PRACTICAL CHEMISTRY FOR MEDICAL STUDENTS: SPECIALLY ARRANGED FOR THE FIRST M.B. COURSE

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BY

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PREFACE.

THE object of this little book is to supply a guide to the Medical Student in his study of practical Chemistry. Many books have been already written for the same purpose. None, so far as I am aware, confines itself rigidly within the limits of the information which the student *must* acquire. I believe that the text-books which are put into the hands of the Medical Student usually fail by attempting to teach too much. The student has a vague remembrance of coloured precipitates, of soluble and insoluble substances, of additions of reagents, and such things, but he has no idea of what it all means.

I have not written this little book in the hope that the student may be better able to "cram" for examination by its aid than he could do with the help of more detailed text books. But I have endeavoured so

to arrange the facts, and the methods, that what the student does he may do thoroughly, that he may learn as much as possible during his necessarily limited course, and that he may lay the foundation for future work, should he have time and inclination for such work.

Experience has convinced me that to burden the Medical Student with a long series of reactions for each metal and acid, and to attempt to teach him to perform more or less difficult separations of metals and acids, is altogether unwise. Far better that he should be able to perform the analysis of a simple salt well, than to blunder through the separation of half-a-dozen groups.

M. M. P. M.

PRACTICAL CHEMISTRY.

QUALITATIVE ANALYSIS is a branch of Practical Chemistry. The object of this analysis is the determination of the composition of chemical compounds and of mixtures of compounds. Mixtures may be resolved into two or more definite compounds, each of which may be again subdivided into its constituent elements. The determination of the composition of a compound therefore means the determination of the elementary bodies of which it is composed. But in a scheme of qualitative analysis, such as is contained in this book, compounds are regarded as made up of two parts—a metallic, and a non-metallic, or acid, radicle: the *metallic radicle* is, in almost every case, an elementary body; the *acid radicle* is, generally, a group of elementary bodies. The primary object of the analyst is, therefore, to discover what metallic and what non-metallic radicle is present in the compound given him

for examination. The course of analysis given in the following pages includes likewise the detection of a few of the commoner alkaloids, bodies which cannot be regarded (analytically) as made up of two distinct parts, and which must therefore be tested for as definite chemical wholes.

The substances to be tested for, in the analysis of salts, are subdivided—as we have already learned—into metallic and non-metallic radicles. Each of these groups is again subdivided into sections, the members of each of which have certain common properties. To illustrate the method of such subdivision the student must perform the following experiments :—

A small quantity of each of the following salts is to be dissolved in distilled water, in a *clean* test tube.

If the salt be not in the state of moderately fine powder it is to be reduced to that state by rubbing in a clean mortar ; solution is aided by warming the test tube over the Bunsen flame.

The salts to be used are—**lead nitrate, corrosive sublimate, alum, calcium chloride, magnesium sulphate,** and **common salt.**

The test tubes containing the solutions are placed in the stand, and to each a few drops of dilute *hydrochloric acid* are added.

In number one tube (lead nitrate) a white solid is immediately formed, and slowly settles to the bottom

of the tube.[1] The remaining solutions are unchanged.

A solution of *sulphuretted hydrogen* gas in water is now added to each tube, beginning at number two—a brownish-yellow precipitate, changing, on addition of more sulphuretted hydrogen, to black, is produced in number two tube; the other liquids remain unchanged.

Ammonium chloride, and subsequently *ammonium hydrate* (ammonia) and *ammonium sulphide* solutions are added to the remaining tubes—in number three a white precipitate is produced.

Ammonium carbonate solution is added to those tubes in which precipitates have not been as yet produced—a white precipitate forms in tube number four.

On adding *sodium phosphate* solution to liquids five and six, number five is alone precipitated.

These experiments teach that by the action of certain reagents (*hydrochloric acid*, *sulphuretted hydrogen*, &c.) certain metals may be distinguished from one another, inasmuch as some of these metals are precipitated by a reagent which does not cause precipitates in the other cases.

Each of the metals, a solution of whose salts have been employed, represents a class: one set of metals

[1] A solid formed in a liquid by the addition of another liquid, or of a gas, is called a **Precipitate.**