LABORATORY GUIDE OF INDUSTRIAL CHEMISTRY

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Rogers' Industrial Chemistry. *Frontispiece.*

CHEMICAL WORKS.

LABORATORY GUIDE

OF

INDUSTRIAL CHEMISTRY

BY

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FACTS WHICH SHOULD BE REMEMBERED

Do right and you will be successful.

Do the task which is set before you, and do it with a smile.

Do not be a time server.

Do not use your neighbor's standard solution for accurate determinations.

Do not borrow apparatus.

Keep your desk and apparatus clean, if you hope to obtain satisfactory results.

Always have a towel and sponge in your desk, and use them when you leave for the day.

Glass-ware will break if dropped to the floor.

Never touch a machine until you are told how to use it.

Never run a machine without oil.

Leave your machine or kettle in better condition than you found it.

PREFACE

In the average course of chemistry as taught in our technical schools there is little or no attempt made to bring the student in close touch with manufacturing conditions. This state of affairs is exceedingly difficult to understand, when we consider the large amount of time devoted to practical work in some of our engineering courses.

The factory is surely no less fertile a department of this industrial era than the railroad or the foundry. For in the manufacturing plant there is more need of techno-practical (if such a term may be used) trained men than in any other branch of industry. Unquestionably it is necessary to have organization for the manipulation of power, machinery, and labor, so as to obtain the maximum of production with the minimum of expenditure or depreciation of plant. But in addition, it is highly essential that we understand the chemical principles upon which these industries are based.

The object of this book, therefore, is to acquaint the student of chemistry with a few commercial processes, by introducing practical methods of handling materials on a large scale; the care and use of machinery; the cost of raw material; transportation; wage system; the handling of men and shop discipline.

The subject-matter of this book presupposes a certain knowledge of chemistry; and purposely leaves many of the minor details to be worked out by the student. Great leeway is also given to the instructor in order that he may exer-

cise his own originality. A few suggestions, however, may not be out of place, and may serve as a guide to those engaged in this important branch of teaching.

The first chapter has been introduced in order to insure that the student understands the use and value of the various methods employed for taking the density of liquids, and the tests given should be conducted by each individual.

The work in the second chapter, dealing with inorganic preparations is best conducted on the foremanship system which is carried out at Pratt Institute as follows: One man is assigned as foreman of the chemical works and has as his assistants three or more of his classmates. The work which he is given may be the manufacture of barium chlorid for example. He first has his men make an analysis of witherite to determine the percentage content of barium and also test the strength of the hydrochloric acid. In order that the work may be more commercial he is told to estimate the cost of producing 15,000 lbs., it being understood that all weighings are made in grams. The necessary quantity of mineral is then weighed, crushed and treated with the diluted acid in the kettle as described under that preparation.

During such a preparation as the one cited it will be necessary to remove impurities, this being regulated by analytical tests.

Chapter three is devoted to the dyeing of textile fibers. Here it will be advantageous to have all tests mounted with names of color, method employed, and any other data written under each skein.

In the fourth chapter the preparations given have been selected with the view of manufacturing commercial products rather than following the usual custom of making organic substances to illustrate typical organic groups. Here

it has been found advisable to have the student save a 4-dram sample of each compound, which he seals and mounts on cardboard. In the case of the coal-tar colors, the student should make dye-tests with the same, mounting the skeins and color on the same card. In order, also, to illustrate the use of his colors in the manufacture of lakes he should prepare dry and pulp colors, mounting them on cardboard together with rub-outs in glue and Japan.

In the chapters devoted to soap, paint, leather and paper the work outlined comes again under the head of foremanship method and should be conducted along the same line as for inorganic chemicals. The foreman should be held responsible for the quality as well as quantity of the output from his plant; he should see that all machinery is left in perfect condition, and that his factory is clean.

The advantages gained by this foremanship system are self-evident, giving the student more confidence in his own ability than by any other possible means.

As we are only beginning to see the first faint light of dawn in this all-important branch of education, the author will be gratified, indeed, if this book proves to be of any service to those who are attempting to solve the great problem of Industrial Education, and especially the teaching of Industrial Chemistry.

In conclusion, the author desires to express his appreciation of the kindness and courtesy shown to him by his many friends for the many valuable suggestions which have been so helpful to him in the preparation of this volume.

ALLEN ROGERS.

PRATT INSTITUTE,
Brooklyn, September, 1908.