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Letter
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COLORIMETRY, SPECTROPHOTOMETRY, AND PHOTOMETRY
Publications by the staff of the National Bureau of Standards for 1941 to 1944

Contents

GENERAL INFORMATION

This Letter Circular is a list of publications appearing during the years 1941 to 1944, inclusive, on colorimetry, spectrophotometry, photometry, lighting, and related subjects. For earlier publications see NBS Letter Circulars LC628 (1939-1940) and LC398 (prior to 1939). Copies of LC398, LC628, and other Letter Circulars may be obtained without charge from the National Bureau of Standards.

Some of the publications in this list have appeared in the regular series of publications of the Bureau, and others in various scientific and technical journals. Unless specifically stated, papers are not obtainable from the National Bureau of Standards. In those references preceded by an asterisk (*), the publication either is of joint authorship with an outside agency or has been issued by an outside agency with which the Bureau has cooperated.

In general, the order of arrangement within each of the major sections listed above is as follows: (1) Formal Government publications listed in order of series number, (2) formal publications appearing in outside journals, listed approximately in order of date of issue, and (3) in the first section, published abstracts of papers presented before meetings of technical societies.

Where the price is stated, the publication can be purchased from the Superintendent of Documents, Government Printing Office, Washington 25, D.C. Remittance should accompany order and should be made either by coupons obtainable from the Superintendent of Documents in sets of 20 for $1.00 and good until used, or by check or money order payable to his order. The prices given in this Letter Circular are for delivery to addresses in the United States and its territories and possessions and in certain foreign countries which extend the franking privilege. In the case of all other countries, one-third the cost of the publication should be added to cover postage.

Series letters with serial numbers are used to designate Bureau publications;

RP = Research Paper. These are reprints of articles appearing in the Journal of Research of the National Bureau of Standards.
C = Circular.
FS = Federal Specification.
CS = Commercial Standard.
LC = Letter Circular. Letter Circulars are obtainable without charge from the National Bureau of Standards.

The List of available Publications of the Department of Commerce, which includes all publications of the National Bureau of Standards that are still in print, is obtainable without charge on application to the Bureau.

For papers in the other scientific or technical journals, the names of the journal or of the organization publishing the article is given in abbreviated form, together with (usually) the volume number (underscored), page, and year of publication in the order named. The Bureau cannot supply copies of these journals, although in some cases reprints of the papers are still available and may be obtained on request to the authors. The journals may usually be consulted in the leading libraries. Copies of the Journal of the Optical Society of America and the Review of Scientific Instruments may be obtained from the American Institute of Physics, 57 East 55th Street, New York 22, N. Y.; ASTM publications may be obtained from the American Society for Testing Materials (ASTM), 260 South Broad Street, Philadelphia 2, Pa. Addresses for other journals are given in the references.

Those who wish to keep informed concerning work at the National Bureau of Standards should subscribe to the "Technical News Bulletin". It is a monthly publication listing all papers published by members of the staff, whether appearing in Bureau publications or in other journals. It contains abstracts of papers appearing in the Journal of Research of the National Bureau of Standards, notes on progress of work in the laboratories, important conferences at the Bureau, and other items of general interest. Subscriptions should be sent to the Superintendent of Documents, Government Printing Office, Washington 25, D. C. The price is 50 cents a year.

COLORIMETRY AND SPECTROPHOTOMETRY

Title	Series	Price

Reflection-transmission relationships in sheet materials. Herbert F. Launer. J. Research NBS 27, 429 (1941). RP1430 5¢

A method is described for determining the reflectance of a sheet of material indirectly from measurements of the transmission of one and two sheets of it. The reflectance, R_a, is found from the expression:

$$R_a = \sqrt{1 - (T_a^2/T_{2a})},$$

where T_a and T_{2a} are the measured transmissions. Comparisons of reflectances found in this way with those obtained by the General Electric recording spectrophotometer are presented, and discussion of the effects of changes in angular conditions of illuminating and viewing the samples is given together with a discussion of fluorescence errors.

