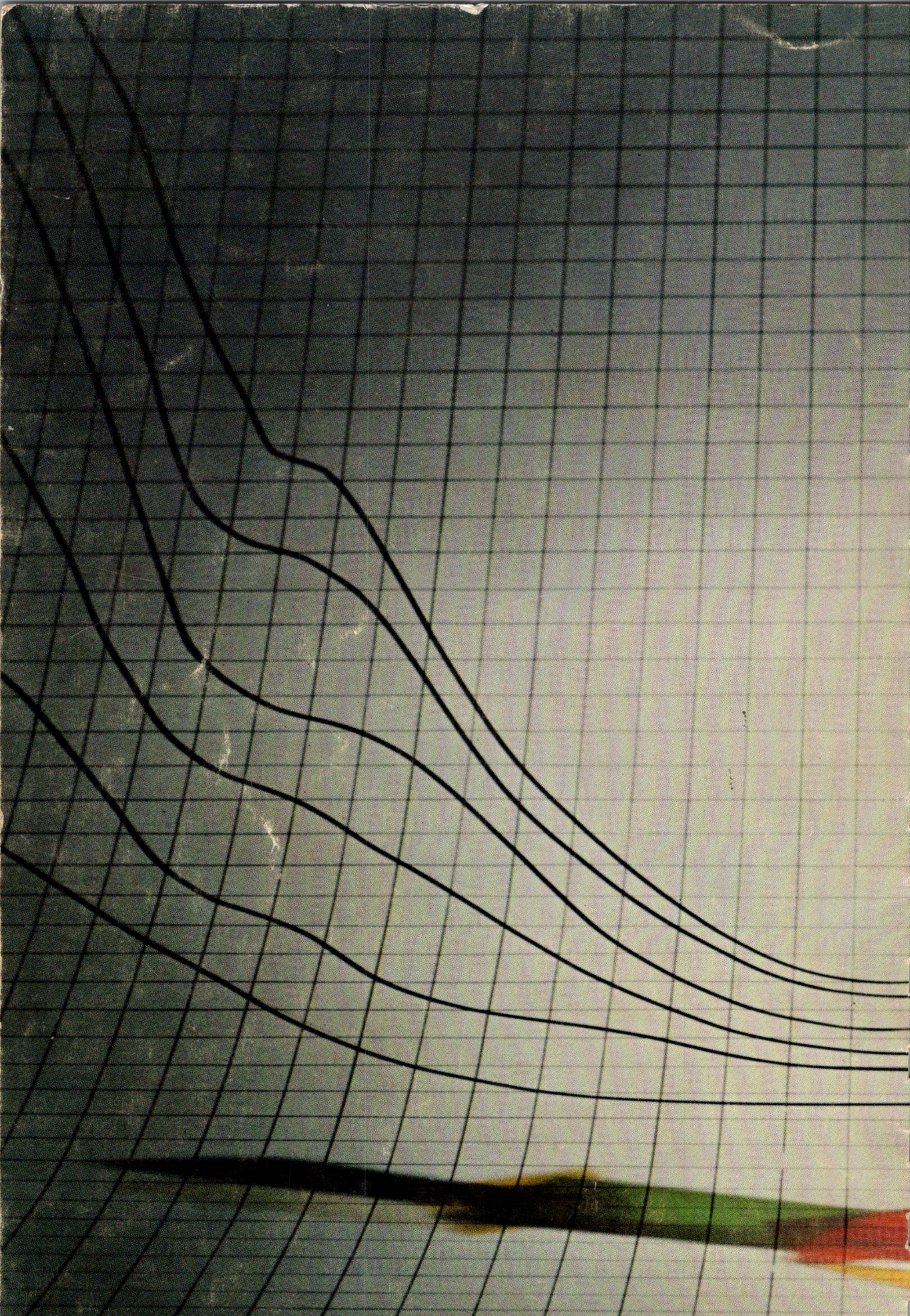
Locate the density reading in the table. The whole number of the extreme left plus the decimal number at the top or bottom of the column in which the reading is located is the percent transmission of the density. For example, the percent transmission of a density of

