PROCEEDINGS

OF THE

AMERICAN PHYSICAL SOCIETY

MINUTES of the PORTLAND MEETING, June 19, 1925

The 134th regular meeting of the American Physical Society was held in Portland, Oregon, at the Laboratory of Physics, Reed College, on Friday, June 19, in affiliation with the Pacific Division of the American Association for the Advancement of Science. The meeting of that Association included a research conference, Wednesday, June 17, and other meetings and excursions extending through Saturday, June 20.

The session of the Physical Society consisted of twenty-four papers of which abstracts are given in the following pages. Numbers 15 and 16 were presented by title. An **Author Index** will be found at the end.

The attendance was about 100.

D. L. WEBSTER
Secretary, Pacific Coast Section.

ABSTRACTS OF PAPERS

1. Quantum theory of the number of beta-rays associated with scattered x-rays. G. E. M. JAUNCEY and O. K. DEFOE, Washington University, Saint Louis.—A. H. Compton and A. W. Simon (Phys. Rev. **25,** 306, 1925) have recently measured the ratio of the number of recoil electron tracks to that of the photo-electron tracks in a Wilson cloud apparatus. For short wave-length x-rays the experimental ratio was found equal to σ/τ as predicted by the theory of Compton and Hubbard (Phys. Rev. **23,** 439, 1924). For the long wave-lengths, however, the experimental ratio is distinctly smaller. In the present paper a correction factor is applied to σ/τ by taking into account the motion and the binding energy of the scattering electron in its Bohr orbit, as done by Jauncey (Phys. Rev. **25,** 314, 1925), and also the minimum energy which the recoil electron must have in order to produce a visible track. Assuming a minimum energy of 630 volts for a recoil electron to produce a visible track, the correction factor for a primary wave-length of 0.71A is 0.36, thus making the theoretical value of the ratio of recoil to photo-electron tracks 0.097 as against an experimental ratio of 0.10. For other wave-lengths the agreement is equally good.

2. X-rays scattered by molybdenum. P. A. ROSS, Stanford University.—Using an ionization spectrometer and a standard water-cooled molybdenum Coolidge tube, the radiation scattered by the molybdenum cathode cup of the tube itself has been measured at 110° and 160° scattering angle. The shift of the modified line at 110° was .035 ± .002A.

The theoretical value is .0345A. At 160° the measured shift was .047 ± .002A and the computed value .0469A. The unmodified line was completely obscured by the intense fluorescent line coinciding with it and making any estimate of relative intensity impossible. Radiation scattered from the glass was measured by slightly displacing the tube so that the line of slits just missed the cathode cup. The glass scattering was small compared with that by the cathode. Using a standard tungsten Coolidge tube and the same method of procedure the scattering of tungsten K radiation from molybdenum was observed. At 160° scattering angle the tungsten Kα line was shifted by .047 ± .001A. The ratio of intensity of modified to unmodified line was .10 but this was probably too low due to fluorescence of the thin coating of tungsten deposited on the cup.

3. The ratio of intensity of the Compton lines. P. A. Ross, Stanford University.—The spectrograms of scattered x-rays taken by the writer alone and in collaboration with D. L. Webster have been studied by means of a photographic densitometer. This has permitted the determination of the intensity ratio of modified to unmodified line (see last column of Table) for various scattering materials and also more precise measurement of the magnitude of shift due to the more accurate determination of the center of gravity of the lines.

Scattering substance	Incident radiation	Scattering angle	Shift (10^{-3}A)	Ratio of intensities
graphite	Mo Kα	30°	3. ±1	0.2
		60°	12.0±0.1	0.95
		90°	23.6±0.3	1.7
aluminum	Mo Kα	90°	24.4±0.1	0.7
aluminum	Mo Kβ	90°	24.2±0.1	1.0
sulfur	Mo Kα	90°	24.0±0.5	0.29
copper	Mo Kα	90°	24.4±0.2	0.32
silver	Mo Kα	90°	23.8±0.2	0.21
lead	Mo Kα	90°	24.0±0.2	0.024

4. Spectrograms of tungsten K series rays scattered by graphite. M. C. Magarian, Stanford University.—Spectrograms of tungsten K rays scattered by graphite were obtained showing the shifted and unshifted Kα lines. The shifted line was much more intense than the unshifted line. The shift in wave-length showed fair agreement, within the probable errors, with the theoretical value given by Compton's relation. For a measured scattering angle of 92° ± 2° this relation gives a change in wave-length of 0.025 ± .001A, whereas the measured change in wave-length was 0.027 ± .003A. The chief source of error came from the measurement of the separation between the shifted and unshifted lines on account of the faintness and lack of sharpness of the lines. The x-rays were obtained from a Coolidge tube with a mechanically rectified current of 5 milli-amperes at 120,000 volts. The spectrometer consisted of a Seeman slit with a calcite crystal and ten photographic plates all of which were mounted on a base.

