

**LABORATORY  
EXERCISES IN PHYSICAL  
CHEMISTRY, NO. II**

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Laboratory exercises in physical chemistry, No. II by J. N. Pring

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# Laboratory Exercises in Physical Chemistry

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## PREFACE.

THE laboratory exercises described in this text book are designed to meet the requirements of students who wish to follow a laboratory course dealing with some of the applications of physical chemistry. The experimental work here described is based on the exercises introduced by Dr. R. S. Hutton, in 1900, as a supplement to the course in practical physics which form part of the curriculum of the students in the Honours School of Chemistry in the University of Manchester, in their first and second years' studies.

It has been endeavoured, in this collection of exercises dealing with certain branches of chemical physics, to present to chemical students a publication which will for their purpose supplement the text books of Schuster and Lees, on "An Intermediate Course in Practical Physics" (Macmillan & Co.), and "Advanced Exercises in Practical Physics" (Cambridge University Press), and it is expected that students following this work will have already taken one or both of the above courses in pure physics.

The field in the borderland between physics and chemistry has grown to dimensions which are now very large and is still rapidly increasing. In this text book it has consequently only been attempted to deal with a few phases of this subject, and

these lie mainly in the domain of electro-chemistry and the closely allied subject of high temperature chemistry. The close association of this latter with electro-chemistry is due to the fact that electrical methods of producing and of measuring high temperatures are now very widely used in chemical research work. Not only for producing temperatures above about  $1800^{\circ}$ , where no other practical method of obtaining definite high temperatures is available, but in the region of comparatively low temperatures, such as between  $1000^{\circ}$  and  $1500^{\circ}$ , electrical heating, on account of the facility with which it can be applied and controlled, has largely supplanted the use of gas and fuel furnaces in laboratory work.

This book also deals with part of the ground covered by students who specialise in electro-chemistry in their third year's studies for the Honours degree; but the remaining part of this course on applied electro-chemistry, which relates to electric furnace work has been omitted, as the ground is covered by the publication of Mr. R. E. Slade on "Laboratory Electric Furnaces."\*

The scope of this book has been limited almost entirely to the experimental details in laboratory manipulations, while the theoretical side has been only very briefly indicated. The introduction of thermo-dynamics has only been made to point out the important bearing that this has when applied to such measurements as those of electrode poten-

\* Constable, London.

tials, decomposition voltages, and polarisation, the theoretical aspects of which have been fully dealt with in numerous existing publications. For a fuller treatment of the subjects in this book, the student is referred to Ostwald-Luther's "Physico-Chemical Measurements"; Nernst, "Theoretical Chemistry"; Foerster, "Elektrochemie wässriger Lösungen"; Elbs, "Electrolytic Preparations"; Le Chatelier and Wologdine, "High Temperature Measurements"; and publications in the scientific journals, to which reference is given in the text.

I wish to express my indebtedness to Mr. A. Parker for his able assistance in the preparation of the diagrams.