

**RAYS OF POSITIVE  
ELECTRICITY, AND  
THEIR APPLICATION  
TO CHEMICAL ANALYSES**

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Rays of positive electricity, and their application to chemical analyses by Sir J. J. Thomson

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**SIR J. J. THOMSON**

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# MONOGRAPHS ON PHYSICS

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BY  
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*WITH ILLUSTRATIONS*

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## PREFACE TO SECOND EDITION

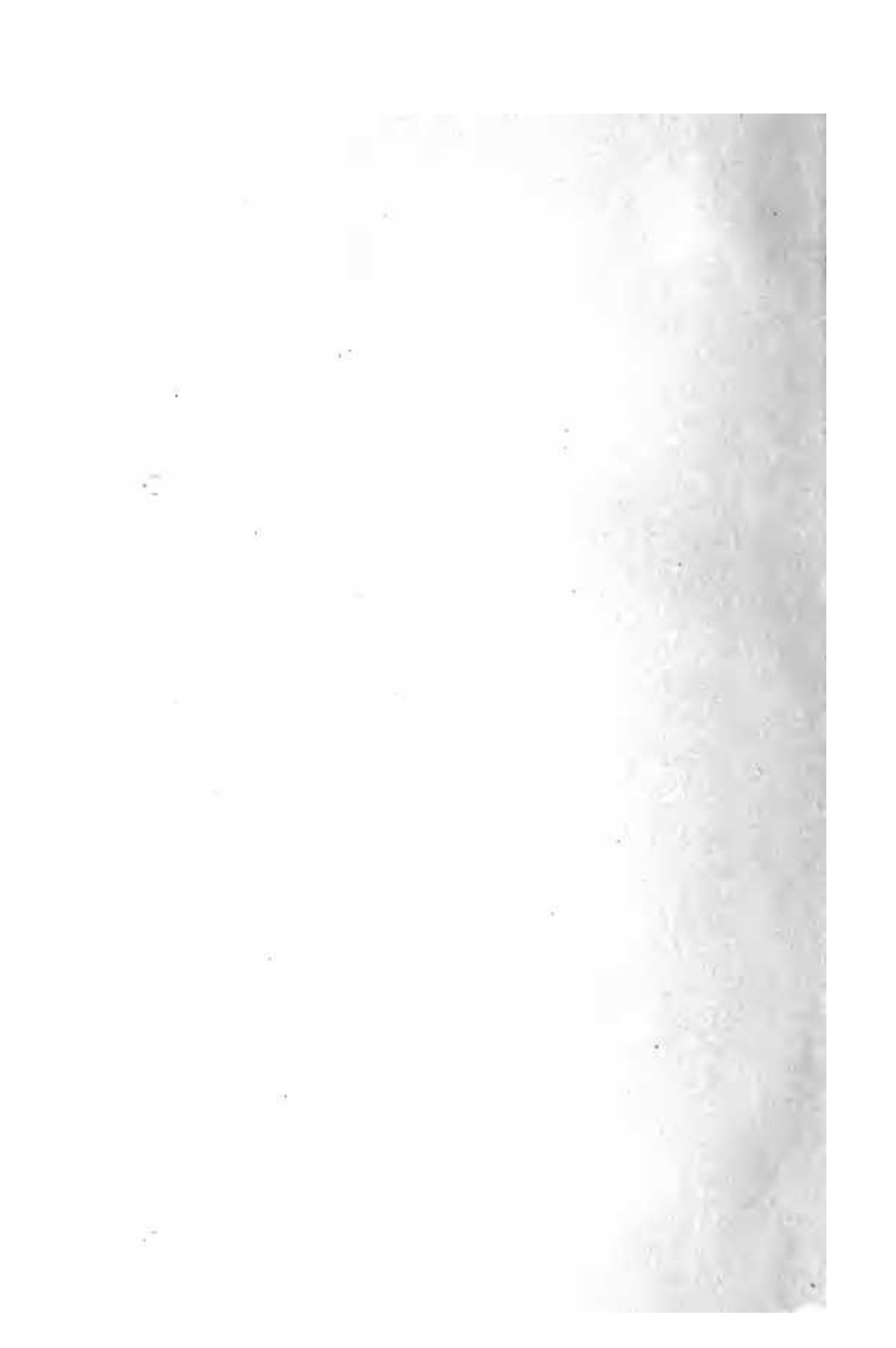
THIS edition contains a considerable amount of new matter both in the text and in the plates. I have paid special attention to those properties of the Positive Rays which seem to throw light on the problems of the structure of molecules and atoms and the question of chemical combination. The hope expressed in the first edition that the method of Positive Rays would be of service in connection with important chemical problems has been fulfilled to a remarkable extent by the researches of Mr. Aston and others on the determination of atomic weights and the detection of isotopes. I am convinced that as yet we are only at the beginning of a harvest of results which will elucidate the process of chemical combination, and thus bridge over the most serious gap which at present exists between Physics and Chemistry.

I regret the long delay in the issue of this edition; it has been due to the War and the pressure of many duties. I have much pleasure in thanking Mr. W. H. Hayles, of the Cavendish Laboratory, for his help in the preparation of the plates.

J. J. THOMSON.

THE LODGE,  
TRINITY COLLEGE, CAMBRIDGE.  
*August, 1921.*





## PREFACE TO FIRST EDITION

I HAVE endeavoured in this book to give some account of the experiments on Positive Rays which have been made at the Cavendish Laboratory during the last seven years, and which have been the subject of papers scattered through the Philosophical Magazine, the Proceedings of the Royal Society, and the Proceedings of the Cambridge Philosophical Society. I have, in addition, included a short account of the researches of Stark and others on the Doppler effect in Positive Rays and of Gehrcke and Reichenheim's experiments on Anode Rays, as these, those on the Doppler effect especially, are very closely connected with the results obtained by the very different methods described in the earlier part of this book. I have described at some length the application of Positive Rays to chemical analysis; one of the main reasons for writing this book was the hope that it might induce others, and especially chemists, to try this method of analysis. I feel sure that there are many problems in Chemistry which could be solved with far greater ease by this than by any other method. The method is surprisingly sensitive—more so even than that of Spectrum Analysis, requires an infinitesimal amount of material, and does not require

this to be specially purified: the technique is not difficult if appliances for producing high vacua are available. I am glad to be able to take this opportunity of expressing my obligations to Mr. F. W. Aston, B.A., and Mr. E. Everett. My thanks also are due to the President and Council of the Royal Society for permission to use the blocks illustrating the Bakerian Lecture.

J. J. THOMSON.

CAMBRIDGE,  
4 October, 1913.