

THE COLOR TEMPERATURE OF ILLUMINATING GAS FLAMES.

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It is of considerable importance in the photometry of gas flames to know their color temperature, because it determines the efficiency at which incandescent electric lamps must run to match them in color.

While the color temperature of the ordinary illuminating gas flames has been known approximately for a long time, recently the question of its variability with the quality of gas and the flame size arose; so the following data may be of interest. Each flame was matched against a carbon lamp whose efficiency was accurately known at several voltages. Using the data on color temperature given by Hyde and Forsythe in the *MARCH INSTITUTE JOURNAL*, these matching voltages have been evaluated in terms of temperatures:

Color Temperatures of Various Gas Flames.

Source	Lamp voltage (E. T. L. No. 4621)	Color temperature °K.
1. Coal gas, full flame	111.0	2075
2. Coal gas, half turned down	107.5	2035
3. Water gas, full flame	115.4	2118
4. Water gas, half turned down	105.5	2015
5. Water gas, full flame, edge on	111.5	2080
6. Mixed gas, full flame	113.5	2095
7. Coal gas, full flame	113.8	2100
8. Coal gas, candle-shaped flame, height of Hefner	97.0	1940
(Reference points)		
9. Pentane lamp	93.5	1914
10. 4.85 w.p.m.s.c.p. carbon	110.4	2070
11. 3.73 w.p.m.s.c.p. carbon	118.8	2153
12. Hefner	88.0	1875

Nos. 1 to 6 inclusive were using an 8-foot Von Schwarz excavated head lava tip; No. 7 was with an 8-foot Bray Union jet tip, and No. 8 was with a $\frac{1}{8}$ -inch open tube; Nos. 9 to 12 were taken as references from the paper referred to. The coal gas was 8 to 9 candle-power and 575 B. T. U.; the water gas 27.5 candle-power and 690 B. T. U., and the mixed gas, 25 candle-power and 665 B. T. U.

As is to be expected, the color temperature of a flame is with-

in certain limits dependent upon its shape, size, position, and composition of the gas. It will also vary in different parts of the flame, the values given above being integral over the entire surface. It will be noted the full flames are slightly whiter than the ordinary 4 w. p. h. c. p. carbon standards. The color temperature of 1870° for the mixed gas flame given by Hyde and Forsythe in the paper referred to is considerably lower than any of the above values, which represent extremes in illuminating gas characteristics.

THE UNITED GAS IMPROVEMENT COMPANY,
PHYSICAL LABORATORY,
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Boron-Copper. ANON. (*La Chronique Industrielle*, vol. 40, No. 285, p. 2, March 16, 1917.)—Isolated for the first time by Moissan in 1895, and since several years made commercially available by the researches of Dr. Weintraud in the laboratory of the General Electric Company at West Lynn, Mass., boron possesses great affinity for certain substances to the exclusion of others. This property is particularly available in the refinement of copper in which dissolved gases, particularly oxygen, cause blowholes and porosity. In the past the elimination of these impurities has been effected by additions of magnesium or zinc, but these metals formed alloys with copper of inferior conductivity. Boron, however, has no affinity for copper and combines energetically with the oxygen, thus eliminating the gas and its effects.

As produced by the National Alloys Limited of Ilford (Essex), which has developed the product, boron-copper consists of electrolytic copper of the greatest purity. Impregnated with fluoride of boron in the gaseous state, the resulting product is employed as a deoxidizing agent in the production of various metals and alloys. Copper castings of exceptional soundness and electrical conductivity are obtained by the addition of 1 per cent. to 3 per cent. of boron-copper. Radiographic examination, recently introduced in metallurgical technology, shows a marked difference in microstructure between the metal treated with boron and the untreated metal, the boron metal being quite uniform, while the untreated metal, though of good quality, shows marked porosity. Boron-copper is equally applicable to all alloys of which copper is a constituent, from gold to steel, including the intermediate types, such as tin, zinc, nickel, lead, and aluminum. Alloyed with steel in the same manner as nickel, but using half the amount required of the latter, a steel substantially equal in quality to nickel-steel is obtained and at lower cost.