

INTER-SOCIETY COLOR COUNCIL

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Charles Bittinger, Editor for Art

C. E. Foss, Editor for Industry
D. B. Judd, Editor for Science

SPRING LAKE

COLOR SYMPOSIUM

The Color Session sponsored jointly by the Illuminating Engineering Society and the Inter-Society Color Council was held on the afternoon of September 11 at the Essex and Sussex Hotel at Spring Lake, N. J. The program of this symposium was given in the July News Letter, and the full papers have been pre-printed and distributed to delegates and members of the I.S.S.C., so we shall not discuss the four interesting papers here in any detail. It will be mentioned, however, that the papers by LeGrand H. Hardy, Parry Moon, and Deane B. Judd were essentially reviews surveying the general fields of the bases of color vision, color determination and "color systems," respectively. The paper by Dorothy Nickerson reported a very large amount of experimental data and calculations designed to answer the question as to how good a substitute one illuminant is for another in color matching and discrimination. Convenient tables are given in which the degree of duplication of each of 17 illuminants by the other illuminants, is listed on the basis of certain selected criteria. The meeting was well attended and enjoyed by every one. Our congratulations and thanks are due the I.E.S. and our cooperating members for their fine work.

EXECUTIVE

COMMITTEE

MEETING

Your Executive Committee met on the Tuesday evening preceding the Spring Lake Color Symposium. An important part of the business of the meeting was the reading of the reports of the Council committee chairmen. An informal meeting on the compilation of bibliography for the News Letter was also held on the morning of the symposium.

BALLOT ON EXTENSION OF ISCC-NBS METHOD OF DESIGNATING COLORS

The vote on the extension of the ISCC-NBS designations to colors of transparent and translucent or cloudy liquids and solids, which was discussed in News Letter No. 29 (May 1940), was counted on September 10 at the Spring Lake meeting; and it was announced that the proposals of the subcommittee considering the subject were accepted by vote of the delegates, 27 affirmative, 2 not voting. The recommendations of the subcommittee were already in use by the U. S. Pharmacopoeia and the National Formulary; and the vote by the Council delegates made them officially a part of the ISCC-NBS system.

DEATH OF MR.

A. L. POWELL

We regret to announce the death of Mr. Alvin L. Powell, Supervising Engineer, Lamp Department of the General Electric Company, New York. Mr. Powell died on August 21 at his home, 194 Forest Avenue, Glen Ridge, N. J., after an illness of several months. Mr. Powell was an internationally known authority on illumination design and application. Shortly after graduating from Columbia University in 1910, he joined the General Electric Company, becoming Manager of

the Engineering Department in 1925. A prolific writer, Mr. Powell was the author of many papers and articles dealing with illuminating engineering. His ability to express the technical features of lighting in non-technical language made him popular as a speaker, and his lectures to professional and lay audiences have been attended by thousands of persons in many sections of the United States. He conducted courses in Illumination at Columbia University School of Architecture and the College of Engineering of New York University for a number of years. A year of study and consultation with leading engineers, architects and decorators in 1924-25, and again in 1932, when he investigated lighting conditions throughout England, France, Germany, and Italy, brought Mr. Powell into close contact with the phase of illuminating engineering dealing with the use of light as an architectural medium, and his writings on this subject should be numbered among his important contributions to lighting progress.

Mr. Powell was a member and past president of the Illuminating Engineering Society, Fellow of the American Institute of Electrical Engineers; and a member of the Architectural League of New York, the New York Electrical Association, the Montclair Society of Engineers and Sigma Xi. Delegates of the I.S.C.C. will remember Mr. Powell as the man who made the original request for a method of designating theatrical gelatins which resulted in the development of the I.S.C.C. method. The Editor remembers with pleasure the cooperation and courtesy extended by Mr. Powell some ten years ago when, at the Editor's invitation, he served as one of the sponsors of the Color Exhibition held then at the New York Museum of Science and Industry, and was responsible for the inclusion of his own excellent exhibit and others.

