KSG: Note 5.

M. REA PAUL, CHAIRMAN
105 YORK ST., BROOKLYN, N. Y.

D. B. JUDD, VICE-CHAIRMAN
NATIONAL BUREAU OF STANDARDS
WASHINGTON, D. C.

M. H. RORKE, TREASURER
200 MADISON AVE., NEW YORK, N. Y.

INTER-SOCIETY COLOR COUNCIL

R. G. MACDONALD, SECRETARY
122 EAST 42ND ST., NEW YORK, N. Y.

NEWS LETTER No. 13

Note:- The News-Letter is issued from time to time by the Inter-Society Color Council to all members for the purpose of bringing to their attention the current activities of the Council and to serve in a clearing house capacity in keeping members informed concerning recent publications on color in the arts, sciences, industries and education.

The material for the News-Letters is obtained from several sources, particularly from the representatives of member-bodies. It is hoped that each member-body representative will keep the News-Letter in mind and furnish material that may be of interest. The basic color problems of all groups are alike and one industry can learn much from the others.

- - - - - - -

All members are urged to send items of interest (similar to those in this News-Letter) to R. G. MACDONALD, Secretary of the Inter-Society Color Council, 122 East 42nd Street, New York, N. Y.

- - - - - - -

CURRENT ACTIVITIES OF THE INTER-SOCIETY COUNCIL

Survey on Terms, Tests and Problems

The following letter was recently sent by D. B. Judd, Chairman of the Inter-Society Color Council Problems Committee to the representative of each member-body who has been appointed to serve on this committee.

Dear Sir:

By action at the annual meeting, our council has undertaken to prepare a survey of the methods of color specification now in use and of the problems which are now being investigated or which it is believed ought to be. The plan is to make some delegate of each member-body responsible for the collection of information from within that member-body. The reports of all member-bodies will then be grouped and made available to all in suitable form. This survey is regarded as an important step toward fulfillment of the purpose of the Inter-Society Color Council as stated in the Articles of Organization and Procedure: "to stimulate and coordinate the work being done by various societies and associations leading to the standardization, description and specification of color, and to promote the practical application of these results to the color problems arising in science, art, and industry."

To facilitate collecting and handling this information, three forms have been prepared: (1) Color Terminology; (2) Tests or Specifications; and (3) Color Problems. Several copies of each form are inclosed.

1. Color Terminology. One sheet is supplied for each term and its definition. We hope to obtain not only those terms which have been adopted by official action of the member bodies but also those which are in good standing solely by general usage. Since in the latter case, there will often be no published definition, a tentative definition will have to be composed. Since it is hoped that the survey will be completed within the year, it is not the present plan to strive for perfection in these tentative definitions; the aim is merely to record the approximate meaning or meanings of the terms as understood in the member-body. Examples of color terms used in some member-bodies are: Hue, shade, dominant wave length, saturation, purity, strength, brightness, lightness, brilliance, value, luminosity, tint, transparency, translucency, opacity, gloss, bloom, polish, shininess, color, gray, neutral, chroma, and chromaticity.

2. Test or Specification. As above, use one sheet for each item, and also include tests not officially adopted if they are in general use. Some of the color terms may be covered by a test method and if so, fill out both a "term" form (1) and a "test" form (2).

3. Color Problems. It is hoped to obtain on these forms first, a record of the work actually in progress within the member bodies, and second a list of problems in color which each member body believes ought to be solved. It is expected that some of these problems will relate to methods

of testing and specification and will be suggested by the information collected on that subject (form 2). Some problems may be mostly technical, such as those dealing with processes of manufacture and some may deal more specifically with advertising and selling of merchandise through color. It is believed that a statement from each member body of four or five problems considered to be most important will show why each member body is interested in the Inter-Society Color Council and what they hope to get out of it. Furthermore, the preparation of a file of this information is the first step toward concerted action on problems of general interest and cooperative action on problems of special interest.

Will you act as chairman of a sub-committee to collect information of these three types from your member body? It is expected that you will need to enlist the aid of others of your society in collecting this material but it is felt that some one person thoroughly familiar with these questions ought to be made responsible for distributing the forms to those most able to supply the information and seeing that the forms are correctly filled out and returned within a reasonable time. At least one copy of Form 3 should be sent to each member of your society who is doing research work in color, and it would probably be a good plan to send several of each of the three forms to the other delegates from your society. Let me know about how many of each form you will require and whether you would like to have me write prospective members of your sub-committee.

