

which can be reduced by heating in hydrogen. The copper surface was observed to be of a darker color only at the places where the secondaries were being emitted. Experiments are now in progress to test these effects on other metals.

UNIVERSITY OF CHICAGO.

CARBON DIOXIDE BAND SPECTRA IN THE NEAR INFRA-RED.

By E. F. BARKER.

THE absorption regions of CO_2 at 2.7μ and 4.3μ have been reexamined with the higher resolution afforded by a prism-grating spectrometer. The 2.7μ region, heretofore considered to be a doublet, proves to be a pair of doublets, with centers at approximately 2.69μ and 2.76μ . The 4.3μ band appears as a single doublet. Complete resolution of the band series has not been effected, but there is evidence of a "head" in each case on the side of shorter wave-lengths. The existence of this head for the 4.3μ band is also indicated by a comparison with the emission spectrum from a bunsen flame.

From the doublet spacing an approximate value of the moment of inertia for the CO_2 molecule is obtained.

UNIVERSITY OF MICHIGAN.

RECENT DETERMINATIONS OF THE SUSCEPTIBILITIES OF OXYGEN AND NITRIC OXIDE AND THE MAGNETON.

By E. C. FRITTS.

PAULI¹ has modified Langevin's equation for the magnetic moment of a gas per gram molecule at absolute zero. Instead of

$$\sigma_{m_0} = \sqrt{3RC_m},$$

he writes

$$\sigma_{m_0} = \sqrt{\frac{3RC_m}{\frac{1}{2}(n+1)(2n+1)}},$$

where n is a quantum number 1, 2, 3 \dots . Pauli has also applied this theory to the values of the susceptibilities of oxygen and NO as determined by Piccard and found a fairly close agreement.

Piccard² and Soné³ have recently redetermined the above susceptibilities. The values obtained are

Piccard,

$$\chi_{\text{O}_2} = 107.8 \times 10^{-6} \quad (20^\circ \text{ C.}),$$

$$\chi_{\text{NO}} = 48.6 \times 10^{-6} \quad (20^\circ \text{ C.}).$$

¹ Phys. Zeit., 21, p. 615, 1920.

² Jour. de Phys., Ser. VI, p. 97, 1920.

³ Phil. Mag., 231, p. 305, 1920.

Soné,

$$\chi_{\text{O}_2} = 104.1 \times 10^{-6} \quad (20^\circ \text{ C}).$$

The values, for oxygen 104.1×10^{-6} , and for NO 48.6×10^{-6} , give results in still closer agreement with Pauli's equation. The ratios of the theoretical and experimental values are, for O₂ 1.019, and for NO 1.067, instead of 1 where for oxygen $n = 2$ and for NO $n = 1$.

We see that oxygen at least has very nearly a magneton of Bohr with the quantum number 2, or 2 magnetons. Experiments are in progress to re-determine the susceptibilities of paramagnetic and diamagnetic gases.

UNIVERSITY OF ILLINOIS,
October, 1921.

THE GROWTH AND DECAY OF PHOTO-THERMIONIC CURRENTS FROM OXIDE-COATED FILAMENTS.

BY H. D. ARNOLD AND HERBERT E. IVES.

AN investigation of the increase of thermionic current caused by illumination. It is found that the current increment due to red light grows and decays exactly as a similar increment due to increasing the temperature of the oxide coated filament. With blue light, on the contrary, the added thermionic current grows and decays at rates different from those due to heating, and at different rates depending on the temperature. At low filament temperatures the added current rises and falls very slowly; at high temperatures it rises and falls abruptly. These properties of the added current due to blue light are considered to differentiate it from a true photo-electric current which, as far as known, rises and falls instantaneously at all temperatures. It is concluded that previously recorded observations on changes in the magnitude of the added current with variation of filament temperature, do not necessarily imply a temperature coefficient of the true photo-electric effect.

RESEARCH LABORATORIES OF THE
AMERICAN TELEPHONE & TELEGRAPH COMPANY
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THE ABSOLUTE SIZES OF CERTAIN MONOVALENT AND BIVALENT IONS.¹

BY WHEELER P. DAVEY.

IN a preceding paper² attention was called to the fact that if the dimensions of crystals were used alone, to find the absolute sizes of ions, the solution was indeterminate, for there were $n - 1$ equations with which to solve for n unknowns. At that time a consideration of the diffraction patterns of KCl led to the assumption that K^+ , Rb^+ , and Cs^+ were equal in size respectively to

¹ Abstract of a paper to be presented at the Am. Phys. Soc., November, 1921.

² W. P. Davey, PHYS. REV., Aug., 1921.