TEST FOR COLOR We have received the Second Report on Problem No. 9 of the I.S.C.C. on the Development of a Test for Color Aptitude (including Color Blindness). This report, which is dated August 1, 1940, and signed by Co-chairmen F. L. Dimmick and C. E. Foss, is too long for inclusion here; but it may be said that it is quite evident that the committee has been quite active and has made much progress. The addition of a member representing the U. S. Navy is announced in a following note. In connection with a method of testing using disk mixtures, suggestions and material have been received from Messrs. E.M. Loveland, F. L. Dimmick, and D. B. Judd and Miss Nickerson. A method of testing discrimination ability discussed by W. O'D. Pierce in 1934 was examined by Dr. Dimmick, using 19 yellowish grays selected from 57 papers furnished by Miss Nickerson. It was found that only the best discriminators could correctly arrange the series of samples. Dr. Dimmick also tried a method of matching pairs of colors discussed by Pierce and favored by Mr. Frank Cheney of the Cheney Brothers silk mills. Work on the determination of the disk-mixture analogue of the Rayleigh Equation of 19 subjects at the Agricultural Marketing Service was reported by Miss Nickerson; and she and Messrs. Loveland, and Dimmick made comments on methodology of the tests. Besides the book of Pierce, attention was called to articles on the subject by Miss Mary Collins and Miss Elsie Murray. References to the former works may be found in the News Letter bibliography; Miss Murray's article is in the American Journal of Psychology for July, 1940.

Mr. Foss and Mr. Walter Granville of Interchemical Corporation have agreed to produce five finely graded series of colors to use in preliminary work with the confusion colors for deuteranopia and protanopia. The specifications for

these series were worked out by Dr. Judd. With these five series (one for hue and two each for saturation and lightness) and with disks for disk mixture made from the end colors of the series, parallel standardization will be undertaken for the three procedures we have mentioned. These proposed procedures should cover the three kinds of color aptitude brought out in discussion and phrased by Dr. Judd as follows: (1) It should definitely eliminate subjects having the common forms of color blindness (deuteranopia, protanopia) and also those having extremely anomalous trichromatism; (2) it should give a quantitative measure of the ability of the subject to discriminate small color differences of all sorts; and (3) it should also give a quantitative measure of the ability of the subject to describe the kind of the color difference after he has succeeded in discriminating it. Thus a color matcher in a dye house has not only to discover an error in matching but also has to make a judgment as to the steps required to correct it. Appendices to the report contain certain specifications and details for carrying out the proposed tests.

NAVY APPOINTEE TO THE SUBCOMMITTEE ON THE COLOR APTITUDE TEST The Bureau of Medicine and Surgery of the U. S. Navy has designated Commander James K. Gordon, Medical Corps, U. S. Navy, attached to the U. S. Naval Hospital, Brooklyn, N. Y., as the Navy representative on Subcommittee No. XIV.

TONGAN COLOR VISION The British magazine Nature for December 9, 1939, contains a review of an article in Man for November 1939 on the color vision of the natives of the Tonga or Friendly Islands of the Southern Pacific. There were 67 male and 68 female subjects. None were "totally color-blind" or "blue-yellow blind;" but of the 135 subjects, 5 males and no females were "red-green blind." The figure of 7.46 percent of color-blind males is compared with the quoted percentages 8.03 for "whites," 3.7 for American negroes and 1.7 for American Indians; and a racial difference in incidence is suggested. It is mentioned that the Tongans have no color name for blue; instead they use the compound "color-sea."

CAVALCADE OF COLOR This is the title of an anonymous article in Textile Age 4, 45, 47-9 (July 1940), which describes the work of the Textile Color Card Association of the United States, Inc., and Mrs. Margaret Hayden Rorke, our popular former treasurer. The article is accompanied by photographs of Mrs. Rorke, who is Managing Director, and of Mr. Charles Pinnell, President. There is reviewed the Association's cooperative work in the standardization of the colors of the Arms and Services of the United States and the Flag colors; as well as cooperative work with the Inter-Society Color Council, the British Colour Council and the American Trade Association Executives. It is stated that 4751 color names have been standardized, and Color Coordination Charts have been assembled. The establishment of a foreign color bureau and the fact that one third of the 1300 members are foreign, is mentioned. A Ninth Edition Standard Color Card is in course of preparation and an American College Color Card, giving the color combinations of American colleges, has been considered.

FADING OF DYED TEXTILES We have seen only the abstract (Chemical Abstracts, 34, 2607; 1940) of an article entitled "Fading of Dyed Textiles by Radiant Energy," by M. Luckiesh and A.H. Taylor, Illum. Eng. 35, 169-72 (1940); but if we may judge from this abstract, it should prove very interesting. 40 specimens of dyed cotton, wool and silk of grades 0 to 4 (appreciable fading in sunlight after 6, 12, 24,

48 and 96 hours) were exposed to fluorescent "daylight" lamps and to 75-watt tungsten-filament lamps. It was found that, in general, tungsten lamps cause more rapid fading of the blue, violet, and purple specimens; and the fluorescent lamps, slightly more rapid fading of pink, yellow, orange, and red specimens, regardless of whether the cloth is cotton, wool, or silk. No dyed synthetic textiles were tested. Experiments are reported still in progress.