- - - - - -

WHO'S WHO IN COLOR COMMITTEE

M. Rea Paul, Chairman of the Inter-Society Color Council has announced the appointment of Dorothy Nickerson as Chairman of the Council Sub-committee on "Who's Who in Color." This Committee will be part of the Problems Committee. Miss Nickerson is Color Technologist for the Bureau of Agricultural Economics, U. S. Dept. of Agriculture, Washington, D .C.

Miss Nickerson has suggested that each member-body of the Council appoint a representative to serve on this committee. Such a committeeman will be responsible for submitting the names of all those persons in his particular field to the committee so that a file can be built up and a bulletin issued for the benefit of all members.

Member-Body secretaries please notify Miss Nickerson concerning your representative on her committee.

- - - - - -

COLOR STANDARDIZATION FOR CERAMICWARE

The following letter of the Chairman of the Inter-Society Color Council to a representative of the American Ceramic Society who had notified the Council regarding an important color problem is published in this News-Letter to illustrate how the Council approaches a problem of this kind.

Mr. V. H. Remington,
B. F. Drakenfeld & Co., Inc.
Washington, Pa.

Dear Sir:

Pursuant to your oral request in New York last month, confirmed by your letter of March 9th, Dr. Judd, Chairman of our Committee on Color Problems, and I have attempted to outline the ways in which your society could make use of the Inter-Society Color Council in working toward a solution of your problems in color standardization.

It was evident even from our short discussion that the ceramic industry is confronted with some rather difficult color problems peculiar to that industry arising from the considerable dependence of the color of vitreous materials on factors (heat treatment and so on) other than the mere composition of the coloring agents added. The first, and perhaps greatest, difficulty is to obtain an accurate formulation of the problems. This can only be done by technical men from your own society; and it cannot be urged too strongly that such formulation be attempted by a committee composed of those of your society most thoroughly acquainted with and interested in all aspects of color in ceramic materials. Probably each of the various technical branches of the American Ceramic Society should be represented on the committee.

It has been found helpful in some cases to attempt to analyze difficulties in color standardization into a number of subsidiary difficulties each possibly requiring a different remedy. Perhaps it may be found that difficulties in the color standardization of ceramic materials consist chiefly in one or more of the following:

1. Difficulty in preparing standards,

2. Difficulty in maintaining standards,

3. Difficulty in obtaining agreement upon standards between producers and consumers,

4. Difficulty in obtaining agreement among producers as to number of standard samples required for various purposes,

5. Difficulty in obtaining agreement among producers as to form standard sample should take to be most usable,

6. Difficulty in satisfying a consumer that the finished material matches the standard with sufficient accuracy,

Once the particular difficulty has been discovered, the Inter-Society Color Council can be of assistance in a number of ways:

1. It can assist in the formulation of the problem. A survey of problems throughout the eight member-bodies of the council is now under way and is expected to be completed within the year.

2. It can supply advice based on previous experience in other industries with similar problems. It is the business of the council to keep up-to-date on color standardization.

3. If the problem requires color measurement, the council may be of assistance as a source of authoritative information regarding which instrument and method is most suited to the purpose. This frees the inquirer from the confusion of conflicting advertising claims and is a much used service of the council.

4. If the problem requires for its solution a systematic arrangement of standard samples or a standardized system of color names, the council can give authoritative advice on these matters. Work by a committee of the council has resulted in the setting up of such a system of color names particularly suited to the needs of one of the member-bodies.

5. If the survey of color problems shows certain of the standardizing difficulties in color of ceramic materials to be identical with difficulties within one or more of the other member bodies, a united attack on such problems may be formulated within the council.

6. If the problem turns out to be one which is peculiar to the industry and one which requires research in the field of color for its solution, the council will assist the society, if they desire it, in finding someone competent to undertake the research; furthermore the council will examine any program of research with respect to color submitted by a member body and make a report on it. The approval of the council of a research program does not guarantee its success, but such approval probably approaches as close to a guarantee as is now possible.

7. If, as is often the case, the solution of the problem depends chiefly on education, the council will sponsor educational campaigns for that purpose, will assist in planning them as by suggesting speakers, and will assist in carrying them out, as by review of material for the press. An example of this type of problem is the serious question of color tolerances. Large sums of money are lost because of material arbitrarily rejected as off-color. Much of this material could be saved if the consumer were informed as to the relationship between price and color tolerance, and if he could be taught to choose a tolerance on the basis of the use to which the material is to be put rather than on an arbitrary basis.

