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INDUSTRIAL SCHOOLS; THE  
CHEMISTRY OF FARM PRACTICE**

Published @ 2017 Trieste Publishing Pty Ltd

ISBN 9780649101894

The Wiley Technical series for vocational and industrial schools; The chemistry of farm practice  
by T. E. Keitt

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Cover @ 2017

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# THE CHEMISTRY OF FARM PRACTICE

BY

T. E. KEITT

*Chemist of South Carolina Experiment Station, and Professor of Soils,  
Clemson Agricultural College, Clemson College, S. C.*

FIRST EDITION

FIRST THOUSAND

UNIV. OF CALIFORNIA  
AT LOS ANGELES LIBRARY

NEW YORK

JOHN WILEY & SONS, Inc.

LONDON: CHAPMAN & HALL, LIMITED

1917

39825

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## PREFACE

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LIFE, food, and raiment are directly or indirectly dependent upon agricultural products. In the settlement of our country, land was abundant and people were few, consequently little thought was given to the needs of the increasing numbers of succeeding generations. As the land first cultivated lost its fertility, the tide of population turned westward where unlimited areas of virgin soil awaited the herds and plowshares of the settlers. But this fresh area has been occupied, and to maintain the fertility of those fields that are still productive and to restore those that have become exhausted is the problem now facing agriculture.

The maintenance of the fertility of a productive soil demands the intelligent application of the principles of agricultural chemistry. The restoration of wornout fields is a difficult and costly undertaking. The successful farmer must reinforce his art by the application of the fundamental information derived from the study of chemistry, geology, botany, bacteriology, and entomology.

Chemistry aids agriculture in many ways. By means of it, exact data are collected and the fundamental reasons for practical results are explained. Then, too, chemistry invents new or improves old methods of fertilization. The chemist analyzes soils, manures and vegetable products. The value of soil analysis to the practical farmer, perhaps formerly overrated, in more recent years has been underrated. From a soil analysis the farmer can at least learn if his soil is unusually deficient in any important element. Chemistry also protects the agriculturist from the impositions of the unscrupulous fertilizer manufacturer.

The thorough analysis of farm products enables the



farmer to know their composition, and how much of each element they contain. This analysis serves a two-fold purpose: First, the composition of a plant shows what elements, and what quantity of each, have been removed from the soil. This, in turn, determines what the soil must contain to grow plants in a healthy condition. Second, in feeding vegetable products to livestock, the composition of these vegetables must be known in order that the rations may be compounded correctly.

Furthermore, chemistry explains how plants grow and are nourished. It shows the kind and the quantity of foods which plants require at various stages of their growth, and this guides the farmer in properly handling his crops. It teaches what purposes the different elements in the food supplied serve in animal economy and how the best results in animal feeding may be obtained with the least outlay of time, labor, and expense.

The purpose of this text is to furnish the knowledge of the fundamentals of chemistry required for intelligent agriculture and to apply this knowledge to the art of agriculture and to the problems of the agriculturist. No attempt has been made to limit its scope to the study of soils, fertilizers, and manures, although these subjects are given careful consideration. In addition, such subjects as feeds, nutrition, sanitary water, boiler water, and insecticides, subjects in which not only the farmer, but the suburban resident is interested—are discussed in as non-technical language as possible.

The student of this book is urgently requested to make a careful study of the first chapters; for in them has been given in as concise and elementary form as is practicable the chemistry applied in the chapters which follow. Each succeeding chapter requires a knowledge of the preceding chapter, consequently they should be studied in sequence.

The author wishes to express here his indebtedness to Professor Charles M. Allen, Pratt Institute, for careful

revision of the chapters on General Chemistry and the critical reading of the whole text, and to Dr. C. A. Peters, Amherst Agricultural College, for many helpful suggestions and criticisms. Acknowledgment is made to Mr. J. Ross Hanahan of Planters' Fertilizer Company for Figs. 37, 38 and 39, to Mr. John S. Carroll of the German Kali Company for Figs. 40, 41 and 42 and 52-60, and to Dr. Wm. S. Myers of the Chilean Nitrate Propaganda for Figs. 45-51. The following members of the faculty of Clemson College furnished photographs: Director J. N. Harper, Dr. F. H. H. Calhoun, Prof. W. A. Thomas, and Mr. F. G. Tarbox. Mr. T. C. Hough furnished valuable aid by making drawings. Director Thorne of the Ohio Experiment Station and Director Hartwell of the Rhode Island Experiment Station very kindly gave permission for the reproduction of cuts used to illustrate bulletins of their respective stations. Cuts from Farmers' Bulletins of the United States Department of Agriculture were reproduced as well as cuts from bulletins of the South Carolina Experiment Station.

Standard books that bear on the subject have been freely consulted. Grateful acknowledgment is also due my father, Thomas W. Keitt, for valuable assistance in reading proof.

T. E. KEITT.

CLEMSON COLLEGE, 1916.