Measurement of the fading rate of paints. Arnold J. Eickhoff and Richard S. Hunter. J. Research NBS 28, 773 (1942). RP1478 10¢
Also Paint, Oil and Chemical Review (537 S. Dearborn St., Chicago 5, Ill.) 104, p. 9, June 18, and p. 6, July 2 (1942).

Panels prepared from several paints were exposed in each of two accelerated-weathering machines and out-of-doors. The changes in color, gloss, and appearance of the different panels were followed. The rates at which fading occurred from artificial and natural weathering were measured numerically and compared.

Fresnel reflection of diffusely incident light. Deane B. Judd. J. Research NBS 29, 329 (1942). RP1504 5¢

The fraction of incident light which is reflected at an interface between two media whose relative index of refraction is n has been computed from the Fresnel formula for three angular conditions: (1) perpendicular incidence, (2) diffuse external incidence and (3) diffuse internal incidence. These results have been amplified by suitable interpolation and are tabulated for intervals of 0.01 throughout the range of $1.00 \leq n \leq 1.60$.

Title	Series	Price
*Tristimulus specification of the Munsell Book of Color from spectrophotometric measurements. Kenneth L. Kelly, Kasson S. Gibson, and Dorothy Nickerson. J. Research NBS 31, 55 (1943). Also J. Optical Soc. Am. 33, 355 (1943).	RP1549	20¢
Tristimulus values X, Y, Z, and trilinear coordinates, x and y, are given for each of the 421 standards of the Munsell Book of Color for each of four illuminants - ICI Illuminants A and C, representative of incandescent-lamp light and average daylight, respectively, Illuminant "D" (lightly overcast north sky), and Illuminant "S" (extremely blue sky). Values of x and y for ICI Illuminant C are also plotted in large diagrams which serve as means for determining the Munsell notation and thereby the ISCC-NBS color name for any color whose trilinear coordinates and apparent reflectance are given.		
Color designations for lights. Kenneth L. Kelly. J. Research NBS 31, 271 (1943). Also J. Optical Soc. Am. 33, 627 (1943).	RP1565	5¢
The color names consist of hue names such as red, pink, yellowish green, or purple without further modifiers since they are intended to differentiate lights chiefly according to hue. The hue names are among those used in the ISCC-NBS system (see RP1239) and carry the same meaning. The chromaticity ranges identified by each of these hue names are defined by areas on the ICI chromaticity diagram.		
Photoelectric tristimulus colorimetry with three filters. Richard S. Hunter. NBS Circular C429 (July 30, 1942). Also J. Optical Soc. Am. 32, 509 (1942), and (in abridged form) as part of Symposium on Color, published by the ASTM, March 5, 1941.	C429	10¢
Three filters are described for use with a particular source and photocell to give a close approximation to an ideal artificial eye for color measurement. The resulting three source-filter-photocell combinations can be used to measure approximate tristimulus specifications, magnitudes of color difference, and values for whiteness and yellowness. A new uniform-chromaticness-scale coordinate system is described and typical data and work sheets show the use of the photoelectric tristimulus method for six different types of measurement.		

Title	Series	Price
Color charts: A descriptive list. NBS Letter Circular (September, 1941). (Supersedes LC526).	LC665	Free
Color and legibility. NBS Letter Circular (August 1943). (Supersedes LC351).	LC730	Free

A multipurpose photoelectric reflectometer. Richard S. Hunter. Paper Trade Journal (15 W. 47th Street, New York 19, N. Y.) 113, Tech. Sec. 275 (1941); also Am. Dyestuff Reporter (440 Fourth Ave., New York, N. Y.) 30, 525 (1941); and Paint and Varnish Production Manager (Mills Building, Washington 6, D.C.) 21, 207 (1941).

This is a condensed version of the paper which first appeared as NBS Research Paper RP1345 in 1940. A null-type photoelectric instrument is described which is suitable for a number of uses.