In conclusion, it must be noted that the Inter-Society Color Council is a cooperative organization in whose activities we desire the American Ceramic Society to participate. The council not only expects to be of use to the American Ceramic Society, but it expects that the present member-bodies will benefit from the advice of the official delegates of the American Ceramic Society. Thus, your delegates will be called upon to reply to inquiries concerning ceramic products, to give information about the use and availability of ceramic materials for color standards, and to refer to particular concerns best able to supply ceramic materials for particular color purposes. They will be expected to do their share of committee work for the council and to contribute items about their color activities for the news letters which are issued to all official delegates of the council so that they may be kept acquainted with the latest developments in color.

I sincerely trust the thoughts contained in this communication will be instrumental in encouraging the creation of an interested group within your society, for the purpose of defining color problems peculiar to the ceramic industry that this council may take under consideration with the view to their ultimate solution.

Very truly yours,

M. REA PAUL, Chairman.

- - - - - - - -

April 20, 1936.

Mr. Faber Birren,
919 North Michigan,
Chicago, Illinois.

Dear Sir: Eye-Protective Glasses

This will partially reply to your letter of March 31, 1936.

Information of the transmission of eye-protective glasses is given in two papers by Dr. W. W. Coblentz of the National Bureau of Standards. There is inclosed letter circular, LC-398, Publications on Colorimetry and Spectrophotometry from the National Bureau of Standards. These two papers are references 8 and 37 of Part III. Consult also the following Federal Specifications: GGG-G-541, Goggles, Welders; GGG-H-191A, Helmets, Welders: and GGG-S-311, Shields, Welder Hand. Other papers listed in this letter circular may be of interest to you in connection with your book on functional color.

Ref. 18 B Part I also KW

The list of references on legibility was issued as a letter circular of the National Bureau of Standards; you may use all or part of it in your book. For your convenience, there is inclosed this letter circular and others which may be of value to you:

LC-351, Color and Legibility,

LC-352, Color of Illuminant and Efficiency of the Worker,

LC-454, Hues of the Spectrum Colors,

The use of transparent cellulose to prevent deterioration of food stuffs is a controversial subject. It is expected that information on both sides of this question can be forwarded to you in about two weeks.

Respectfully,

DEANE B. JUDD, Chairman,
Committee on Color Problems.

COLOR OF ILLUMINANT AND EFFICIENCY OF THE WORKER

Letter Circular 352 - National Bureau of Standards:

This bureau has not carried on any research connecting color of illuminant with efficiency of the worker. It is believed that the connection is not very important, not nearly as important as the amount and angular distribution of the light.

The following rules for efficient lighting are given by Cady and Dates (Illuminating Engineering, Wiley, New York, pp. 354-402; 1928). Minimize glare, hang lights high up out of the field of vision, get plenty of steady and well, but not perfectly, diffused light (5 to 25 foot-candles), avoid flickering light, sharp shadows, and any very light or very dark regions in the room. Walls should reflect 30-50 per cent of the incident light; preferred colors, light warm gray, light buff, dark cream, light olive green; ceilings should reflect more than 65 per cent; preferred colors, white and light cream. Upper part of walls may be made lighter than lower; ceiling color may be extended down the walls somewhat. Desk tops should reflect not more than 25 per cent. Edges of steps should contrast with background as seen from above.

The color of the illuminant of the workshop has some effect, however, on the efficiency with which work may be conducted. The following bibliography serves not only to indicate the most important sources of information on this effect but also to give a brief summary of the several conclusions.

M. Luckiesh, Color and Its Application, Van Nostrand, New York, p. 135; 1915. For discrimination of fine detail spectrum yellow light is best.

C. E. Ferree and G. Rand, The Effect of Visual Angle, Intensity, and Composition of Light on Important Ocular Functions, Transactions Illuminating Engineering Society, vol. 17, pp. 69-102; 1922. Speed of discrimination and acuity are best for white light, poorest for blue. The order is: white (artificial daylight), pale yellow (gas-filled incandescent lamp), spectrum yellow, spectrum yellow-green, medium reddish-yellow (incandescent lamp at voltage considerably under rating), spectrum orange, spectrum green, spectrum red, spectrum blue-green, spectrum blue. These results may be accounted for by two opposing principles: (1) light of highly saturated color is not favorable; (2) spectrum light is favorable because the retinal image is free from chromatic aberration. Power to sustain acuity is similar to the above except that spectrum green is inferior to spectrum red.

