NOTES FROM NELA RESEARCH LABORATORY.*

COLOR TEMPERATURE OF HIGH EFFICIENCY LAMPS.

By W. E. Forsythe.

THE efficiency and life of incandescent lamps depend upon the temperatures at which they are operated, the efficiency being greater for high temperatures and life shorter. Lamps are therefore operated at temperatures which will give the desired life. The integral color of the light given by the lamp also depends upon the temperature, the light being bluer for the higher temperatures.

It has been found by experiment that the light from incandescent lamps can be matched in color with that from a black body at some particular temperature, which temperature is called the color temperature. Making use of this fact, the quality of the light given by the different lamps can be given by its color temperature.

This color matching can be done quite accurately by the use of an ordinary Lummer-Brodhun contrast photometer. It is sometimes difficult to operate a black body of sufficient size at high enough temperatures, so that its luminous flux will match in color that of higher efficiency Mazda C lamps. For this reason different means are employed in obtaining the color standards for high temperatures. The standards of color used in obtaining the color temperature of the Mazda C lamps were obtained by measurements with a pyrometer of the relative brightness in limited parts of the red and blue ends of the spectrum of both the color standard and the black body. By this method a smaller black body at higher temperature can be used. The color standard and the black body are at a color match when they both have the same ratio of red to blue brightness.

Several different kinds and types of incandescent lamps operated at certain efficiencies have been color-matched with a black body and the results are given in Table I.

The true temperatures given are the actual temperatures of a portion of the filament far enough removed from the ends so that

* Communicated by the Director.

it is at the maximum temperature, while the color temperatures are for the lamp taken as a whole.

Lamp	W. P. S. C. P.	Temperatures Degrees K	Color Temperature
50-Watt Carbon	3.76	2115 ¹	2156
50-Watt Gem	3.1	2180 ¹	2195
50-Watt Tantalum	2.56	2160 ²	2260
40-Watt Mazda B	1.36	2410	2460
100-Watt Mazda C	1.00	2745	2740
500-Watt Mazda C	0.72	2835	2880
1000-Watt Mazda C	0.62	3010	2985
1000-Watt Stereopticon	0.52	3185	3175
900-Watt Movie	0.46	3290	3220

These temperatures are based upon the assumption of Wien's equation with c_2 taken as $14,350\mu$ degrees and upon the melting point of gold taken as 1336° K. On this scale the melting point of palladium has been found to be 1828° K. For convenience in the calibration of optical pyrometers, a black body held at the melting point of palladium is used as the point of reference.

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COLLOIDAL METALS AND BIOLUMINESCENCE.

By E. Newton Harvey.

(Physiological Laboratory of Princeton University. From experiments carried out at Nela Research Laboratories.)

LIGHT production by animals is due to the oxidation of a substance, luciferin, in the presence of an enzyme or catalyst, luciferase, water, and oxygen. Oxyluciferin is the oxidation product and this may be reduced to luciferin again by appropriate methods. Although luciferin from a small crustacean, *Cypridina*, will oxidize spontaneously in presence of oxygen without luciferase, it does not luminesce under these conditions, but only gives light if the catalyst is present.

For some years efforts have been made by the author to find an organic or inorganic catalyst of known composition which

¹ True temperature calculated from brightness temperature, assuming an emissive power of 80 per cent.

² True temperature calculated from brightness temperature, assuming an emissive power of 48 per cent.