Use of liquid surfaces as standards of specular glo . Dwight G. Moore and Richard S. Hunter. J. Am. Ceramic Soc. (2525 N. High St., Columbus 2, Ohio) 24, 167 (1941).

Films of liquids can be flowed onto depolished plaques of black glass and used as standards of specular reflectance. The specular reflectances of these liquid films at 45°,60° and 75° were computed as a function of refractive index by Fresnel's equation and are plotted on a large graph.

Color systems and their inter-relation. Deane B. Judd. Illuminating Engineering (51 Madison Ave., New York 10, N.Y.) 36, 336 (1941).

This paper is part of a Symposium on Color. The color systems whose inter-relations are indicated include: (1) the ICI standard coordinate system (2) linear homogeneous transformations thereof (a) for simplicity in computation, (b) for uniform chromaticity scales, and (c) for theories of color vision, (3) polar coordinate specifications such as that by dominant wavelength and purity, (4) systems of transparent color standards such as the Lovibond glasses and the Arny solutions, (5) systems of opaque color standards such as Munsell, Ostwald, Maerz and Paul, and Ridgway, and (6) the ISCC-NBS method of designating color.

Introduction to color. Deane B. Judd. Part of Symposium on Color, published by the ASTM, March 5, 1941.

The following topics are treated briefly in the paper: psychological definition of color, attributes of

object color (hue, lightness, and saturation), modes of appearance (surface, transparent volume), technical definition of color, instrumentation (goniophotometer, spectrophotometer), color specification by combinations of lights (ICI standard observer and coordinate system, uniform-chromaticity-scale system, dominant wavelength and purity), and color specification by material standards.

The definition of black and white. Deane B. Judd. The American Journal of Psychology (Morrill Hall, Cornell University, Ithaca, N.Y.) 54, 289 (1941).

Argument is presented to support the view that black and white are the terminal members of any series of gray colors perceived to belong to opaque surfaces, providing only that the apparent reflectances of these surfaces vary by a factor sufficiently large (between 10 and 100).

*A proposed method of designating color. Francis Scofield, Deane B. Judd, and Richard S. Hunter. ASTM Bulletin No. 110 p. 19, May (1941).

The proposed method is based upon the (α,β)-diagram which is related to the standard ICI coordinate system, yields approximately uniform chromaticity scales, and is conveniently adaptable to expressions of results obtained by any one of several recently developed photoelectric tristimulus colorimeters.

Methods of designating color. Deane B. Judd. The Bulletin of the American Ceramic Society (2525 N. High Street, Columbus 2, Ohio) 20, 375 (1941).

This paper is part of a Symposium on Color Standards and Measurements. The topics discussed in the paper are definitionsor ideas of color, attributes of color perception, modes of appearance of object colors, limitations of color standards, and tristimulus specifications.

*The success of the ISCC-NBS system of color names in the Chemical Monographs. Kenneth L. Kelly. Bulletin Nat. Formulary Com. (Am. Pharmaceutical Assoc., 2215 Constitution Ave., Washington 25, D.C.) 9, 302 (1941).

Facts of color blindness. Deane B. Judd. J. Optical Soc. Am. 33, 294 (1943).

Colorblindness is of various types, and there is a greater or lesser adherence of groups of observers to these types. The most common are the two types of red-green blindness, protanopia and deuteranopia, and the corresponding types

of anomalous vision, protanomaly and deuteranomaly. Color blindness is usually congenital, but it may also be acquired as a result of injury or disease. Congenital red-green blindness and anomalous vision are much more prevalent among males than among females, and are regarded as sex-linked characteristics. Methods of predicting precisely the appearance of colors to red-green-blind observers are described with a view to their possible usefulness in the design and development of color-blindness tests.

Colorblindness and the detection of camouflage. Deane B. Judd. Science (Science Press, Lancaster, Pa.) 97, 544 (1943).