C. E. Ferree and G. Rand, Further Studies on the Effect of Composition of Light on Important Ocular Functions, Transactions Illuminating Engineering Society, vol. 19, pp. 424-455; 1924. Yellow light is less fatiguing and more comfortable for reading than red, blue or green light, saturation and brightness being equalized. White light is still better.

M. Luckiesh and F. K. Moss, The Effect on Visual Acuity of Shortening the Spectrum at the Blue End, Journal Optical Society of America and Review Scientific Instruments, vol. 10, pp. 275-281; 1925. Acuity is

slightly increased by using a yellow filter (potassium dichromate) over an incandescent lamp in spite of the decreased brightness. This accounts for some of the advantages of yellow glasses for the eyes.

C. E. Ferree and G. Rand, The Effect of Mixing Artificial Light with Daylight on Important Functions of the Eye, Transactions Illuminating Engineering Society, vol. 21, pp. 588-612; 1926. The undesirable results of mixing incandescent-lamp light with diminishing daylight in the late afternoon are not due to the color of the mixture, but to a lag in adapting to the lower brightness. In order to minimize this lag, lights should be turned on before daylight is noticeably diminished.

F. E. Carlson, Relative Value of Daylight, Tungsten Filament, and Mercury Arc Light, and Mixtures as Measured by Visual Acuity, Transactions Illuminating Engineering Society, vol. 21, pp. 613-640; 1926. The acuity differences are not great, but daylight is generally the best.

I. G. Priest, Note on the Relative Comfort in Reading by Artificial Daylight and Unmodified Gas-filled Tungsten Lamps, Journal Optical Society of America and Review Scientific Instruments, vol. 15, pp. 131-136; 1927. For one observer artificial daylight proved highly satisfactory and incandescent-lamp light of the same intensity unacceptable.

K. Y. Tang, Visual Performance under Daylight, Incandescent, Mercury Vapor, and Their Mixtures, Transactions Illuminating Engineering Society, vol. 26, pp. 258-274; 1931. Daylight is definitely best, mercury-vapor light second, and incandescent-lamp light a good third.

- - - - - - -

HUES OF THE SPECTRUM COLORS

Letter Circular 454 National Bureau of Standards.

The characteristic appearance of the visible spectrum is a series of chromatic colors varying from dim red through orange, yellow, brilliant yellow-green, green, blue, to dim violet. The brightest part of the normal equal-energy spectrum under usual observing conditions is at 555 millimicrons (yellowish green), and from this point toward both longer and shorter wave lengths the brightness progressively diminishes.

If color differences due to variation in brightness are left out of account, there still remain more than one thousand parts of the spectrum which can be distinguished by hue and saturation alone under suitable observing conditions. An appreciable part of these one thousand distinguishable steps is ascribable to saturation difference. For example, spectrum red is a much more saturated color than spectrum yellow, and there are many more steps between spectrum yellow and spectrum red than there are between spectrum yellow and a red color of the same saturation; a considerable part of the difference between spectrum red and spectrum yellow is, therefore, a difference in saturation. The part of the spectrum having the least saturated color is at 570 millimicrons (greenish yellow).

Strictly speaking, the appearance of the spectrum is variable depending chiefly on the following factors which will be discussed in turn:

1. Color Vision of the Observer. To the totally color blind observer, the spectrum appears as a band of achromatic light varying from very dim at one end through a maximum brilliance near the center back to very dim at the other end; it exhibits no hue whatsoever. To the observer who has inherited partial color blindness (red-green blindness), the spectrum exhibits only two hues; it consists of a long-wave band appearing yellow and of a short-wave band appearing blue, the two bands being separated by an achromatic or neutral point. To the normal observer, the spectrum appears as indicated above, but such observers disagree somewhat in their descriptions of the spectrum and there is reason to believe that the appearance of the spectrum varies slightly from one normal observer to another.

2. Size and Location of the Retinal Region Stimulated. Portions of the normal retina moderately distant from the center (point of most distinct vision) frequently respond as if red-green blind; the extreme periphery under ordinary conditions is totally color blind.

3. Retinal Illumination. If the spectrum is very weak so that the retina receives only twilight illumination, its appearance will be the same to the normal as to the totally color blind observer. If the spectrum is very strong so as to be dazzling, it likewise exhibits no hue. Just weaker than the dazzle stage, it appears predominantly yellow and blue, and just stronger than the twilight stage, it appears predominantly red, green, and violet. At intermediate retinal illuminations, it takes on the characteristic appearance, but the appearance depends on the particular illumination.