GESTALT AND CONTRAST A paper by Gerhard Riedel, Dependence of Optical Contrast on Configurational Conditions (or Factors —Gestaltbedingungen), Neue Psychol. Studien 10, 1-44 (1937), raises the question as to what extent gestalt factors contribute to or oppose the impression of visual contrast. For the positive part, it is concluded from the work of Fuchs (1923), Benary (1924), Wm. Wolff (1934) and others that the gestalt factors unquestionably play a part in the development of contrast. An illustration from Wundt is given: two crosses, cut from the same gray paper, are put on adjacent black and white grounds, when there is obtained the familiar result, the cross on the white ground appearing darker, that on the black ground, lighter. Next the horizontal members of the two crosses are connected by a strip of the same gray paper. The two crosses then gradually appear of the same lightness. The gray joining strip here makes the crosses parts of a single configuration; and the contrast tends to be suppressed. Riedel exhibits a series of figures in which obvious simultaneous lightness contrast is seen to be suppressed when the light and dark halves of the ground are bridged by "gestalted" figures. The strikingness of the effect seems to vary with the degree of pattern (Gestalthöhe). In the case of the human face, the maximum effect is said to occur. A figure is shown in which a gray drawing of the face shows a vertical division with the two halves separated. The one half is backed with a light ground and the other with a dark ground; and marked contrast is seen in the two halves of the face viewed separately. In a second figure, the two halves are juxtaposed and the contrast disappears, that is, the entire face appears of the same gray. Riedel's paper may be summarized as follows: (1) Under optimal conditions, simultaneous color contrast reaches a strength of about 40 percent; that is, the saturation of the induced color amounts to 40 percent of the saturation of the comparison pigment color. This means that the gray figure becomes 40 percent as saturated as the inducing color. (2) Simultaneous lightness contrast reaches a strength of about 67 percent; that is, through the action of contrast, the lightness of a gray can be altered as much as 67 percent. (3) Strength of contrast depends on the relative magnitudes of the contrasting surfaces, gestalt factors and individual differences in "Einstellung." (4) If the isolated parts of a figure are united to form a gestalt, an assimilation (reduction) of the differences in lightness occurs; and the level of the assimilation is dependent on the grade (Gestalthöhe) of the configuration. (5) The strongest assimilation occurs in the expressive human face with its extraordinary unity of configuration.

CHANGES IN DELEGATES AND MEMBERS The death of Mr. A. L. Powell, delegate from the I.E.S., has been noted elsewhere in this issue. At the Spring Lake meeting of the Executive Committee, the application of Mr. Burton J. Jones, New York University Color Workshop, for individual membership was approved; and the resignation of Mr. R. H. Ringen of the John W. Masury Company was accepted. There have been changes in delegates; and we now have full delegations for both the U. S. P. and the N. F., as follows:

U.S.P. delegates

Frank J. Pokorny, Chairman
H. W. Youngken (voting)
K. L. Kelly (voting)
R. R. Foran
L. D. Hiner
E. J. Hughes
R. L. McMurray
M. J. Reichert
F. D. Smith
A. Taub

N.F. delegates

Katherine Graham, Chairman
H. M. Burlage (voting)
E. N. Gathercoal (voting)
D. C. Beach
E. D. Beeler
E. B. Fischer
K. L. Kelly
E. H. MacLaughlin
J. E. Seybert
E. H. Wirth

REPRINTS Each of you has received recently a bound preprinted copy of the papers of the I.E.S. symposium and — a few days ago — a bound copy of the papers given at the TAPPI symposium last February.

AVAILABLE Additional single copies of the I.E.S. papers will be supplied for a time without charge, if more are wanted the price will be \$5.00 per dozen copies. Single copies of the TAPPI symposium, of which the supply is more limited, will be supplied at a cost of one dollar each, whether a single copy, or more, is requested. If you send for copies, please address your request to the Inter-Society Color Council, Box 155, Benjamin Franklin Station, Washington, D.C., and enclose payment with your order (in order to save your secretary extra work).