Observers of both of the two common types of abnormal color vision might detect a position perfectly camouflaged for normal vision. The first type of observer, the anomalous trichromat, might detect spectral differences between object and background invisible to the normal observer. The second type of observer, the red-green-blind dichromat, might detect the position hidden in a pattern of exhibiting red-green differences more confusing to the normal observer than to the red-green-blind observer.

Colorimetry of pulp and paper with special reference to "Brightness" and "Whiteness". Deane B. Judd. Pulp and Paper Magazine of Canada (National Business Publications, Ltd., Garvendale, Quebec) 43, No. 2, 94 (1942).

Colorimetry of pulp and paper by the spectrophotometer and by the photoelectric tristimulus method are discussed, together with the use of Munsell and Ostwald color systems. Evaluation of "whiteness" of paper and its relation to reflectivity of pulp for blue light is treated in some detail because of its connection with the saving of chlorine used as a bleach.

*Chapters from the forthcoming report of the Optical Society of America Committee on Colorimetry, J. Optical Soc. Am., as follows:

Chapter 2, The concept of color, 33, 544 (1943).
Chapter 5, Physical concepts: Radiant energy and its measurement, 34, 183 (1944).
Chapter 6, The psychophysics of color, 34, 245 (1944).
Chapter 7, Quantitative data and methods for colorimetry, 34, 633 (1944).
Chapter 8, Colorimeters and color standards, 35, 1 (1945).

Methods and standards for gloss measurements of camouflage materials. Richard S. Hunter. Metal Finishing (11 W. 42nd Street, New York 18, N.Y.) 42, 519 (1944).

This paper discusses the problem of obtaining agreement between different instruments built to measure 60° specular gloss. It is shown that differences in source and receptor field angles will cause differences in the results which such instruments give. These differences can be minimized in the low-gloss range by the use of uniformly calibrated low-gloss standards.

Color vision. Deane B. Judd. Medical Physics, p. 285, Otto Glasser, Editor (Chicago: Year Book Publishers, 1944).

This is a condensed introduction to color vision including treatment of metamers, anomalous trichromatism, color-blindness, standard observer, visual colorimetry, photoelectric colorimetry, trichromatic production of pictures, tri-receptor mechanism and color theories (Young-Helmholtz, Ladd-Franklin, Hering, Müller), modes and attributes of color perception, retinal zones (perimetry), retinal adaptation (negative after-image, Bezold-Brücke phenomenon), and post-retinal adaptation (simultaneous color contrast, color transformation, memory color).

Signaling with mirror. Richard S. Hunter. Air Sea Rescue Bulletin (Air Sea Rescue Agency, U.S. Coast Guard Headquarters, Washington 25, D.C.) No. 2, p. 6 (July 1944). (Restricted publication).

Different methods of aiming sunlight reflected from mirrors are described, and the effectiveness of each is discussed.

Abstracts on Colorimetry and Spectrophotometry

Methods of designating color. Deane B. Judd. Bull. Am. Ceramic Soc. 20, 85 (1941).

Use of liquid surfaces as standards of specular gloss. Dwight G. Moore and Richard S. Hunter. Bull. Am. Ceramic Soc. 20, 91 (1941).

Examples of color measurements with the multipurpose reflectometer and tristimulus filters. Richard S. Hunter. Bull. Am. Ceramic Soc. 20, 91 (1941).

Introduction to color. Deane B. Judd. ASTM Bulletin No. 108, 11 (1941).

Photoelectric colorimetry. Richard S. Hunter. ASTM Bulletin No. 108, 13 (1941).

Whiteness of light surface-colors. Deane B. Judd. J. Optical Soc. Am. 31, 462 (1941).

Use of didymium glasses for wavelength calibration of recording spectrophotometers. Kasson S. Gibson and Harry J. Keegan. J. Optical Soc. Am. 31, 462 (1941).

The wavelengths given are superseded by those in the eighth reference below.

Permissible short cuts in the photoelectric tristimulus measurement of color differences. Richard S. Hunter. J. Optical Soc. Am. 31, 463 (1941).

