

# **STUDIES IN LUMINESCENCE**

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Studies in luminescence by Edward L. Nichols & Ernest Merritt

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**EDWARD L. NICHOLS & ERNEST MERRITT**

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BY

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## PREFACE.

The series of investigations described in this memoir was begun in 1903.

The authors believed that by the use of quantitative methods and particularly by the application of the spectrophotometer to the study of the spectra of fluorescent and phosphorescent substances, something of definite value might be added to the existing information concerning luminescence.

Spectroscopy, whether visual or photographic, is a method of high precision where applied to line spectra, but in the case of the broad bands of the spectra of fluorescent solids and liquids it affords but little information beyond the approximate width and general location of the bands. The spectrophotometer, on the other hand, enables the observer to determine the distribution of intensities throughout the emission bands and the coefficients of absorption for the various wave-lengths of the corresponding absorption bands. From the curves expressing the results of such measurements, moreover, it is possible to locate with considerable accuracy the crests of the bands. One may thus attain some detailed knowledge of the laws of the radiation of luminescence, compare luminescence with the radiation due to temperature, and obtain a basis for theoretical discussion.

A number of important portions of the work described in this volume have been carried out at our suggestion by Doctors Frances G. Wick, C. A. Pierce, Percy Hodge, and C. W. Waggoner, and by Messrs. H. E. Howe and Carl Zeller. To these investigators and also to Prof. W. R. Orndorff, who has repeatedly aided us by undertaking the preparation of fluorescent compounds and by suggestions concerning the chemical aspects of the problem, we desire to express our indebtedness.

The recent exhaustive, thorough, and discriminating review of the very large literature relating to luminescence published by Professor Kayser (H. Kayser, *Handbuch der Spektroskopie*, Bd. iv, Kap. v and vi) in his *Handbook of Spectroscopy*, makes any extended bibliographic or historic treatment here unnecessary and we have therefore given only such references to previous researches as bear directly upon the subjects under consideration.

The subject-matter contained in the several chapters appeared from time to time, as each portion of the work reached completion, in a series of papers in the *Physical Review*. In gathering this material together in a single treatise we have recast and rearranged it, but have preserved the original form of presentation in so far as it was found to be consistent with our views after the completion of the work.

Grants which were received from the Carnegie Institution of Washington in 1905, 1909, and 1910 have greatly facilitated the prosecution of the experiments described in this memoir and of others now in progress and have furthered the preparation for investigations which it is proposed to undertake in the near future.

PHYSICS LABORATORY OF CORNELL UNIVERSITY,

May 23, 1911.





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