BIBLIOGRAPHY

- Filters for the Study of Raman Spectra of Liquids and Powders. F.J. Taboury; Bull. soc. chim. (5) 5, 1394-9 (1938).
- Spectrophotometric Study of Hydrolysis of Ferric Salts. J. Cathala & J. Cluzel; Compt. rendus 207, 781-3 (1938); 208, 186-8 (1939); 209, 43-5 (1939).
- The Chemiluminescence and Absorption Spectra of Luminol. J. Kubal; Phot. Korr. 74, 132-5 (1938).
- Comparison of Visible and Ultraviolet Color of Mineral Oxides and their Hydroxides and Hydrates. A. Berton; Compt. rendus 207, 625-7 (1938).
- Fluorescence and Absorption Spectra and Electrical Conductivity of Fluorescein, Rhodamine and Acriflavine in Aqueous Solution. J. C. Ghosh & S. B. Sengupta; Z. physik. Chem. B 41, 117-41 (1938).
- Absorption by Aromatic Hydrocarbons (Calculation of "color" by Slater-Pauling Theory). T. Förster; Z. physik. Chem. B 41, 287-306 (1938).
- A Spectrophotometric Study of Certain Neutralization Indicators. W.B. Fortune & M. G. Mellon; J. Amer. Chem. Soc. 60, 2607-10 (1938).
- Origin of the Color of Paramagnetic Ions in Solution. D. M. Bose & P. C. Mukherji; Phil. Mag. 26, 757-76 (1938).
- Monochromatic Filters for Spectrum Lamps. H. Naumann & J. Kaltenbach; Z. wiss. Phot. 37, 27-32 (1938).

- Absorption Spectra of Ferric Salts in Concentrated Acid and Salt Solutions. J. Abraham; Acta Lit. Sci. Regiae Univ. Hung. Francisco-Josephinae Sect. Chem. Mineral. Phys. 6, 272-87 (1938).
- The Fluorescence and Absorption of Praseodymium Salt Solutions. Y. Larinov, O. V. Novikova-Minash & A. Zaidel; Compt. rend. acad. sci. U.R.S.S. 21, 325-7 (1938); in English.
- Colorimetric and Nephelometric Method of Analysis of Quinoid Dyes and their Leuco-compounds. V. V. Kozlov; Zavodskaya Lab. 7, 1367-70 (1938).
- The Structure and Absorption of Diamine Dyes Derived from Acridine. P. Ramart-Lucas, M. Grumez & M. Martynoff; Compt. rend. 207, 1106-9 (1938).
- Spectrography and Spectrophotometry in the Examination of Works of Art. M. Roulleau; Documentation sci. 5, 161-7 (1936); see Chem. Abstr. 33, 6163(1939).
- Absorption of Light by Nickel Colloids in Rock Salt. K. N. Pogodaev; J. Exptl. Theoret. Phys. U.S.S.R. 8, 992-7 (1938).
- The Absorption and Luminescent Spectra of Some Organic Dyes. A. Wrzesinska; Acta Phys. Polon. 4, 475-88; Chem. Zentr. 1938, I. 2524-5.
- Photoelectric Gloss Meter. L. A. Carpenter & E. J. Schreiner, assignors to Oxford Paper Co., U. S. Pat. 2,127,477 (Aug. 16, 1938).
- Measuring the Absorptive Power of Paper towards Printing Ink. B. I. Berezin; Bumazhnaya. Prom. 15, No. 2, 70-2 (May 1937); Chimie & Industrie 39, 954 (May 1938).
- Photoelectric Method of Determining the Whiteness and Transparency of Paper. S. S. Kuvshinov; Bumazhnaya. Prom. 16, No. 2, 27-32 (1938); Chem. Abstr. 32, 7261.
- Stains for Determining the Degree of Cooking, the Degree of Bleaching and the Purity of Pulp. J. H. Graff; Paper Trade J. 109, 65-73 (1938).
- Color Perception. A. de Gramont; J. physiol. path. gen. 36, 993-1021 (1938).
- Pathology of Color Vision. M. Karbowski; v. Graefe's Arch. Opth. 139, 480-502 (1938).
- Color Illumination (Ueber die Summation unterschwelliger farbiger Lichtreize). W. Keck; Z. Sinnesphysiol. 67, 159-74 (1938).
- To what Extent may the Detlefsen 1905 Method of Color Measurement be Considered a Forerunner of Ostwald's Method? O. Krummacher; Z. Sinnesphysiol. 67, 189-206 (1938).
- The Summation of Subliminal Colored Lights in Normal and Color-blind Individuals. F. Schwarz; Z. Sinnesphysiol. 67, 175-88 (1938).
- The Influence of Color on Size Perception. R. A. Kanicheva; Bekht. Inst. Brain Res., 20th Anniv., 63-4 (1938); Trud. Inst. Mozga Bekht. 9, 61-75 (1939).
- The Effect of Muscular Work on the Threshold of Achromatic Vision. K. H. Kekcheev & A. V. Kavtorina; Chetvert. Soveshch. fiziol. Probl., Fiziol. Org. Chuvstv Akad. Nauk U.S.R.R. VIEM, 1938, 51-2.