The accurate measurement of specular gloss. Richard S. Hunter. J. Optical Soc. Am. 31, 758 (1941).

Measurement of the accelerated fading of paints. A. J. Eickhoff and R. S. Hunter. J. Optical Soc. Am. 31, 759 (1941).

The geometric identification of reflection and transmission measurements. Richard S. Hunter. J. Optical Soc. Am. 33, 685 (1943).

The color perceptions of protanopic and deuteranopic observers. Deane B. Judd. J. Optical Soc. Am. 34, 351 (1944).

Symposium on the Ostwald color system. Foreword. Deane B. Judd. J. Optical Soc. Am. 34, 353 (1944).

The relation of protanopic to normal vision. Deane B. Judd. J. Optical Soc. Am. 34, 768 (1944).

On the use of working standards of didymium and Vitrolite glasses for spectrophotometric measurements. Harry J. Keegan and Kasson S. Gibson. J. Optical Soc. Am. 34, 770 (1944).

On the measurement of the spectral apparent reflectance of low reflecting materials. Harry J. Keegan. J. Optical Soc. Am. 34, 770 (1944).

PHOTOMETRY AND LIGHTING

Title	Series	Price
The daytime photoelectric measurement of cloud heights. Maurice K. Laufer and Laurence W. Foskett. J. Research NBS 26, 331 (1941). Also J. Aeronautical Sciences 8, 183 (1941).	RP1379	5¢

Title	Series	Price

A photoelectric detector is described which was used with a modulated beam of light for the measurement by triangulation of the height of clouds during the daytime. An a-c mercury-arc lamp was used to obtain the modulated beam. The shot noise of the phototube, resulting from the relatively high brightness of daytime clouds, limits the detection. Dark overcast clouds at an elevation of 9,000 feet were detected.

A physical photometer. Ray P. Teele. J. Research NBS 27, 217 (1941). Also J. Optical Soc. Am. 31, 696 (1941) — RP1415 — 5¢

A physical photometer has been constructed, consisting of a thermopile, a potentiometer, and a filter which has at each wavelength a transmission closely proportional to the ICI luminosity factor for that wavelength. This photometer gives results for colored lights or filters which are consistent with the ICI luminosity factors and which are more accurate than those obtained by visual observers when the photometric fields are not closely color-matched.

Fluorescent lamps. NBS Letter Circular (June 1941) — LC652 — Free

Incandescent electric lamps: Photometric standards distributed by the National Bureau of Standards. NBS Letter Circular (February 1942). (Supersedes LC220.) — LC680 — Free

Luminous and fluorescent paints. NBS Letter Circular (September 1942). (Supersedes LC678) — LC703 — Free

Radiation from fluorescent lamps. NBS Tech. News Bulletin No. 286, p. 11 (February 1941).

NBS letter discussing possible effects of fluorescent lighting upon vision. Lighting and Lamps 44, 14 (February 1944).

*Life tests of electric discharge lamps. M. K. Laufer and H. S. Bernstein. Civil Aeronautics Administration, Technical Development Note No. 29 (May 1943).

*Calibration of a permanent control beacon for a 300-meter photometric range. T. H. Projector. Civil Aeronautics Administration, Technical Development Report No. 34 (September 1943).

*Construction of a goniometer for use in determining the candlepower characteristics of beacons. F.C. Breckenridge and T. H. Projector. Civil Aeronautics Administration, Technical Development Report No. 39 (February 1944).

Airport lighting in the United States and Europe. F.C. Breckenridge. Illuminating Engineering (51 Madison Avenue, New York 10, N.Y.) 36, 1157 (December 1941).

An improved "zero-resistance" circuit for photo-cell photometry. T. H. Projector, M. K. Laufer, and C. A. Douglas. Rev. Sci. Inst. 15, 107 (1944).

*Transport blinkers. Alan L. Morse, Chief, Technical Development Division, Civil Aeronautics Administration. Flying 35, 53 (1944).