5. Series spectra of B_{II} and C_{III}. I. S. Bowen and R. A. Millikan, California Institute of Technology.—By the methods previously reported in our development of hot-spark spectrometry, the following term values of B_{II} have been determined: $2S = 194325.9$; $3S = 66665.1$; $2P = 120929.4$; $3D = 48410.3$; $3s = 72930.8$; $4s = 36655.5$; $2p_1 = 165343.9$; $2p_{2,3} = 165362.7$; $3p_1 = 59006.5$; $3p_{2,3} = 59010.0$; $3d = 52054.2$; $.4d = 28640.4$; $4f = 27800.0$; $5f = 17795.7$. The following term values of C_{III} have also been found: $2S = 375463.1$; $2P = 273111.0$; $3s = 146197.2$; $2p = 331939.2$; $3p_1 = 124685.8$; $3p_2 = 124698.6$; $3p_3 = 124704.1$; $3d = 114387.2$; $4f = 62600$.

6. Series and multiplets in sulfur and chlorine. J. J. Hopfield, University of California.—Some time ago the author published some new sulfur series, (Nature **112,**

437, 1923). These have been rechecked. The frequencies are given by the following equations:

$$\nu = 83554 - R/(n + 1.05086 - 0.13386/n + 0.05425/n^2)^2;\ n = 1, 2, \ldots$$
$$\nu = 83554 - R/(n + 0.53341 + 1.06794/n - 0.82152/n^2)^2;\ n = 2, 3, \ldots$$

The series' head is indicated only for the highest members of the triplets. By the use of these series the unassigned lines of sulfur (Fowler's Report, p. 170) have been arranged into series. The stronger members of these series lie in the infrared and have not been observed. Two multiplets whose shortest wave-lengths are 1381.60 and 1473.00 respectively have been found in sulfur. They each contain the fundamental triplet differences and are attributed to a two electron transition. Strikingly similar groups have been found in chlorine which has lost an electron (Phys. Rev. **23,** 766, 1924). The shortest wavelengths of the triplets are 789.03, 834.83, 888.18, and that of the multiplet like the 1381 group of sulfur is 1063.88. By analogy with S_I the ionizing potential of Cl_{II} is provisionally calculated as 18.32 volts; hence that of Cl_I is about 9.16 volts.

7. The quantum analysis of new nitrogen bands in the ultraviolet. J. J. HOPFIELD and R. T. BIRGE, University of California.—A group of strong bands, degraded to the red, extending from λ1354 to λ1854, appears in purified nitrogen, at 0.003mm pressure, arc discharge, using a long tube and flowing gas. The thirty observed bands (of which seventeen have previously been recorded by Lyman) have in general the customary intensity distribution and thus indicate definitely the correct assignment of vibrational quantum numbers. The resulting equation is $\nu = 68{,}956.6 + (1681.45n' - 15.25n'^2) - (2345.16n'' - 14.445n''^2)$, where n' varies from 0 to 3 only, and n'' from 0 to 9. The average (obs. − calc.) is 0.1A. Contrary to expectations, the progressions occurring in this formula have no relation to any other analyzed group of bands, so that the chemical origin of the group is not definitely known. The usual nitrogen groups occur with great intensity on the spectrograms, and there are also a number of additional new bands (or at least hazy lines) between λ950 and λ2100, but no consistent numerical relationships have as yet been found. Hence the hitherto assumed fundamental group of nitrogen bands in this region of the ultraviolet seems to be missing.