Investigation of Interoception by Measuring the Threshold of Achromatic Vision.

K. H. Kekcheev, F. A. Sirovatko & A. V. Kavtorina; Chetvert. Soveshch. fiziol. Org. Chuvstv. Akad. Nauk U.S.S.R. VIEM, 1938, 50.

Experimental Data on the Perception of Black. V. N. Osipova; Bekht. Inst. Brain Res., 20th Anniv., 1938, 61-3.The Change of Color Perception of Black and White Background at a Small Visual Angle. B. N. Kompaneisky; Bekht. Inst. Brain Res., 20th Anniv., 1938, 57-61.The Action of Dark Adaptation on the Critical Frequency of Flashing of Non-chromatic Light. S. V. Kravkov; Chetvert. Soveshch. fiziol. Probl., Fiziol. Org. Chuvstv. Akad. Nauk U.S.S.R. VIEM, 1938, 45.A Quantitative Study of the Visual After-image. W. A. Feinbloom; Arch. Psychol. (NY) 1938, No. 233, pp. 46; Psychol. Abstr. 13 (Oct., 1939).Phenomenology of Color Vision; II. After-images. M. Karbowski; v. Graefe's Arch. Ophthal. 138, 337-50 (1938).The Influence of Acoustic Stimulation upon the Color-sensibility of a Protanopic Eye. S. V. Kravkov; Acta Ophthal. Kbh. 15, 337-42 (1937).Experimental Studies of Color and Non-color Attitude in School Children and Adults. B. J. Lindberg; pp. 170; Levin & Munksgaard; Copenhagen.The Saturation Discrimination of two Trichromats. W. D. Wright & F.G.H. Pitt; Proc. R. Phys. Soc. London 49, 329-31 (1937).The Color-vision Characteristics of a Trichromat. II. J. H. Nelson; Proc. R. Phys. Soc. London 49, 332-7 (1937).Tests in Common Use for the Diagnosis of Color Defect. Mary Collins; Nature 140, 532-4, 569-70 (1937).The Change of Visual Sensitivity with Time. B. H. Crawford; Proc. Roy. Soc. B 123, 69-89 (1937).Fundamentals of Glassine Transparency. D. B. Wicker; Paper Trade J. 107, 44-52 (1938).Trichromatic Colorimeter: Precision. A. D. Aleksandrov; J. Exper. Theor. Phys. U.S.S.R. 7, 785-91 (1937); through Kodak Abstr. Bull. 24, 234 (1938)."T.C.B.T." Daylight Lamp: Application. J. Pinte & R. Toussaint; Rev. gen. Mat. col. 42, 282-4 (1938).A Color Densitometer for Subtractive Processes. R. M. Evans; J. Soc. Mot. Pict. Eng. 31, 194-201 (1938).The Theory of Three Color Photography. A. C. Hardy; J. Soc. Mot. Pict. Eng. 31, 331-42 (1938).The Fundamentals of Color Measurement. D. L. MacAdam; J. Soc. Mot. Pict. Eng. 31, 343-50 (1938).