Work is described leading to the use of flashing position lights for commercial aircraft. The National Bureau of Standards cooperated in this development.

SPECIFICATIONS AND STANDARDS CONTAINING COLORIMETRIC OR PHOTOMETRIC DATA.

Title	Series	Price
Federal Specifications		
*Federal Specification for lamps; electric incandescent, large, tungsten-filament. April 8, 1942.	W-L-101e	5¢
*Current annual supplement to W-L-101e		5¢
*Federal Specification for lamps; electric, incandescent, miniature, tungsten-filament. March 18, 1937.	W-L-111b	5¢
*Current annual supplement to W-L-111b.		5¢
*Federal Specification for flashlights; electric, hand.	W-F-421a	5¢
*Federal Specification for lamp-auxiliaries; fluorescent.	W-L-131	5¢
*Current supplement to W-L-131.		5¢
*Procurement Division Specification for lamps, electric, fluorescent; No. 570 (Obtainable from the Procurement Division, Treasury Department, Washington 25, D.C.)		

Title	Series	Price
*Federal Specification for enamel; interior, gloss, light-tints and white.	TT-E-506a	5¢
*Federal Specification for paint, paste, resin emulsion, interior, light tints and white.	TT-P-88	5¢
*Federal Specification for paint, varnish, lacquer, and related materials; general specification for sampling and test methods.	TT-P-141a	20¢

National Bureau of Standards

NBS Simplified Practice Recommendation, Color marking for anesthetic gas cylinders.	R176-41	5¢

Army and Navy Specifications

*Army-Navy Aeronautical Specification. Colors; aeronautical lights and lighting equipment; AN-C-56, July 25, 1942. (Obtainable from the Air Technical Service Command, Army Air Forces, Wright Field, Dayton, Ohio, the Bureau of Aeronautics, Navy Department, Washington 25, D. C. or The Airways Engineering Division, Civil Aeronautics Administration, Washington 25, D.C.)

This specification was approved by joint action of the War and Navy Departments and the Civil Aeronautics Administration for use in the procurement of aeronautical supplies; it covers the chromaticity and transmission requirements of equipment and lighting ware in four grades, A, B, C, and D, in descending order of transmission.

*Army-Navy Aeronautical Specification. Covers; light-transmitting (for aeronautical lights); AN-C-70, July 23, 1942. (Supersedes U. S. Army Specification 98-12017 and Navy Aeronautical Specification M-74). (Obtainable from the Air Technical Service Command, Army Air Forces, Wright Field, Dayton, Ohio, the Bureau of Aeronautics, Navy Department, Washington 25, D.C. or the Airways Engineering Division, Civil Aeronautics Administration, Washington 25, D.C.)

This specification was approved by the joint action of the War and Navy Departments and the Civil Aeronautics Administration for use in the procurement of aeronautical supplies. Specifications are given for general requirements of Class A, B, C, and D covers for allowable imperfections, chromaticity and transmission, heat resistance, impact strength, specific gravity, water absorption, etc., and references are made to

other specifications wherein detailed requirements are given for these particular properties.

*Army-Navy Aeronautical Specification. Lamps; all-glass sealed reflector; AN-L-25a. (Obtainable from either the Air Technical Service Command, Army Air Forces, Wright Field, Dayton, Ohio or the Bureau of Aeronautics, Navy Department, Washington 25, D.C.).

This specification was approved by joint action of the War and Navy Departments for use in the procurement of aeronautical supplies; it covers photometric measurements for candlepower performance and life tests of "sealed-beam" type lamps. Detailed requirements are covered by Army-Navy Aeronautical Standard drawings AN3126, AN3128, AN3129, and AN3130.

*Army-Navy Aeronautical Specification. Lamps; red coated miniature incandescent; AN-L-28, July 29, 1944. (Supersedes Navy Aeronautical Specification M-573). (Obtainable from the Office of the District Supervisor in the following Army Air Forces Procurement Districts: New York, Atlanta, Detroit, Chicago, Wichita, Los Angeles; from the Army Air Forces, Air Technical Service Command, Wright Field, Dayton, Ohio; or from the Bureau of Aeronautics, Navy Department, Washington 25, D.C.)