8. The band spectra associated with carbon. RAYMOND T. BIRGE, University of California.—Vibrational quantum numbers have, as far as possible, been assigned to all of the thirteen band groups associated with carbon, where such work has not already been done. It is found that the final states of the first negative group and of the comet-tail bands are identical, and both groups of bands are probably due to ionized CO. The intensity distribution in the comet-tail bands in a helium mixture, as observed by Merton and Johnson, is a low temperature distribution, in contrast with the high temperature distribution observed by Fowler and by Baldet. The high pressure CO bands have as a final state the initial state of the comet-tail bands, but more accurate measurements are needed for the former group. The triplet bands of Merton and Johnson have an intensity distribution similar to the comet-tail bands, and the final state may be the same as that of the third positive group, but the progression is too short to decide the question. The fourth positive group represents a remarkably slow initial vibration (500), and a very rapid final vibration (3000). No other new relations between progressions of these carbon groups or of others have been found.

9. Emission from the Bunsen flame. JOSEPH W. ELLIS, University of California, Southern Branch.—Using a new self-registering infrared spectrograph with two quartz prisms in Littrow mounting, the 2.7μ emission band of the Bunsen flame appears widely resolved with maxima at 2.58 and 2.76μ. A weaker doublet at 1.79, 1.99 and a still weaker broad band at 1.40 appear. These regions of emission correspond in general to numerous weak maxima found by Paschen in 1894 who identified them all except the long wave-

length part of the first mentioned band with water vapor since they also occur in the oxyhydrogen flame. Barker's assumption that the primary separation of the 2.7 carbon dioxide band is not a regular infrared doublet is here supported by the fact that a corresponding emission doublet would have a separation equal to that observed between the water vapor and carbon dioxide bands in this region. Calculation of the bunsen flame temperature from Barker's 4.4 emission and absorption doublet gives a value consistent with measurements.

10. Secondary standards of wave-length in the spectra of neon and iron. GEORGE S. MONK, University of Chicago.—A comparison has been made by the use of the interference spectrograph, of the wave-length of the primary standard obtained from a Michelson H-tube, an arc in vacuo, and a modified and brilliant form of tube. The results show the wave-length to be the same for all. Several neon lines recommended by the International Astronomical Union were compared with the primary standard from the new tube, giving a result of 6438.4696 ± 0.0003A for the primary standard, verifying the values of the chosen neon lines. Compilation of the results of nearly fifty observations show that the recommended values of two lines, 5852 and 5881, are questionable. In the spectrum of the standard ion arc, 110 lines have been compared with the spectrum of neon. While for lines shorter than 6000A the results agree well with the last observations of the Bureau of Standards, in the red they are about 0.002A lower. The values obtained for all the *b* lines are systematically lower for the Pfund arc than for the Bureau of Standards arc. Observational work done thus far on the vacuum iron arc leads to the belief that the adopted system of standards should be based on the arc at atmospheric pressure.

11. The ionization of nitrogen as interpreted by positive ray analysis. T. R. HOGNESS and E. G. LUNN, University of California.—The previously described method for the positive ray analysis of the products of electron-impact ionization of gases has been applied to nitrogen. Study of the relative intensities of the ions N_2^+, N^+ and N^{++} as a function of pressure gives evidence that in the ionization of nitrogen the primary process is the formation of N_2^+. The processes of ionization in nitrogen are thus analogous to those in hydrogen found by Dempster (Phil. Mag. **31,** 438, 1916; Phys. Rev. **8,** 651, 1916) and confirmed by Smyth (Phys. Rev. **25,** 452, 1925) and by the authors (Phys. Rev. **25,** 718, and **26,** 45, 1925). The above conclusions are discussed in the light of the results of Smyth (Proc. Roy. Soc. **104A,** 121, 1924, etc.)

12. The energy of combination of gaseous ions. J. H. HILDEBRAND, University of California.—The energy of combination of the gaseous ions of the alkali metals with the gaseous halide ions to form the solid halides have been calculated from the best available thermochemical and spectroscopic data. The values for the larger ions are about the same, approximately 165 kg cal., but they increase as the ions get smaller, becoming 233 with lithium fluoride. The figures approximate those of Born and Landé, although their assumptions are rejected in the light of criticisms by Latimer. The high values for the smaller ions are in harmony with their closer approach and greater contraction as shown from lattice constants. The affinity of a positive for a negative ion is related to but greater than its affinity for an electron; this explains the instability of monohalides of the alkaline earth metals with respect to metal and bihalide, in spite of the fact that the second ionization potentials of these metals are much greater than the first. The high energy values for the small ions likewise explain the abnormally high stability of compounds between the elements of low atomic number, many of which are not in harmony with familiar electrochemical criteria such as the "replacement series."