- Textile Lighting with Particular Reference to Color Discrimination. J. W. Howell; J. Soc. Dyers Col. 54, 293-301 (1938).
- Eye and Brain as Factors in Visual Perception. R. H. Thouless; presidential address to the Psychology section, Report of the British Assoc. for the Advancement of Science, Cambridge, Aug. 1938.
- Artificial Daylight. R. Toussaint; Bull. Soc. Franc. Elec. 8, 875-8 (1938).
- Problems of Photometry and Colorimetry. J. Dourgnon; Bull. Soc. Franc. Elec. 8, 887-98 (1938).
- Visual Telephotometry. L. J. Collier; Trans. Ill. Eng. Soc. (London) 3, 141-52; Disc. 152-4 (1938).
- Thresholds and Supra-thresholds of Seeing. M. Luckiesh & F. K. Moss; Trans. Ill. Eng. Soc. 33, 786-813 (1938).
- Rotating Disc and Pigment Colors. A. Polack; Rev. d'Optique 17, 239-43 (1938).
- The Thermal Decomposition of Visual Purple. R. J. Lythgoe & J. P. Quilliam; J. Physiol. 93, 24-38 (1938).
- A Comparison of Color-blind Tests. R. B. Philip; Amer. J. Psychol. 51, 482-8 (1938).
- Effect of Stimulus Texture upon Apparent Warmth and Affective Value of Colors. M. A. Tinker; Amer. J. Psychol. 51, 532-5 (1938).
- Color Vision in Relation to Artistic Ability. S. Atwell; J. Psychol. 8, 53-6 (1939).
- Color Vision and Color Blindness in Monkeys. W. F. Grether; Comp. Psychol. Monogr. 15, No. 4, pp. 38 (1939).
- Instruments and Technics for the Clinical Testing of Light Sense: I. Review of the Recent Literature. L. L. Sloan; Arch. Ophthal. (Chicago) 21, 913-34 (1939).
- Measurement of Visual Depth Perception. N. Warren; Psychol. Bull. 36, 526 (1939).
- The Change of Color Perceived at a Distance. B.N. Kompaneisky; Trud. Inst. Mozga Bekht. 9, 15-59 (1939).
- Experimental Study of the Perception of Achromatic Colors. V. N. Osipova; Trud. Inst. Mozga Bekht. 9, 72-100 (1939).
- New Experiments on Color Vision in Bees. M. Hertz; J. Exp. Biol. 16, 1-8 (1939).
- Influence of Caffeine on the Color-sensitivity. S. V. Kravkov; Acta ophthal. Kbh. 17, 89-92 (1939).
- Test-tube Photoelectric Colorimeter. W. H. Summerson; J. Biol. Chem. 130, 149-67 (1939).
- Artificial Light Sources. C.C. Paterson; Gen. Elec. Co. J. 10, 172-82 (1939).
- Photoelectric Colorimeter. F. Loewenberg; Amer. Dyestuff Repr. 28, 706 (1939).
- Measurement of the Fastness to Light of Dyed Materials. H. Rein; Bull. Fed. Int. Assoc. Chim. Text. Coul. 3, 394-8 (1938).
- Measurement of the Fastness to Light of Dyed Materials. H. Sommer; Bull. Fed. Int. Assoc. Chim. Text. Coul. 3, 398-412 (1938).