4. Pre-exposure Stimulus. The spectrum looks different to a dark adapted eye than to a light adapted; to a red adapted eye than to a green, and so on.

In the work to be summarized, the observers were either presumed to be normal or found by test not to be seriously anomalous; they looked directly at the spectrum so that a region near the center of the retina was used; the spectrum was neither too weak nor too strong to prohibit the characteristic appearance, and the pre-exposure stimulus was darkness, sunlight, overcast-sky light, or some other stimulus which was presumed not to introduce chromatic fatigue. Within these limits various observing conditions were used. The lack of agreement is to be ascribed to these variations, to individual differences between the observers, and to the usual experimental error which prevents an observer from duplicating his results exactly even though observing conditions are identical.

The following table gives the wave lengths corresponding to red, orange, yellow, green, blue, and violet, and their intermediates according to various authorities. The entries have been arranged chronologically. The average values given are equally-weighted arithmetical means. No average wave length for red is given because some of the authorities state that pure red is not to be found in the spectrum, spectrum red being reported as slightly orange. For the same reason no maximum value of wave length for red could be given, nor any average or minimum values for violet.

Bibliography

H. V. Helmholtz, Handb. d. Physiol. Optik. p. 236 (1866).

W. V. Bezold, Die Farbenlehre, pp. 24-27 (1874).

J. C. Donders, Farbengleichungen, Arch. f. (Anat. u.) Physiol., 533-535 (1884).

O. N. Rood, Modern Chromatics, p. 26 (1890).

H. Voeste, Messende Versuche uber die Qualitatsanderungen der Spectralfarben in Folge von Ermudung der Netzhaut. Z. Psychol. u. Physiol. d. Sinnesorg., 18, 257 (1898).

L. v. Kries and E. Schottelius, Beitrag zur Lehre vom Farbengedachtnis, Zs. f. Sinnesphysiol., 42, 192-200 (1907).

H. Westphal, Unmittelbare Bestimmung der Urfarben, Zs. f. Sinnesphysiol., 44, 182-230 (1909).

E. Dreher, Methodische Untersuchung der Farbtonanderungen homogener Lichter bei zunehmend indirektem Sehen und veranderter Intensitat, Zs. f. Sinnesphysiol., 46, 48, 54 (1911).

R. Ridgway, Color Standards and Color Nomenclature, p. 7 (1912).

L. Goldytsch, Messende Untersuchungen uber die Gelbvalenzen spektraler roter Lichter mit Hilfe einer neuer Methode, Zs. f. Biol., 67, 43, 50 (1916).

M. Bradley, Color Primer, p. 12 (1920.)

H. Goldmann, Uber Dauerwirkungen farbiger Lichter auf das Auge, Pfluger's Arch. f. d. ges. Physiol., 210, 70-115 (1925).

I. G. Priest, unpublished work at the National Bureau of Standards (1926).

A. Brückner, Zur Frage der Eichung von Farbensystemen, Zs. f. Sinnesphysiol., 58, 331 (1927).

G. Shubert, Sind urfarbige Lichterpaare komplementar?, Pfluger's Arch. f. d. ges. Physiol., 220, 82 (1928).

LeRoy D. Weld, Some Observations on Spectral Color Discrimination, Iowa Acad. Sci., 39, 209 (1932).

H. P. Gage, Report of Limits of Hue, Preliminary Draft by the Committee on Color Names (unpublished). Inter-Society Color Council, 1933.

H. P. J. Verbeek and M. L. Bazen, Distribution of the Chief Colours in the Spectrum, Physica, II, 4, 380 (1935).

Authority	Date	Wave Length in Millimicrons										
		Red	R-O	Orange	O-Y	Yellow	Y-G	Green	G-B	Blue	B-V	Violet
Helmholtz	1866	687	656					527			431	
Bezold	1874		656		589	578	558	532	502	468	432	
Donders	1884					582		535		485		
Rood	1890	700	621	597	588	581		527	502	473	438	406
Voeste	1902					577		498		476		
V. Kries	1907					574		503				
Westphal	1909					574		506		479		
Dreher	1911					575		509		477		
Ridgway	1912	644		598		577		520		473		410
Goldytsch	1916									468		
Bradley	1920	656		608		579		514		469		421
Goldmann	1922					568		504		468		
Priest	1926	680				583		515		475		
Bruckner	1927					578		498		471		
Shubert	1928					574		500		467		
Weld	1932		622		597		577		492		456	
Gage	1933		625		600							
Verbeek	1935		605	598	587	580	569	530	496			
Maximum			656	608	600	583	577	535	502	485	456	421
Average			631	600	592	577	568	515	498	473	439	
Minimum		644	605	597	587	568	558	498	492	467	431	

The following is a response to a request of an individual for a list of a few fairly recent books on the subject of color, both from the point of theoretical consideration and from the position of the practical colorist.

