

# **REPORT ON SERIES IN LINE SPECTRA**

Published @ 2017 Trieste Publishing Pty Ltd

ISBN 9780649139934

Report on series in line spectra by A. Fowler

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**A. FOWLER**

**REPORT ON SERIES  
IN LINE SPECTRA**



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optics

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PHYSICAL SOCIETY OF LONDON.

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REPORT

ON  
SERIES IN LINE SPECTRA.

BY

<sup>1/5 red</sup>  
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*Price, 12/6. Post Free, 13/-.*

*Bound in Cloth, 15/6. Post Free, 16/-.*

173206  
18/8/22

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LONDON:

PLEETWAY PRESS, LTD.,  
3-9, DANE STREET, HIGH HOLBORN, W.C.1.

1922.

LONDON:  
THE FLEETWAY PRESS, LTD.,  
DANE STREET, HOLBORN, W.C. 1.

## PREFACE.

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ALTHOUGH the spectra of elements and compounds were studied in the first instance chiefly as providing a powerful means of chemical analysis, it has long been recognised that a spectrum must contain an important clue to the structure and modes of vibration of the atoms or molecules which produce it. Spectra, however, are most frequently very complex, and there could be but little hope of progress in the direction indicated if it were not possible to discover laws governing the distribution of the lines or bands of which they are composed. The search for such laws has attracted many workers, and organised systems of lines which can be approximately represented by simple formulæ have been identified in the spectra of many elements and compounds. The recognition of these regularities has naturally played a fundamental part in the development of theories of the origin of spectra and of the constitution of atoms and molecules. The analysis of spectra has thus become one of the main objects of modern spectroscopy, stimulating the experimentalist to the extension of existing data, and providing material in a form suitable for the theoretical investigator.

My purpose in the present report has been to give a comprehensive account of the development and present state of our knowledge of the regularities in spectra, as deduced from the spectra themselves, with but little regard to theories of their origin. The report is in two parts, the first of which gives a general account of spectral series, excluding those which occur in band spectra, while the second is intended to include the most authentic experimental data available in April, 1921. It is hoped that the tables of series lines, together with the references to lines which have not yet been classified, will suggest and facilitate further investigations. The system of numeration of the series lines which has been adopted is that of Rydberg and Hicks, but if it should be found convenient to modify this numeration on theoretical grounds there should be no difficulty in making the desired alterations.

The spectra dealt with are those obtained by optical methods, extending from the infra-red to the extreme ultra-violet. The emissions of higher frequencies which have been revealed in the study of X-ray spectra do not form extended series of the kind met with in optical spectra, and have accordingly not been considered.

I am indebted to Professor F. A. Saunders, of Harvard University, for much useful help during the preparation of the report, and especially for his kindness in supplying important observational material in advance of publication. My thanks are also due to Col. E. H. Grove-Hills, F.R.S., for the photograph reproduced in Fig. 6; to Dr. A. S. King, of the Mount Wilson Observatory, for Plate III. *b*; and to Mr. N. R. Fowler for the negatives from which Plate IV. was prepared. I also have pleasure in acknowledging the valuable assistance which has been rendered by Dr. D. Owen, Secretary of the Physical Society, and Mr. H. Dingle, B.Sc., D.I.C., in reading the proof sheets.

A. FOWLER.

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SOUTH KENSINGTON, LONDON.

*February, 1922.*

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PART I.  
GENERAL ACCOUNT OF SERIES.