- Criticism of Toussaint-Pinte Fading Test. G. Martin, J. Niederhauser, J. Pinte & R. Toussaint; (1) H. Ris; Bull. Fed. Int. Assoc. Chim. Text. Coul. 3, 89-92, 390-4 (1938).
- A Time Analysis of Sunshine. F. Benford & J. E. Bock; Trans. Ill. Eng. Soc. 34, 200-18 (1939).
- Spectral Distribution of Solar Radiant Energy. H. P. Gage; Trans. Ill. Eng. Soc. 34, 316-29 (1939).
- Theory and Measurement of Visual Mechanisms. I. A Visual Discriminometer. II. Threshold Stimulus Intensity and Retinal Position. W. J. Crozier & A. H. Holway; J. Gen. Physiology 22, 341-64 (1939).
- The Problem of Stimulus Equivalence in Behavior Theory. C. L. Hull; Psychol. Rev. 46, 9-30 (1939).
- Present Status of Colorimetry. M. G. Mellon; Ind. Eng. Chem., Anal. Ed. 11, 80-5 (1939); Bull. Inst. Paper Chem. 2, No. 7 (March 1939).
- Filters for Adjusting the Spectral Sensitivity of a Selenium Photocell to that of the Eye. P. M. Fridlyand; J. Tech. Phys. (U.S.S.R.) 2, 1952-9 (1939).
- Absorption Spectra of Organic Substances in Concentrated Sulfuric Acid. IV. Heterocyclic Compounds. F. Bandow; Biochem. Z. 299, 199-221 (1938); 301 37-59 (1939).
- Absorption Spectrum of Cobalt Chloride in Organic Solvents. M. Richter; Acta Univ. Szeged. Chem. Min. Phys. 7, 29-45 (1939).
- "Subjective Colors" from Line-patterns. M. B. Erb & K. M. Dallenbach; Amer. J. Psychol. 52, 227-41 (1939).
- Relation of Size of Stimulus and Intensity in the Human Eye. I. Intensity Thresholds for White Light. C. H. Graham, R. H. Brown & F. A. Mote, Jr.; J. Expt. Psychol. 24, 555-73 (1939); II. Intensity Thresholds for Red and Violet Light. C. H. Graham & N. R. Bartlett; J. Expt. Psychol. 24, 574-87 (1939).
- Spectrophotometry of Reflecting Materials. R. Donaldson; J. Sci. Instruments 16, 114-7 (1939).
- Screen Color. W. C. Marcus; J. Soc. Mot. Pict. Eng. 33, 144 (1939).
- Color and Color Rendering. C. C. Paterson; Text. Mercury & Argus 100, 436 (1939).
- Absorption Spectra of the F. A. C. Color Standards. W. M. Urbain & H. L. Roschen; Oil & Soap 16, 124-6 (1939).
- Daylight: Ultra-violet Energy Content. M. Luckiesh, A. H. Taylor & G. P. Kerr; J. Franklin Inst. 128, 425-31 (1939).
- Determination of Constitution on the Basis of the Spectra of Solutions. H. Ley & H. Specker; Berichte d. chem. G. 72 B, 192-202 (1939).
- Absorption Spectra of Some Quinones. L. Brüll & F. Griffi; Gazz. chim. ital. 69, 28-31 (1939).
- Origin of Color in Some Inorganic Salts. J. Hoffmann; Chem. Erde 12, 208-20 (1939).
- High-speed Method of Absorption Spectrophotometry for the Range 10,000 to 2000 Å. G. R. Harrison; Proc. Sixth Summer Conf. (at M.I.T.) on Spectroscopy and its Applications, John Wiley & Sons, New York, 1939; pp. 91-6.

Structure and Absorption Spectra of Azo Dyes. W. R. Brode; Proc. Sixth Summer Conf. (at M.I.T.) on Spectroscopy and its Applications, John Wiley & Sons, New York, 1939; pp. 128-33.

Photochemistry of the Visual Purple. F. Weigert; Proc. Sixth Summer Conf. (at M.I.T.) on Spectroscopy and its Applications, John Wiley & Sons, New York, 1939; pp. 134-42.

Absorption Spectra of Permanganate, Chromate, Vanadate and Manganate Ions in Crystals. J. Teltow; Z. physikal. Chem. B 43, 198-212 (1939); Errata: Z. physikal. Chem. B 44, 74 (1939).

Spectrocolorimeter for Comparing the Spectra of Solutions of Different Depth. E. Perlman; Science 90, 279-80 (1939).

Fluorescent Dyes: Photochemical Reaction. G. L. Natanson; J. Phys. Chem. Russ. 13, 552 (1939); through Brit. Chem. Physiol. Abstr. 1939, AI, 574.

Matching Colors. C.H.S. Tupholme; Text. J. Australia 14, 173-4 (1939).

Spectrophotometric Study of Indanthrene Scarlet GG and Bright Orange GR. I.V. Gratshev; Prom. Org. Chim. 6, 620-3 (1939); through Brit. Chem. Physiol. Abstr. 1940, B 266.

Vinyl and Divinyl Chromophoric Groups: Absorption Spectra. E. Hertel & H. Lührmann; Z. physikal. Chem. B 44, 261-85 (1939).

Colors (Dyes) of the Renaissance. L.G. Deruisseau; Ciba Rev. 2, 601-3 (1939).

Relation between the Structure and the Color of Unsymmetrical Cyanine Dyes. A. I. Kiprianov & G. T. Pilyugin; Byull. Vsesoyuz Khim. Obshchestva im D.I. Mendeleeva 1939, No. 3-4, 60-1; Khim. Referat Zhur. 1939, No. 7, 105-6.

Influence of Foreign Substances on the Absorption of Dyestuffs in Solution. S. Mitra; Indian J. Phys. 13, 397-405 (1939).

Absorption of Iodine in Some of its Principal Polar and Non-Polar Solvents. F. Cennamo; Nuovo Cimento 16, 355-9 (1939).

Fluorescence and Absorption Spectra of Complex Molecules. D. Blokhintsev; J. Phys. (U.S.S.R.) 1, 117-24 (1939).