13. Organic absorption media as color screens in the ultraviolet. THOS. M. DAHM, University of Idaho.—Ultraviolet absorption spectra of aqueous solutions of organic compounds frequently show very broad deep bands on the edges of which the absorption coefficient κ approximates the curve $\kappa = \kappa_1 e^{a(\nu-\nu_1)}$. If such adjustment of concentration or of length of cell is made that the transmission I/I_0 $(=e^{-kcx})$ has a value less than e^{-1} for a spectrum line, the transmission of nearby lines will fall off more rapidly than κ rises. The "gradation constant" $a=(1/\kappa)\ (d\kappa/d\nu = d(\log \kappa)/d\nu = -d(\log c)/d\nu$. A geometrical series of decreasing concentrations will shift a given transmission from line to line in arithmetical series of frequencies; the medium can be used at any point in the range $\nu-\nu_1$ by proper choice of c or x; a choice of media can be made by comparing "gradation constants." Values of a have been found so large that adjacent strong lines of the mercury spectrum may be transmitted with 20 percent and less than 0.2 percent of the unabsorbed valued. Many substances transmit a characteristic high frequency band between b oad absorption bands.

14. Measurement of the light scattering coefficient of some saturated vapors. SCOTT EWING, University of California.—This investigation is an attempt to verify the theory of light scattering by measuring the scattering coefficient and comparing it with the theoretical value which can be calculated from a knowledge of the compressibility and refractive index of the medium and the wave-length of the incident light. The saturated vapors of ether, benzol, chloroform, ethyl alcohol and methyl alcohol were used as scattering media. The effective wave-length of the incident light was calculated by measuring the effectiveness of the different wave-lengths of the source (a locomotive headlight) in blackening a photographic plate, and assuming that the scattering coefficient varies inversely as the fourth power of the wave-length, which is true except for the small effect of dispersion. The scattering coefficient was measured by making a photographic comparison of the intensity of the light scattered at right angles, with the incident intensity. The results agree with the theory within the limits of experimental error. The data may be used to make an estimate of the *number of molecules per cubic centimeter* and the result obtained is $(2.68\pm.04)\times10^{19}$.

15. The reflecting powers of elements in the ultraviolet and the photo-electric thresholds. RICHARD HAMER, University of Pittsburgh.—A comparison of the curves showing the reflecting power of different elements for different wave-lengths in the ultraviolet observed by E. O. Hulburt and of the reflection coefficients at different wave-lengths recorded in the Landolt-Bornstein tables 1923 with the observed photo-electric thresholds, reveals that there is a change in the reflecting power at a wave-length which coincides approximately with the threshold. This change of slope is sometimes quite marked and generally indicates that the reflecting power for shorter wave-lengths is decreased at this point. This indicates that energy is taken from the incident radiation and assists in bringing about release of photo-electrons from quantised orbits. Electrons in metals are not free but bound. In the following summarized examples the order of comparison is, approximate wave-length of change observed by Hulburt (H) or Hagen and Rubens (HR), the nearest observed threshold λ_0 in brackets, and the author's predicted λ_0 which equals the ionizing energy for some critical orbit $I(x)$: Cu (H) 3150, (HR) 2880, (3000), I $(2p_1)$ 3175; Ag, (H) 3383, (3390 ± 60), I $(2p_2)$ 3383; Au, (H) 3010, (Meyer) 3010, (approx. 2850), I $(2p_1)$ 3010; Mg (H) 3750, (HR) 3800, (3820), I $(2P)$ 3750; Zn, (H) 3076, (Meyer) 3076, (3016), I $(2P)$ 3450; Al, (H) 3400, (3595 ± 100); Sn, (H) 3200, (3185 ± 55); Ni, (H) 3100, (HR) 2880, (3050 ± 50); Pt, (H) 2900, (HR) 2749, $(2780-35)$; Pb, (H) 3650, (3650); Sb (H) 3075, (3075); Bi, (H) 3068, (2980 ± 50); W (H) 2635, (2615 ± 30); Se (H) 2460, (2670 ± 35); Fe 2850, (2870 ± 40); Pd 2870, (approx. 2850).

16. "Raies ultimes" and photo-electric thresholds. RICHARD HAMER, University of Pittsburgh.—A comparative study of the energy values of the "raies ultimes" and the photo-electric thresholds as summarized in the following table points to the general rule that the photo-electric threshold (column 5) equals the difference between the ionization potential (column 4) and the energy (column 3) of a prominent "raie ultime" (column 2). On this basis the author is able to predict the ionization potentials and the corresponding terms or the thresholds for certain elements.