DENSITY-TRANSMITTANCE TABLE

DENSITY

TRANS. (%)	0	.1	.2	.3	.4	.5	.6	.7	.8	.9
51	.29	.29	.29	.29	.29	.29	.29	.29	.29	.28
52	.28	.28	.28	.28	.28	.28	.28	.28	.28	.28
53	.28	.28	.27	.27	.27	.27	.27	.27	.27	.27
54	.27	.27	.27	.27	.26	.26	.26	.26	.26	.26
55	.26	.26	.26	.26	.26	.25	.25	.25	.25	.25
56	.25	.25	.25	.25	.25	.25	.25	.25	.25	.24
57	.24	.24	.24	.24	.24	.24	.24	.24	.24	.24
58	.24	.24	.24	.23	.23	.23	.23	.23	.23	.23
59	.23	.23	.23	.23	.23	.23	.22	.22	.22	.22
60	.22	.22	.22	.22	.22	.22	.22	.22	.22	.22
61	.21	.21	.21	.21	.21	.21	.21	.21	.21	.21
62	.21	.21	.21	.21	.20	.20	.20	.20	.20	.20
63	.20	.20	.20	.20	.20	.20	.20	.20	.19	.19
64	.19	.19	.19	.19	.19	.19	.19	.20	.19	.19
65	.19	.19	.19	.19	.18	.18	.18	.18	.18	.18
66	.18	.18	.18	.18	.18	.18	.18	.18	.17	.17
67	.17	.17	.17	.17	.17	.17	.17	.17	.17	.17
68	.17	.17	.17	.17	.16	.16	.16	.16	.16	.16
69	.16	.16	.16	.16	.16	.16	.16	.16	.16	.16
70	.15	.15	.15	.15	.15	.15	.15	.15	.15	.15
71	.15	.15	.15	.15	.15	.15	.14	.14	.14	.14
72	.14	.14	.14	.14	.14	.14	.14	.14	.14	.14
73	.14	.14	.14	.13	.13	.13	.13	.13	.13	.13
74	.13	.13	.13	.13	.13	.13	.13	.13	.13	.13
75	.12	.12	.12	.12	.12	.12	.12	.12	.12	.12
76	.12	.12	.12	.12	.12	.12	.12	.11	.11	.11
77	.11	.11	.11	.11	.11	.11	.11	.11	.11	.11
78	.11	.11	.11	.11	.11	.10	.10	.10	.10	.10
79	.10	.10	.10	.10	.10	.10	.10	.10	.10	.10
80	.10	.10	.10	.10	.09	.09	.09	.09	.09	.09
81	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09
82	.09	.09	.08	.08	.08	.08	.08	.08	.08	.08
83	.08	.08	.08	.08	.08	.08	.08	.08	.08	.08
84	.08	.07	.07	.07	.07	.07	.07	.07	.07	.07
85	.07	.07	.07	.07	.07	.07	.07	.07	.07	.07
86	.07	.06	.06	.06	.06	.06	.06	.06	.06	.06
87	.06	.06	.06	.06	.06	.06	.06	.06	.06	.06
88	.06	.05	.05	.05	.05	.05	.05	.05	.05	.05
89	.05	.05	.05	.05	.05	.05	.05	.05	.05	.05
90	.05	.04	.04	.04	.04	.04	.04	.04	.04	.04
91	.04	.04	.04	.04	.04	.04	.04	.04	.04	.04
92	.04	.04	.04	.03	.03	.03	.03	.03	.03	.03
93	.03	.03	.03	.03	.03	.03	.03	.03	.03	.03
94	.03	.03	.03	.03	.02	.02	.02	.02	.02	.02
95	.02	.02	.02	.02	.02	.02	.02	.02	.02	.02
96	.02	.02	.02	.02	.02	.02	.01	.01	.01	.01
97	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
98	.01	.01	.01	.01	.01	.01	.01	.01	.01	.00
99	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
100	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
	0	**.1**	**.2**	**.3**	**.4**	**.5**	**.6**	**.7**	**.8**	**.9**

1.29 is 5.1 percent. For a density that appears more than once in the table, use the middle density number. For example, the percent transmission of the density .44, which appears 9 times, is 36.3; the percent transmission of the density .32 is either 47.8 or 47.9.



EASTMAN KODAK COMPANY • ROCHESTER, N.Y. 14650

KODAK WRATTEN Filters
KODAK Publication No. B-3

2-65 Major Revision L-GLP-BX
Printed in the United States Of America