Books on Color

A readable and fairly comprehensive discussion of color is given by Luckiesh, Color and its Applications, New York; Van Nostrand, 1915. An exceptionally well-done series of three monographs on color, New Light on Color, was published in 1935 by the International Printing Ink Corporation, 75 Varick Street, New York.

For theory of color, see Ladd-Franklin, Colour and Colour Theories, New York; Harcourt-Brace, 1929.

The following publications deal with the merchandising aspect of color:

F. Birren, The Printers Art of Color, Chicago; Crimson Press, 1934.

F. Birren, Color Dimensions, Chicago; Crimson Press, 1934.

E. Burris-Meyer, Color and Design in the Decorative Arts, New York; Prentice-Hall, 1935.

M. Luckiesh, Light and Color in Advertising and Merchandising, New York; Van Nostrand, 1923.

- - - - - - -

NEW MEMBERS OF COLOR COUNCIL

The Executive Committee of the Inter-Society Color Council has announced that the following individual members have been elected:

ERNEST M. LOVELAND, Superintendent, George La Monte & Son, Nutley, N. J.

Mr. Loveland is particularly interested in rapid, accurate color measurement of a fairly large field so as to average uneveness in coloration.

Note: Members having suggestions that may be helpful to Mr. Loveland are urged to send them to R. G. Macdonald, Secy., I.S.C.C., 122 East 42nd Street, New York.

MARLIN E. FOGLE, Colorimetry Division, Weston Electrical Instrument Company, Newark, N.J.

Dr. Fogle is particularly interested in instruments and methods for color matching and color analyzing.

W. A. WEIDLICH, R-B-H. Lacquer Base Company, Bound Brook, N. J.

ARTICLES ON COLOR

New Monograph on Color

"Psychology Answers the Problem of Color Harmony" by Faber Birren is the title of a pamphlet recently issued by The Crimson Press, 919 North Michigan Avenue, Chicago. It presents new viewpoints in the nature of colors as sensations, the harmony of color forms and the selection of color schemes. Copies may be obtained from the Crimson Press for 25 cents.

- - - - -

Articles on Color in the Graphic Arts

"Color Engraving" by C. H. Alston, Printing Industry, page 64 December 1935.

"Color Work on Newspapers" by Henry E. Sommer and Harry L. Lange, American Pressman, December 1935.

"Sales Value of Color," Photo-Lithographer, December 1935.

"A Plan for Teaching Color " by Hugo Jahn, N.E. Printer, December 1935.

The Graphic Arts Research Bureau, an organization associated with the Graphic Arts Division of the American Society of Mechanical Engineers, 29 West 39th Street, New York, has recently issued a bulletin containing the papers presented at its Cincinnati meeting. Among these are the following relating to color:

"Color Printing in Daily Newspapers" by Harold M. Tillinghast.

"Precision Measurement of Color Values" by William C. Huebner.

- - - - -

Retarding Rancidity

In the November 1935 issue of Industrial and Engineering Chemistry an article appeared entitled "Retarding Rancidity" by Willard L. Morgan of the Sylvania Industrial Corporation, New York, N.Y. In this article it is shown that blue and invisible ultraviolet light materially accelerates the development of rancidity in such materials as potato chips, crackers, cakes, butter, candies, nuts and soaps, whereas other visible light such as red and yellow has little effect. Consequently rancidity-retarding wrappers may be of any visible color except blue. Highly protective yellow transparent cellulose films have been developed for food packaging.

Gloss, Reflectance and Whiteness

The following abstracts have been furnished by Deane B. Judd of the National Bureau of Standards.

"Gloss Investigations Using Reflected Images of a Target Pattern" by Richard S. Hunter.

Circular No. 503, Scientific Section of the National Paint, Varnish and Lacquer Association, Inc., April 1936; J. Opt. Soc. Am., April, 1936; also scheduled for the Journal Research, NBS, April, 1936 (RP 879).

