AN INTRODUCTION TO CHEMICAL ANALYSIS. FOR STUDENTS OF MEDICINE, PHARMACY, AND DENTISTRY

Published @ 2017 Trieste Publishing Pty Ltd

ISBN 9780649055791

An Introduction to Chemical Analysis. For Students of Medicine, Pharmacy, and Dentistry by Elbert W. Rockwood

Edited by Trieste Publishing Pty Ltd.
Cover @ 2017

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FOR STUDENTS OF MEDICINE, PHARMACY, AND DENTISTRY

BY

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SECOND REVISED EDITION

Illustrated

PHILADELPHIA
P. BLAKISTON'S SON & CO.
1012 WALNUT STREET
1904

PRESS OF
THE NEW ERA PRINTING COMPANY
LANCASTER, PA.

PREFACE.

ALTHOUGH it may be desirable that elementary chemistry should be completed before the professional college is entered this is impractical in case of many American schools. The value of analytical chemistry in stimulating observation, power of discrimination, independence and self-reliance has long been recognized, as well as its services in affording an easy introduction to chemical work. It may, however, be carried on as a handicraft, without being of assistance in demonstrating the fundamentals of chemistry. The medical student not infrequently regards it as of no value except for the purpose of making analyses and for these he believes he will have little use. Though the importance of chemical analysis *per se* will probably always be slight, its points of contact with the other subjects in the medical curriculum are so numerous that, when rightly carried on, it not only stimulates interest in its own pursuit but gives a mastery over other branches which can be as easily attained in no other way.

The chemical incompatibility of medicinal substances is so intimately related to their chemical reactions that for their intelligent use a thorough acquaintance with the latter is a prerequisite. The same is true of the chemical antidotes for poisons. For this reason the reactions are quite fully given here. The properties and methods of manufacture of many substances employed for medical or dental purposes are also illustrated by the analytical reactions, which can therefore be used to impress them upon the mind of the student and thus make a connected chain of what is often learned as dismembered facts.

It is natural that chemical analysis for beginners should be differently conducted with professional students than with those who do not desire to apply it to any particular branch of knowledge. This book has been arranged for students of medicine, pharmacy and dentistry, much of whose territory is common. It assumes that some study has been devoted to general chemistry or that this is a contemporaneous course. It is designed to furnish a scientific basis for more technical courses but not to supplant these, and to give the familiarity with chemicals and manipulative methods, which is so necessary for real success in some lines of medical work.

There is no intention to make of the student an analytical chemist or mere mechanical manipulator. In many cases the work is abridged, as in the detection of poisons, where only the principal ones are considered or those which best illustrate the methods of such analysis. At the same time no attempt has been made so far to cut down the work that, with a mere smattering of knowledge, the student finishes, believing himself competent to meet all problems that he may encounter.

To accomplish the purposes outlined, series of questions have been inserted. The answers to these may be found partly in the experimental work previously done, and partly through reading in other departments of chemistry or of medicine. Others will suggest themselves to the instructor and it is only by insisting upon such outside study that the greatest value can be gained from such a course as this. If followed out they are a stimulus to individual application, they prevent mechanical working without thinking, and, by connecting chemical analysis with general chemistry, materia medica, physiology, toxicology, and other departments of medicine, they help to make clear the unity of the complete course.

But few equations have been given, and those usually only the more difficult ones. These benefit the student only when he can write them for himself and he should do this as far as possible in the time allowed. For a similar reason no tables are given for finding without labor the results of volumetric analyses. To represent the metric system as something more than a theory and to prepare for its future practical use all measurements are stated in metric denominations. Degrees of temperature are given by the centigrade thermometer.

While the length of the medical course often forbids any extended work in quantitative analysis some practical work in this is indispensable, partly in order to familiarize the student with the principles, partly because of its applications to other departments of medicine. Volumetric methods are admirably adapted for both these purposes and enough are given to illustrate the more common and to indicate how they may be extended. They include the preparation of the standard solutions, as well as the use of these, so that the student may, if necessary, be in condition to undertake the whole process in the practice of his profession and not be reduced to a state of helplessness if the emergency should arise. For the same reason, in a special table is included the preparation and testing of the qualitative reagents.

To make the course more interesting, by showing some of its applications, chapters are added on the testing of water, the detection of poisons, and analysis by means of the blow-pipe. While the latter is of subordinate importance for students of medicine and pharmacy it has, in this laboratory, proved itself of value is demonstrating to students of dentistry the physical and chemical properties of the metals and their alloys in a manner not possible by wet methods of testing. The length of the course can be