Glassine Paper: Transparency. D.B. Wicker; Paper Trade J. 110, TAPPI Sect. 8024 (1940).

Shining in Human Eyes. Anon; Nature 145, 737 (May 11, 1940).

Color and the Black-out. Anon; Text. Colorist 62, 106, 127 (Feb. 1940) (from The Dyer & Text. Printer).

Camouflage in Modern Warfare (Review of "Adaptive Colouration in Animals" by Dr. Hugh B. Cott, Methuen & Co. Ltd., 1940; also lecture to officers at Chatham, in Royal Engineers J., Dec. 1938); Anon.; Nature 145, 949-51 (June 22, 1940).

Colorimetry for Paper. W.E. Rand; Pulp & Paper Mag. Canada 41, 13-8, 231 (1940).

Certain Experimental Aspects of the Psychology of Colour (Pleasant and unpleasant associations, preference tests, sales records, etc. for pigment colors of dominant wavelengths 619, 578, 528 and 467 millimicrons). D.E. Roe; Oil & Colour Chem. Assoc. J. 23, 126-44 (June 1940).

- Comparison of Human and Chimpanzee Spectral Hue Discrimination. W. F. Grether; J. Expt. Psychol. 26, 394-403 (1940).
- The Role of Eye Movements in the Autokinetic Phenomenon. A. Skolnick; J. Expt. Psychol. 26, 373-93 (1940).
- Relative Effectiveness (Visibility) of Red, Orange, Yellow, Green, and Blue under certain Specified Conditions. F. O. Smith; J. Expt. Psychol. 26, 124-8 (1940).
- Convenient and Practical Means for Studying Light and Color Minima in any Part of the Retina. C. E. Ferree & G. Rand; J. Expt. Psychol. 26, 28-52 (1940).
- Functional Adaptation to Near-vision. M. Luckiesh & F. K. Moss; J. Expt. Psychol. 26, 352-6 (1940).
- Perception of Yellow Light through Red and Green Binocular Stimulation as Determined by the Conditioned Galvanic Response. J. E. Hernandez; J. Expt. Psychol. 26, 337-44 (1940).
- The Moon Illusion and the Angle of Regard. A. H. Holway & E. G. Boring; Amer. J. Psychol. 53, 109-16 (1940).
- Luminous Standard: Development and Properties. G. Heller; Philips Tech. Rev. 5, 1-5 (1940).
- Action of Light on Dyed Textiles. A. Seyewetz; Rev. gen. Mat. Color. 44, 1-4, 45-6 (1940).
- Plastics: Fastness to Light (Color change measurement). O. Schäfer; Kunststoffe 30, 4-9 (1940).
- Photoelectric Colorimeter: Application in Analysis. I. Sorgato; Chimica e Industria 18, 1-5 (1940).
- A Neutral-wedge Abridged Spectrophotometer. P. A. Clifford & B. A. Brice; Ind. Eng. Chem., Anal. Ed 12, 218-22 (1940).
- Spectrocolorimetry: Adaptation of a Colorimeter for Evaluating Absorption Spectra. Marjorie R. Mattice, Catherine F. Gannon & C. H. Greene; J. Lab. Clin. Med. 25, 629-33 (1940).
- Eye: Adaptation to Brightness. K. J. W. Craik; Proc. Roy. Soc. B 128, 232-47 (1940).
- Carcinogenic Hydrocarbon Photo-oxides: Absorption Spectra and Properties. C. B. Allsopp; Nature 145, 303 (1940).
- Advantages of Non-reflecting Glass Optical Instruments. A. Smakula; Z. Instrumentkunde 60, 33-6 (1940).
- The Glory of Color. J. H. Archibald; Text. Colorist 62, 191-3 (1940).
- Fluorescent Lighting for Textile Mills. J. A. Ralph; Can. Text. J. 57, No. 10, 32, 34 (1940).
- Color Comparison Devices. R. H. Park; Amer. Dyestuff Reprtr. 29, No. 11; Proc. Amer. Assoc. Text. Chem. Colorists P 272-8 (1940).
- Color of Pigment Mixtures. D. R. Duncan; Paint Manuf. 10, 107-11 (1940).
- Relation between the Absorption Spectra and the Chemical Constitution of Dyes. XV. Influence of Sulfonic Acid Groups in Aminoazo Dyes. W. R. Brode & D. R. Eberhart; J. Org. Chem. 5, 157-64 (1940).

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