A target pattern of concentric rings varying from fine lines to broad bands has been placed in the open face of a desk lamp. This luminous target is useful in the study of the gloss characteristics of the more glossy surfaces. The lines and bands of various sizes in the target provide means for studying surfaces of a wide range of "distinctness-of-reflected image" gloss. Records may be made of which lines and bands are visible by reflection from different surfaces. Such records serve as permanent gloss values from the different surfaces studied. The dark areas of the target immediately adjacent to the luminous areas provide ideal conditions for the identification of surface "bloom." The best gloss differentiations are made when the lamp is used in a darkened room so that the luminous pattern is the only source of light illuminating the surfaces inspected. Photographic records of gloss and unusual gloss effects are discussed.

"Note on the Effect of a Cover Glass in Reflectance Measurements," by Deane B. Judd and Keesson S. Gibson. Research, NBS, 16, 261, March (1936) RP872.

It has been found from theoretical considerations that the use of a cover glass may result in an error of as much as 10 percent when two diffusing surfaces, one light and one dark, are compared for apparent reflectance. The error arises from multiple reflections between sample and cover glass, the lighter sample obtaining much more added illumination from this cause than the darker. The error depends on the angular distribution of the illuminant, the angle of view, and the diffusing characteristics of the samples as well as their reflectances.

"A Method for Determining Whiteness of Paper, II," by Deane B. Judd, scheduled for Paper Trade Journal and Technical Association Papers, Series XVIX.

In the first paper under this title was proposed a definition of whiteness based on the degree of approach to the appearance of an ideal perfectly reflecting, perfectly diffusing surface. Magnesium oxide was proposed as a working standard white. A plan for testing this definition was outlined; it involved obtaining visual whiteness gradings from 15 observers on a series of 30 papers whose colorimetric specifications were known. The present paper gives the analysis of the results obtained in this way. The general principle of the definition has been corroborated, but it appears that only about one-third of the observers find magnesium

oxide an acceptable standard white. About one-third of the observers base their judgments on a standard which is slightly greenish yellow compared to magnesium oxide. This color is called by some of the observers "natural paper white" by which is meant the color of paper made from good grade, well-bleached pulp to which no dye has been added (paper stock is frequently blued with dye). The remaining third of the observers show some agreement with either working standard, but the system or systems of grading used by individuals of this group have been less perfectly discovered. It may be that their criteria for whiteness are inconstant. The definition of whiteness can be written around either working standard with equal convenience, and perhaps a useful purpose would be served by defining both "whiteness" and "natural paper whiteness".

- - - - -

WORLD OF COLOR

David Katz's book "The World of Color" has been added to the Central Branch of the New York Public Library. This book is published in London by Kegan Paul, Trench, Trubner & Co. (1935) 300 pages. It is a translation by R. B. McLeod and C. W. Fox of an advanced German work on color, which first appeared in 1911 and was revised in 1930.

- - - - -

MISCELLANEOUS ITEMS

Senior Scientific Aid Wanted

The U. S. Civil Service Commission announces an examination for SENIOR SCIENTIFIC AID (COLOR TECHNOLOGIST).

Duties: Under immediate supervision to assist in scientific work in connection with laboratory studies and investigations in colorimetry. Salary: $2,000 per year.

If anyone is interested and wishes to take this examination, he must possess the qualifications outlined in the U. S. Civil Service announcement of April 15, 1936, and must file Application Form No. 8, with the Officer's Certificate of Residence, with the U. S. Civil Service Commission at Washington, D.C., not later than May 6, 1936. The necessary application forms may be obtained from the Secretary, Board of U. S. Civil Service Examiners, at any first-class post office, or from the U. S. Civil Service Commission, Washington, D.C.

The announcement includes details of this examination and of one also for Junior Cotton Technologist ($2,000 per year) and for Junior Scientific Aid ($1440 per year).

SPECTROSCOPY AND COLOR AND THEIR APPLICATIONS

Spectroscopy Conference - July 20, 21, and 22, 1936.

Morning and afternoon meetings will be held during three days, with discussions by qualified experts on spectroscopic analysis of materials and on other applications of spectroscopy to biology, medicine, chemistry, metallurgy, minerology, and to industrial and engineering problems.

Color Conference - July 23, 24, and 25.

