

**EXERCISES IN ELEMENTARY  
QUANTITATIVE CHEMICAL  
ANALYSIS FOR STUDENTS  
OF AGRICULTURE**

Published @ 2017 Trieste Publishing Pty Ltd

ISBN 9780649579396

Exercises in Elementary Quantitative Chemical Analysis for Students of Agriculture by Azariah Thomas Lincoln & James Henri Walton

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**AZARIAH THOMAS LINCOLN & JAMES HENRI WALTON**

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CHEMICAL ANALYSIS



THE MACMILLAN COMPANY  
NEW YORK · BOSTON · CHICAGO  
ATLANTA · SAN FRANCISCO

MACMILLAN & CO., LIMITED  
LONDON · BOMBAY · CALCUTTA  
MELBOURNE

THE MACMILLAN CO. OF CANADA, LTD.  
TORONTO

EXERCISES  
IN  
ELEMENTARY QUANTITATIVE  
CHEMICAL ANALYSIS

FOR STUDENTS OF AGRICULTURE

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New York

THE MACMILLAN COMPANY

1907

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Set up and electrotyped. Published December, 1907.

Notwood Press

J. S. Cushing Co. — Barwick & Smith Co.  
Norwood, Mass., U.S.A.



## PREFACE

OWING to the growing demand for quantitative analytical chemistry by those engaged in the study of agriculture, it seemed to the authors that the presentation of the fundamental methods of agricultural analysis as carried out in the laboratories of the American Experiment Stations would be desirable. While this book is designed primarily as an elementary quantitative guide for the use of agricultural students, it may also be used for the work in general elementary quantitative analysis.

This text-book is the outgrowth of several years' experience in teaching quantitative analysis to students specializing in Agriculture, Chemistry, Medicine, and Household Science. No attempt has been made to present a complete treatise on quantitative analysis; but a few typical exercises have been chosen to illustrate the fundamental principles and the most important methods of manipulation. To further the interest in this work, the student should be encouraged to do considerable outside reading, and there should be available for his use a number of the best books of reference. In the Appendix will be found a list of some of the most important works having a bearing on this subject, while throughout the text reference is made to the original literature.

The gravimetric exercises and the work outlined under Acidimetry and Alkalimetry, together with the analysis of Milk or Feeding Material and Fertilizer, comprise the work usually accomplished by the agricultural students in one semester. Those students who desire more quantitative analysis complete the remainder of the exercises in another semester.

Owing to the importance of the calculation of analytical data, this subject has been treated in considerable detail in Part V (Stoichiometry). The matter presented is arranged to be studied in conjunction with the regular laboratory exercises. In addition to the methods of solving problems, a large number of problems is given for practice. The selection has been made with the idea of emphasizing the fundamental principles brought out in the

laboratory exercises, and many of the problems are taken from the experimental data of the students.

Although it will be found convenient to have a certain amount of platinum ware available for these exercises, it is not necessary. Porcelain crucibles and dishes may be used for all the determinations, with the possible exception of the alkalis in soils.

The notes which are introduced throughout the text emphasize the important points and may serve as the basis of the classroom work, which should be an important feature of instruction in quantitative analysis.

In preparing this manual, free use has been made of the various standard works on quantitative analysis, of the publications of the Association of Official Agricultural Chemists, of the Bulletins of the United States Department of Agriculture, Bureau of Chemistry, and, particularly, of Leach's excellent treatise on Food Inspection and Analysis.

The authors desire to express their gratitude to Mr. J. H. Pettit, Assistant Professor of Soil Fertility, University of Illinois, for many valuable suggestions on the determinations connected with Fertilizers and Soils; to Mr. Cyril G. Hopkins, Professor of Agronomy, for his help in correcting the proofs of the Analysis of Fertilizers and of Soils; and to Mr. D. L. Weatherhead, for assisting in solving the problems.

A. T. L.  
J. H. W., JR.

URBANA, ILLINOIS, August 7, 1907.

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