NOTES FROM THE RESEARCH LABORATORY.
EASTMAN KODAK COMPANY.*

THE VISIBILITY OF RADIATION.¹

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[ABSTRACT.]

THIS experiment was performed to obtain more data on the subject by using a method similar to that used by Ives² and Nutting.³ The values for the spectral energy distribution of acetylene were those offered by Nutting and two values offered by Coblentz. The data obtained by using the different acetylene energy values enable one to compare results with the other experiments, as well as to show the effect of using the values with the same data.

The apparatus used was a modification of the Nutting monochromatic colorimeter. The light from a standard acetylene burner passes through a pair of Nicol prisms and a collimating lens to a constant deviation dispersing prism which is operated by a screw carrying a direct-reading wave-length drum and then to the observer's eye. By means of a Whitman disk the light from a gas-filled tungsten lamp which passes through a daylight filter is intermittently mixed with the monochromatic light, and a flicker balance is made by varying the intensity of the colored light. With both light-sources constant and three independent series taken on different days it is safe to assume that the resultant average for each of the thirteen observers is representative.

* Communicated by the Director.

¹ Communication No. 55 from the Research Laboratory of the Eastman Kodak Company, published in *Trans. Illuminating Engineering Society*, February, 1918, p. 101.

² H. E. Ives, *Phil. Mag.*, 1912, 24, p. 149.

³ P. G. Nutting, *Phil. Mag.*, 1915, 29, p. 301; *Trans. Illum. Eng. Soc.*, 1914, 9, p. 633.

Five of the observers in the experiment were also observers in Nutting's experiment, and the figure shows the mean of the writer's results and Nutting's results from these five observers treated separately. For these observers the average maximum visibility found by the writer is 0.555 and by Nutting 0.554.

The table shows the writer's data obtained from all observers when using the different acetylene results, the means obtained by Nutting and Ives, and visibility as computed from Nutting's formula

$$V = V_m R^a e^{a(l-R)}$$

where $R = \lambda / \lambda_{\max}$ and $a = 181$. The maximum visibility obtained from the thirteen observers is at wave-length 0.553 in agreement with Ives, as against 0.555 from Nutting's results.

TABLE OF COMPARATIVE VISIBILITY RESULTS.

Wave-length	Mean <i>V</i> from 13 subjects	Coblentz data pub. 1911	Coblentz data pub. 1916	Nutting's mean	Ives's mean	Computed from formula
0.49	0.175	0.172	0.172	0.237	0.235	0.232
0.50	0.289	0.283	0.275	0.330	0.363	0.358
0.51	0.475	0.471	0.474	0.477	0.596	0.514
0.52	0.702	0.705	0.686	0.671	0.794	0.675
0.53	0.842	0.851	0.841	0.835	0.912	0.824
0.54	0.950	0.947	0.935	0.944	0.977	0.933
0.55	0.990	0.988	0.993	0.995	1.000	0.994
0.56	0.977	0.982	0.985	0.993	0.990	0.993
0.57	0.898	0.926	0.935	0.944	0.948	0.939
0.58	0.807	0.825	0.836	0.851	0.875	0.839
0.59	0.676	0.693	0.710	0.735	0.763	0.717
0.60	0.548	0.552	0.580	0.605	0.635	0.585
0.61	0.409	0.417	0.446	0.468	0.509	0.456
0.62	0.293	0.294	0.319	0.342	0.387	0.343
0.63	0.194	0.185	0.214	0.247	0.272	0.235
0.64	0.127	0.125	0.140	0.163	0.175	0.158

Degrees of Permanence in Photographic Prints. ANON. (*The British Journal of Photography*, vol. 65, No. 3015, February 15, 1918.)—Within ten or fifteen years ago a photograph by a "permanent" process meant one by either the platinum or carbon process. There is a very good reason why it had this signification, for during the twenty-five or thirty years during which albuminized paper was the printing method in universal use carbon and platinum prints were the only two forms of photograph which could be said to have established themselves as yielding prints of unquestioned permanence, and in this respect were distinguished from the ordinary silver prints, with their liability, particularly in later years, to fade. Opinions will differ as to what constitutes permanence, but such a formula is that no marked alteration will be observable in prints when kept under reasonable conditions for a period of, say, twenty years. This definition refers to prints belonging to the vast majority classed as portraits, views, etc. Obviously twenty years would be much too short a time for prints in which permanence is a prime consideration; such prints would be expected to last for fifty or a hundred years. Leaving carbon and platinum out of consideration, there can be no doubt that the most permanent form of photograph among the papers available at the present time is that on a bromide or gaslight paper. Such a print, if properly made and mounted, and preserved under suitable conditions, should meet the permanence requirement of twenty years' life. The effect of time upon it when mounted and framed should never be more than a slight yellowing of the whites, and need not necessarily be that.