Morning and afternoon meetings will be held during three days with discussions by eminent authorities on the subject of color and its various applications. This conference will be devoted to spectrophotometry colorimetry, and the applications of color measurements to industrial problems. Detailed consideration will be given to the behavior and control of the color of dyes and pigments, and their application in such fields as the paint, ink, paper, textile, and ceramics industries. This conference follows the Spectroscopy Conference immediately, and the two are being planned as a unit, since it is expected that the subject matter of each will be of interest to persons specializing in or using the methods of either.

A Program of Papers and Discussions is Being Prepared
On the Following Topics, Among Others:

Spectroscopy Conference

Photographic Photometry: Basic methods and apparatus underlying the photographic determination of spectral light intensities; especially from the standpoint of application to spectroscopic analysis.

Absorption Spectrophotometry: Application of absorption measurements to analysis of organic and inorganic substances and to the diagnosis and treatment of disease.

Analysis by the Emission Spectrum: Determination of metallic and other atomic and molecular constituents of samples by study of their emission spectra, with special emphasis on quantitative analysis.

Biological and Chemical Effects of Spectral Radiation.

Spectroscopy of the Ultra-violet and the Infra-red.

Analysis of Spectra, and Measurement of Wavelengths.

Industrial Applications of Spectroscopy.

Color Conference

Spectrophotometry in the Visible Regions: Determination of spectral transmission and reflection data by means of modern spectrophotometric equipment.

Chromatic Properties of the Human Eye: Discussions of the methods and results of measurement on the chromatic properties of the human eye.

Colorimetry: Discussions of methods of measuring and specifying color with the aid of colorimeters and with the aid of spectrophotometers and standard data on the normal human eye.

Industrial Applications of Color: Analyses of the color problems confronting those industries in which these problems are important. Special consideration will be given to the behavior of light in pigmented and dyed materials, paper, and ceramic products.

As soon as they have been prepared, copies of the detailed programs of the conferences will be sent on request to anyone interested. The object of the conferences is to promote cooperation between investigators in different fields who have found or may find useful the technical methods of spectroscopy and color.

Requests for information regarding the Color Conference or for its program when issued should be addressed to Professor A. C. Hardy, while similar requests for information on the Spectroscopy Conference and its program, and on the summer courses and spectroscopic research, should be addressed to Professor G. R. Harrison.

Department of Physics
Massachusetts Institute of Technology
Cambridge, Massachusetts.

- - - - - - -

SIGNAL GLASS STANDARDS

In a previous issue of the News-Letter mention was made of the signal glass standards adopted by the Association of American Railroads.

Copies of the A.A.R. Signal Section Specification 69-35 are enclosed with this News-Letter.

COLORISTS MEET IN WASHINGTON

On Wednesday, February 5, 1936, the "Colorists" of Washington and Baltimore met for dinner at the Cosmos Club, Washington, D.C., for the mid-winter meeting of their third year.

Mr. M. Rea Paul, chairman of the Inter-Society Color Council outlined to the group something of the Council's purposes, personnel, and problems.

Captain Frederick Helweg of the Naval Research Observatory, in an informal and most entertaining fashion, told the group something of the practical use to which the work of astronomers is put by every naval man. A series of lantern slides illustrated many of his points.

During the last several years the particular hobby of Mr. William H. Beck of Baltimore has been the measurement and arrangement of various types of American stamps by their color. To the uninitiated this may not seem as highly fascinating as it is. He plans to exhibit at the spring meetings of the international philatelic groups in New York City, and brought with him to the meeting several of the very beautiful books which he has prepared for this exhibit. His series of books explains the method and purpose of arranging stamps by color measurement. His explanation of the work and the measurements, and the exhibition of the books was of real interest.

The Spring meeting of the Colorists will take place in Washington in April or May.

* * * * * * *

M. REA PAUL, CHAIRMAN
105 YORK ST., BROOKLYN, N. Y.

D. B. JUDD, VICE-CHAIRMAN
NATIONAL BUREAU OF STANDARDS
WASHINGTON, D. C.

M. H. RORKE, TREASURER
200 MADISON AVE., NEW YORK, N. Y.

INTER-SOCIETY COLOR COUNCIL

R. G. MACDONALD, SECRETARY
122 EAST 42ND ST., NEW YORK, N. Y.

ERRATA

Please note that on Page 15 of the News Letter No. 13, the following line of the heading was omitted:

ANNOUNCING A SPECIAL SUMMER PROGRAM ON APPLIED PHYSICS SPECTROSCOPY AND COLOR AND THEIR APPLICATIONS

This course will be given at Massachusetts Institute of Technology, George Eastman Research Laboratories.