Specifications are given for total luminous transmission and cone-to-rod luminosity ratios for red silicate-enameled and transparent red lacquered globes.

*Navy Aeronautical Specification. Inspection of light-transmitting covers for aircraft lights; M-540, November 15, 1942. (Obtainable from the Bureau of Aeronautics, Navy Department, Washington 25, D. C.)

This specification supplements Specifications AN-C-56 and AN-C-70 and is primarily a set of instructions for the use of inspection equipment (comparator-photometers) provided by the Bureau of Aeronautics.

*Navy Aeronautical Specification. Emergency signaling mirror; NAVAER M-580a, June 20, 1944. (Obtainable from Bureau of Aeronautics, Navy Department, Washington 25, D.C.)

*Navy Aeronautical Specification. Tri-color approach light filter; NAVAER M-599, February 1, 1944. (Obtainable from the Bureau of Aeronautics, Navy Department, Washington 25, D.C.)

Chromaticity and transmission requirements are given for identification red, yellow and green, in accordance with

Specification AN-C-56; optical equipment for determining the width of one component of the filter is described.

*U. S. Army Specification. Paints and related materials; general specifications for inspection and test; No. 3-1F, May 19, 1943. (Obtainable from Office of the Chief of Ordnance, War Department, Washington 25, D.C.)

*Corps of Engineers. Reflectorized coating systems (retro-directive); tentative specification No. T-1290, February 22, 1943. (Obtainable from the Office of the Chief of Engineers, War Dept., Washington 25, D.C.)

Office of Civilian Defense

*OCD standard specifications for window obscuration. Prepared by the Office of Civilian Defense Committee on Window Obscuration and the Protective Lighting Unit, Engineer Section (December 1943).

American Standards Association

*Specification and description of color. American War Standard of the American Standards Association (70 East 45th Street, New York 17, N. Y.), ASA-Z44-1942, 25 cents, approved June 17, 1942.

The standard provides (1) for the use of a spectrophotometer, (2) for the reduction of spectrophotometric data by means of the ICI standard observer to luminous reflectance (or transmission) and to chromaticity coordinates (either x and y or dominant wavelength and purity), (3) for the use of the Munsell system of working standards of color, and (4) for the use of ISCC-NBS color designations wherever precision is not required.

*Photographic Flash Lamps. American War Standard of the American Standards Association (70 East 45th Street, New York 17, N.Y.), ASA-Z52.43-1944.

This standard has also been approved as Federal Specification W-L-122 and 1945 Supplement thereto, copies of which are obtainable from the Superintendent of Documents, Washington 25, D.C.

*Illuminating Engineering Nomenclature and Photometric Standards. (See under Illuminating Engineering Society, below.)

American Society for Testing Materials

*Spectral characteristics and color of objects and materials, method of test for. ASTM designation D307-44 (issued as tentative method, 1942).

*Specular gloss of paint finishes, tentative method of test for. ASTM designation D523-44T (revised from previous tentative methods published in 1939 and 1941).

*Daylight 45-degree, 0-degree apparent reflectance of paint finishes, tentative method of test for. ASTM designation D771-44T.

Illuminating Engineering Society

*Illuminating Engineering Nomenclature and Photometric Standards. American Standard, approved February 27, 1942 by American Standards Association (70 East 45th Street, N. York 17, N.Y.), ASA Z7.1-1942. Prepared under the direction of and issued by The Illuminating Engineering Society (51 Madison Avenue, New York 10, N.Y.). Published also as Report of I.E.S. Committee on Nomenclature and Standards, E. C. Cirttenden, Chairman, Illuminating Engineering 36, 813 (1941).