Element	Wave-length	Energy	Ionization	Threshold	Series term
Cu	3247 A	3.80 v.	3.89 v.	4.11v.	$I_{(2p_1)}$
Ag	3281	3.76	3.78	3.64 ± .07	$I_{(2p_1)}$
Au	2428	5.08	4.12	4.33 ± ?	$I_{(2p_1)}$
Mg	2852	4.33	3.28	3.23	$I_{(2P)}$
Ca	4227	2.92	3.17	3.08 ± .16	$I_{(2P)}$
Zn	2138	5.78	3.57	3.60 ± .08	$I_{(2P)}$
Cd	2288	5.39	3.56	3.43	$I_{(2P)}$
Al	3961	3.12	2.84	2.58	$I_{(1s)}$
Tl	5350	2.26	3.82	3.56 ± .08	$I_{(1s)}$
C	2479	4.98	....	4.72 ± .06	....
Sn	3262	3.78	1.92	3.87 ± .07	....
Pb	4058	3.04	4.35	4.14 ± .07	....

17. On the thermo-electric properties of pure metals and alloys. A. E. CASWELL, University of Oregon.—Analyzing data used in the preparation of the International Critical Tables, the author shows that the thermo-e.m.f. between a compressed metal and the same metal when uncompressed, can generally be represented by an equation of the form $E=apt(1+bp)\ (1+ct)$. Exceptions are aluminum, iron and tin. Apparently aluminum undergoes a quasi-allotropic modification under pressures in excess of 6500 kg/cm². The effect of pressure upon the concentration of free electrons in a metal is discussed. Changes in their thermo-electric properties as metals pass from the solid into the liquid are examined and deductions drawn therefrom on the basis of electron theory. The author also shows that in certain cases it is possible to predict the thermo-electric properties of an alloy from those of its constituents, especially when the pure metals unite in definite proportions, e.g. Ag-Pd alloys.

18. Parasitic thermo-electric forces in homogeneous metals due to a changing temperature gradient. E. D. MCALISTER, University of Oregon (introduced by W. P. Boynton).—When the ends of an apparently homogeneous wire are attached to a galvanometer and a Bunsen flame is used to heat a section of the wire to incandescence, no deflection is observed, unless the wire has been maltreated mechanically or is a non-homogeneous alloy. However, when the glowing part is caused to move along the wire by moving the flame, a current is observed to flow (large in the case of Fe and Ni), and the direction of the current is reversed when the direction of motion of the glowing part is reversed. Data on a considerable number of substances are presented and the relation to electron theory discussed.

19. Thermo-electric effects due to mechanical treatment; Benediks effect. L. J. NEUMAN, University of Oregon (introduced by Professor W. P. Boynton).—The end or central sections of annealed wires of Fe, Cu, Ni, Pb, Al, constantan, german silver, brass, nichrome, fuse wire and manganin were rolled, thus altering the crystalline structure. Thermo-electric powers as high as 2.6 microvolts per degree were obtained between the rolled and unrolled sections. The sign of the e.m.f. was not the same for different metals. Several experiments were carried out for each metal, all of which gave consistent results. In some cases the temperature vs. e.m.f. curve takes the form of a parabola. The e.m.f. from such a junction changes markedly with the amount of rolling and in some cases finally reached a maximum value and decreased. The influence of the length

of the transition section between the original and rolled portions has been studied but no consistent results secured. In all of this work pressure and soldered joints were eliminated because in many cases such contacts were found to produce e.m.fs. of considerable magnitude. In some instances the thermo-electric properties produced by rolling are not completely eliminated by re-annealing the specimen. This seems to indicate the presence of a Benedicks effect; however results so far obtained are not sufficiently consistent to warrant definite conclusions.

20. Thermal conductivity of some metals at high temperatures. M. F. ANGELL, University of Idaho.—A continuation of some work done several years ago. The metal in form of a long hollow cylinder is heated electrically by a heavy current sent through it, the heat flow midway between the ends being assumed radial. The heat flow is calculated from resistance and current at a steady state. Temperatures are taken midway between the ends, upon the axis of the cylinder and at the surface, and thus the thermal conductivity determined. As temperatures inside and out differ only a few degrees and as the bar may be held at any temperature, complete curves are obtained for thermal conductivity from 50°C to the melting point. Data are given for aluminum, copper, nickel, and zinc.

