

**AN INTRODUCTION TO
QUALITATIVE CHEMICAL ANALYSIS
BY THE INDUCTIVE METHOD: A
LABORATORY MANUAL FOR
COLLEGES AND HIGH SCHOOLS**

Published @ 2017 Trieste Publishing Pty Ltd

ISBN 9780649491506

An Introduction to Qualitative Chemical Analysis by the Inductive Method: A Laboratory Manual for Colleges and High Schools by Delos Fall

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DELOS FALL

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A LABORATORY MANUAL
FOR
COLLEGES AND HIGH SCHOOLS.

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LEACH, SHEWELL, & SANBORN,
BOSTON AND NEW YORK.
1895

PREFATORY NOTE.

THIS manual is designed to impart but little chemical truth directly. It aims rather to lead the student to gain that truth himself as nearly as possible at first hand and as a product of his own thinking. This he is enabled to do, without waste of time, guided as he is by the suggestions of the book and the constant prevision of the live teacher.

The student is first thoroughly grounded in the fundamental ideas of chemistry before he goes on to use those ideas as tools in the practical work of qualitative analysis. If he gains a proper conception of the relation of the atom to the molecule, of valence; if he masters the principles of nomenclature and the chemical equation as set forth in chapters ii. and iii., he will certainly acquire his chemistry with facility and clearness. That it produces strong, accurate, enthusiastic, and independent students the author has demonstrated in his own classes through several years.

For the sake of emphasizing what is expressed elsewhere, the author would insist upon regular recitations, at stated times, upon the laboratory work, in which there shall be full and searching discussion of the results obtained, of errors committed, how these errors have arisen and how controlled. Comparison of results obtained and informal discussion of the difficulties to be met with beget an interest and enthusiasm for the work which is invaluable. Moreover, a few experiments fully reported and discussed are of much greater value than many experiments with little time given to such discussion.

ALBION COLLEGE,
September, 1892.
April, 1894.

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PLANS AND METHODS OUTLINED.

LABORATORY practice, as often carried on, consists in setting before the student a task to perform, the end of which is known to him as well at the beginning of a series of experiments as at its close. He may see the fact more clearly, but the substance of the truth he knew to begin with. Recognizing this, he assumes at least an attitude of doubt as to the value of laboratory work. Especially is this true when he comes fresh from the study of history or language, where he has been trained to regard the printed page as the only authority obtainable or necessary.

The object sought in conducting the student through a course in qualitative chemistry by the method embodied in this book, is to counteract this tendency to undervalue laboratory work, and also to place him as nearly as possible, from the first, under the conditions enjoyed by the original investigator.

For example, a frequent method of procedure is to make the statement to the student that the reagent hydrochloric acid will only precipitate silver, lead, and mercurous salts. He seldom doubts this, and, acting on his previously acquired habit of regarding the printed statement as sufficient authority, he does not appreciate the desirability or necessity of demonstrating it. If he does proceed to investigate the question by practical tests, his work will, in many cases, consist in making the three precipitates in question, and perhaps trying the effect of the reagent on one or two additional salts. It will be seen that this is no demonstration whatever.

If, however, he should be sent to the laboratory with the