Association of American Railroads

*A.A.R. Signal Section Specification 69-40. Signal glasses (exclusive of kerosene hand lantern globes). Manual of the Signal Section, Association of American Railroads, Part 136 (1940). (Obtainable from the Secretary, A.A.R. Signal Section, 30 Vesey Street, New York 7, N.Y.)

Colorimetric specifications are given for red (including highway-crossing red), yellow, green, blue, purple, and lunar-white railroad signal colors, lenses, and standard glasses. Corresponding specifications for hand lantern globes are given in AAR Signal Section Specification 59-39.

Institute of Traffic Engineers

*Standards of the Institute of Traffic Engineers, Technical Report No. 1, Adjustable face traffic control signal head standards, 1940 Proceedings. (Obtainable from the Institute of Traffic Engineers, 60 John Street, New York, N.Y.).)

Colorimetric specifications are given for red, yellow and green traffic signal colors, lenses, and standard glasses.

APPLICATIONS OF COLORIMETRY, FILTER PHOTOMETRY, OR SPECTROPHOTOMETRY TO CHEMICAL ANALYSIS

Title	Series	Price
Rapid method for determining ascorbic acid concentration. Myron A. Elliott, Alfred L. Sklar, and S. F. Acree. J. Research NBS 26, 117 (1941).	RP1364	5¢
Colorimetric determination of phosphorus in steel and cast iron. John L. Hague and Harry A. Bright. J. Research NBS 26, 405 (1941).	RP1386	5¢
Spectrophotometric determination of praseodymium, neodymium, and samarium. Clement J. Rodden. J. Research NBS 26, 557 (1941).	RP1395	5¢
Spectral transmittancy curves are given (350 to 1000 millimicrons) of nitrate solutions of lanthanum, cerium, praseodymium, neodymium, samarium, europium and gadolinium.		
Effects of hydrochloric acid and salts on the absorption of light by β-naphthoquinone-sulfonic acid. Baker Wingfield and S. F. Acree. J. Research NBS 27, 361 (1941).	RP1424	5¢
Spectral transmittancy curves from 400 to 750 millimicrons are shown.		
The carbohydrate content of collagen. John Beek, Jr. J. Research NBS 27, 507 (1941). Also J. Am. Chem. Soc. (1155 16th Street, N.W., Washington, D.C.) 63, 1483 (1941).	RP1438	5¢
Spectrophotometric determination of dysprosium, holmium, erbium, thulium, and ytterbium. Clement J. Rodden. J. Research NBS 28, 265 (1942).	RP1456	10¢
Transmittancy curves are given from 350 to 1000 millimicrons.		
The assay of potassium p-phenolsulfonate, its pH range, and its ultraviolet absorption spectrum. Elizabeth E. Sager, Majorie R. Schooley, and S. F. Acree. J. Research NBS 31, 197 (1943).	RP1558	5¢

Title	Series	Price
Basic ionization constant of metacresolsulfonphthalein; pH values and salt effects. Elizabeth E. Sager, Harry J. Keegan, and S. F. Acree. J. Research NBS 31, 323 (1943).	RP1569	10¢
Spectral transmittancy or absorption curves in the visible and ultraviolet are given for metacresolsulfonphthalein in neutral, acid, and alkaline aqueous solutions.		

MISCELLANEOUS

Distribution of ozone in the stratosphere: Measurements of 1939 and 1940. W. W. Coblentz and R. Stair. J. Research NBS 26, 161 (1941).	RP1367	5¢
Measurements of ultraviolet solar- and sky-radiation intensities in high latitudes. W. W. Coblentz, F. R. Gracely, and R. Stair. J. Research NBS 28, 581 (1942).	RP1469	10¢
Rate of oxidation of typical nonferrous metals as determined by interference colors of oxide films. Dunlap J. McAdam, Jr. and Glenn W. Geil. J. Research NBS 28, 593 (1942).	RP1470	10¢
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The spectral transmission of several specimens of rubber are included.

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The spectral absorption of butter oil, lard, cottonseed oil, and corn oil are illustrated.