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Paschen-Back Effect of Hyperfine Structure and Polarization of Resonance Radiation: Cadmium (61P1-51S1)

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DISCRIMINATION OF RELATIVELY PURE SPECTRAL COLORS BY NORMAL AND COLOR- BLIND SUBJECTS

A. A. BENEDICT

Various methods for testing color blindness have been devised. In many of the tests commonly used, the light that reaches the retina of the subject's eye is reflected from bodies in which selective reflection and absorption of the pigments determine the wave lengths acting as a stimulus. It was thought worth while to try a series of tests in which narrow bands of relatively pure spectral colors were viewed directly. The apparatus for this purpose consisted of a constant deviation wave length spectrometer and a polarization spectrophotometer using the Brace prism.

In addition to the test mentioned above, which was given to both the normal and color-blind subjects, the Ishihara, Holmgren, and Nagel tests were used for the color-blind subjects. A study of the comparison of these tests is being made to determine the degree of correlation.

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PASCHEN-BACK EFFECT OF HYPERFINE STRUCTURE AND POLARIZATION OF RESONANCE RADIATION; CADMIUM ($6^1P_1 - 5^1S_0$)

N. P. HEYDENBURG

Because of the Paschen-Back effect of the hyperfine structure of the odd isotopes, the polarization of cadmium $\lambda 2288\text{\AA}$ resonance radiation excited by plane polarized incident light changes from 76.7 per cent in zero field to 100 per cent in a strong field parallel to the electric vector of the exciting light. The experimental results agree very closely with computations based on Goudsmit's modification of Darwin's theory of the Paschen-Back effect and give for the separation of the two levels into which the 6^1P_1 level of Cd (odd-isotopes) is split a value of $12.6 \times 10^{-3} \text{ cm}^{-1}$. From this result and Schüler's measurements of the hyperfine separations of the triplet lines $6^3P_{0,1,2} - 6^3S_1$ the constants a and b giving the interactions of the p and s electrons, respectively, from Goudsmit's equation

$$A(J) = a(2-g) - a \frac{6\Gamma(2-g) - 2(g-1)L(L+1)}{(2L-1)(2L+3)} + b(g-1)$$

are found to be $a = 8.4 \times 10^{-3}$ and $b = 225.7 \times 10^{-3}$.

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THE PASCHEN-BACK EFFECT OF HYPERFINE STRUCTURE AND THE POLARIZATION OF RESONANCE RADIATION; SODIUM ($5^2P_{1/2,3/2} - 3^2S_{1/2}$)

N. P. HEYDENBURG

Preliminary measurements on the polarization of resonance radiation of the second doublet of sodium when a magnetic field is applied with its direction parallel to the incident light beam shows that the polarization changes from a value of about 10 per cent in zero magnetic field to a value of 34 per cent in fields less than 100 gauss. In order that a Paschen-Back effect of the hyperfine structure of the $5^2P_{1/2,3/2}$ levels should occur in field strengths of this order of magnitude the hyperfine separation constant for these levels must be of the order $.0005 \times 10^{-3} \text{ cm}^{-1}$.

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SUGGESTION AS TO STRUCTURE IN IONIC SOLUTIONS

G. W. STEWART

The Debye-Hückel theory gives about each ion an atmosphere of ions which is preponderately of the opposite sign. While this theory is the best quantitative theory at the present time, yet it neither explains nor discusses the manner in which both the association of ions and of ions with solvent molecules can occur. But in x-ray diffraction in several normal alcohol solutions with lithium chloride as a solute, it has been found that the quasi-structure of the liquids is modified in precisely the manner one would expect if these liquids can be regarded a mixture of liquified ionic crystals of alcoholates and the corresponding alcohols. This suggestion gives a description in terms of what we know about the structure of crystals and of solid solutions. It accounts for both the association of ions and the associations of ions with solvent molecules.

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