21. Extension of bar method of measuring specific heat. MARCUS O'DAY, University of California.—Measurements of thermal and electrical properties of metals to be of theoretical value should all be made on the same sample under similar conditions or else all on single crystals. By sending a heavy current of proper magnitude through a bar whose ends are kept at zero temperature, electrical and thermal conductivities, their coefficients, and the Thomson effect can all be measured. By use of a double potentiometer, the thermo-electric power of the sample against the copper wire of the thermocouples can be measured. If the temperature of the middle of the bar is taken before the steady state is reached, the diffusivity is equal to $[(2L)^2/\pi^2 t] \log [\theta_m/(\theta_m-\theta)]$ and the specific heat is equal to $.00299\pi^2 I^2 Rt/M\theta_m \log[\theta_m/(\theta_m-\theta)]$ where $2L$ = length, R = resistance, M = mass of bar, θ_m = temperature of middle at any time t measured from moment circuit is closed, θ_m = value of θ in the steady state, and I is proper value of current to compensate for heat loss. No difficulty attends the measurement of these quantities but appreciable error is introduced if the temperature of the ends changes. Corrections for this together with results of measurements of the above effects now in progress on Sn, Sb, and Zn will be published shortly.

22. Design of an acoustic oscillograph. S. H. ANDERSON, University of Washington.—An instrument has been designed of a purely mechanical type in which only the natural frequencies of the diaphram on which the sound waves impinge need to be considered in the calibration, and hence a comparatively simple calibration curve is obtained. Diaphrams of mica, clamped at the edge, have been found to be the most satisfactory. In the investigation previously reported, the natural frequency of the first mode of vibration of diaphrams 5 cm in diameter seemed to be nearly independent of the thickness. Further work with carefully selected samples of different diameters and thickness shows that for a given diameter the natural frequency is a linear function of the thickness. Assuming Kennelly's equation $2\pi n_0 = \sqrt{s/m}$, the stiffness coefficient s is found to vary directly as the square of the thickness. The natural frequency is also a function of the diameter, increasing rapidly with a decrease of diameter. From this work it will be possible to predict the dimensions of a diaphram for any specified frequency. It is desirable to select a diaphram whose natural frequency is higher than that of any vibromotive force applied.

23. The effect of reverberation upon the quality of speech. VERN O. KNUDSEN, University of California, Southern Branch.—Speech articulation tests are being con-

ducted to determine the improvement in the quality of speech in auditoriums as a result of reducing the reverberation. The results obtained in several auditoriums, having approximately the same volumes and shapes but different times of reverberation, are tabulated below. The percentage articulation in each case, given in last three columns, is the average of observations made at essentially all parts of the auditorium.

Auditorium	Volume	Reverb.	Word art.	Vowel art.	Consonant art.
A	320,000ft³	7.5 sec.	44.0	88.0	65.4
B	280,000	5.3	56.3	92.0	73.0
C	310,000	5.0	64.5	97.0	79.0
B (corr.)	280,000	3.0	82.2	99.8	88.5
D	270,000	2.8	84.8	99.6	91.7

Tests in a room having a volume of 4096 ft³ and a variable reverberation, controlled by bringing in different amounts of hairfelt, show that as the time of reverberation was reduced from 5.01 sec. to 0.60 sec., the word, vowel and consonant articulations increased, almost uniformly, from 51, 94 and 71 percent to 92, 99 and 96.5 percent respectively.

24. An anomalous sound absorption coefficient. S. H. ANDERSON, University of Washington.—The time of reverberation of sound in the auditorium of Anderson Hall (new Forestry Building) was found to be 70 percent of that required by the simple Sabine equation. The construction materials being the same as in rooms where the equation holds, an explanation was sought in the type of construction. The ceiling is supported by five steel trusses encased in wood, the crown of each truss being 16 feet below the peak of the ceiling. The apparent coefficient of absorption of the wood covering the trusses, computed from the observed time of reverberation, was found to be 0.114, while the accepted value is 0.061. A reasonable explanation is that the mean free path of the sound waves is less and the number of reflections per second greater than in a simple room of the same volume, as the low hanging trusses divide the upper part of the room into six compartments. Sabine's exact equation $t=(p/v)(1/a)\log[(p/v)(A/aVE)]$, shows that t is a function of p/v, the number of reflections per second.

AUTHORS INDEX