

The Relation of Residual Gases to the Photo-Electric Sensitiveness and the Contact E.M.F. of Sodium. R. A. MILLIKAN and W. H. SOUDER.

Effect of Glass Walls on Thermionic Currents. SAUL DUSHMAN.

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High Frequency Verification of Kirchoff's Capacity Formulæ. (By title.) F. C. BLAKE and CHAS. SHEARD.

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A Significant Instance of Galvanometer Instability. W. P. WHITE.

A New Design of Flicker Photometer for Laboratory Colored-Light Photometry. H. E. IVES and E. J. BRADY.

Note on the Physiological Effect of the Current. F. J. ROGERS.

Examples of the Precision Attainable in Determinations of Thermal Expansivity. ARTHUR W. GRAY.

Dioptric Formulæ for Combined Cylindrical Lenses at Oblique Axes. (By title.) CHARLES SHEARD.

The Testing of Potentiometers. FRANK WENNER and ERNEST WEIBEL.

An Absorbing Solution for Eliminating Color Differences in Photometry. H. E. IVES and E. F. KINGSBURY.

Photographs of Retrograde Rays, (*a*) from the Cold Cathode, (*b*) from the Hot Lime Cathode. O. H. SMITH.

A. D. COLE,
Secretary.

ON METALLIC CONDUCTION AND THERMOELECTRIC ACTION IN METALS.¹

BY EDWIN H. HALL.

IN this paper² an attempt is made to consider and compare the functions of (*A*) electrons transferred from atom to atom during collisions or contacts and of (*B*) electrons relatively free between the atoms.

The proposition is advanced that thermoelectric action cannot be accounted for without assigning thermal capacity to the electrons, and the idea that such thermal capacity is a function of the temperature is introduced by treating R , of the equation $p\nu = RT$, as a variable for electrons, $= k_r T^\rho$, where k_r and ρ are constants.

The main conclusions are that the free electrons (*B*) are essential for the

¹ Abstract of a paper presented at the Washington meeting of the Physical Society, April 24-25, 1914.

² Acting upon information which I had not examined with sufficient care, I stated at Washington that pure metals, when heated under such pressure conditions as not to suffer change of volume, show a decrease of resistance. This statement is true regarding liquid mercury, as Barus found long ago, but it is not true of metals in the solid state. After going carefully over the ground of my investigation once more I find that the mistake which I had made in this particular did not affect my general conclusions, which remain unchanged.

phenomena of thermoelectricity, but play an unimportant part in electric conduction.

The relation between the Peltier effect and the Volta effect is discussed.

A table of data concerning change of volume and change of resistance in the fusion of metals is given in an Appendix.

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SOME POINTS WITH REGARD TO THE VARIATION OF THE SPECIFIC MAGNETIZATION OF A SUBSTANCE WITH TEMPERATURE.¹

By W. F. G. SWANN.

ACCORDING to the theory of Weiss the molecular magnetic theory of a solid may be treated on the lines of that for a gas provided that the applied field H is replaced by $H + H_m$, where H_m is a field which represents the effects of the molecular actions. H_m is assumed to be of the form NI where I is the intensity of magnetization and N is a constant for the substance.

Weiss has shown that in order to account for the variations of the specific magnetization with temperature above the Curie point, it is necessary to assume that the number of magnetons in a molecule changes abruptly at certain temperatures. In the present communication it is shown that this is not all that is necessary to account for the facts, but that the constant N must also vary abruptly with the temperature and in some cases must even acquire a negative value.

A change in the number of magnetons is usually not accompanied by an abrupt change in the coefficient of magnetization, which fact seems to indicate a tendency on the part of the substance to make a change in the number of magnetons, only when the temperature conditions are such that it can do so without altering that part of the energy which is purely magnetic.

DEPARTMENT OF TERRESTRIAL MAGNETISM,

CARNEGIE INSTITUTION OF WASHINGTON.

CHARACTERISTIC CURVES OF TUNGSTEN FILAMENT INCANDESCENT LAMPS AND THEIR APPLICATION IN HETEROCHROMATIC PRECISION PHOTOMETRY.¹

By G. W. MIDDLEKAUFF AND J. F. SKOGLAND.

AS the international candle is maintained by means of carbon filament incandescent lamps operated at four watts per candle, the standardization of lamps of higher efficiency involves photometric difficulties due to color difference. Although differences in color may be reduced or eliminated in the direct comparison of the lamps either by the use of blue glass screens placed in the path of the light from the carbon standards, or by the substitution of secondary standards of the same color as the lamps to be measured, nevertheless the difficulties mentioned must be encountered in calibrating the screens and the secondary standards.

¹ Abstract of a paper presented at the Washington meeting of the Physical Society, April 24-25, 1914.