

**CHEMICAL REAGENTS: THEIR
PURITY AND TESTS. AUTHORIZED
TRANSLATION OF PRÜFUNG DER
CHEMISCHEN REAGENZIEN AUF
REINHEIT (ZWEITE AUFLAGE)**

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HENRY SCHENCK & E. MERCK

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- 1888 **Die Prüfung der Chemischen Reagentien auf Reinheit.** Von Dr. C. KRAUCH. Published by Julius Springer, Berlin.
- 1891 **Die Prüfung der Chemischen Reagentien auf Reinheit.** Von Dr. C. KRAUCH. Published by Julius Springer, Berlin.
- 1895 **Die Prüfung der Chemischen Reagentien auf Reinheit.** Von Dr. C. KRAUCH. Published by Julius Springer, Berlin.
- 1902 **The Testing of Chemical Reagents for Purity.** By Dr. C. KRAUCH. Translated by J. A. WILLIAMS, F.C.S., and L. W. DURNÉ, with additions and emendations by the author (Translation of 1896 Edition.) Published by MacLaren & Sons, London.
- 1905 **Prüfung Der Chemischen Reagenzien auf Reinheit.** Von E. MÄRCK. Published by E. Merck, Darmstadt.
- 1907 **Chemical Reagents: Their Purity and Tests.** By E. MÄRCK. Authorized translation by HENRY SCHWOCK, A.B. (Translation of 1905 Edition.) Published by D. Van Nostrand Co., New York.
- 1912 **Prüfung der Chemischen Reagenzien auf Reinheit.** (Zweite Auflage.) Von E. MÄRCK. Published by E. Merck, Darmstadt.
- 1914 **Chemical Reagents: Their Purity and Tests.** By E. MÄRCK. Authorized translation by HENRY SCHWOCK, A. B. (Translation of 1912 Edition.) Published by Merck & Co., New York. Supplied by D. Van Nostrand Co., New York.

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(ZWEITE AUFLAGE)

VON

E. MERCK

BY

HENRY SCHENCK, A.B.(HARVARD)

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TRANSLATOR'S PREFACE

The second edition of "Prüfung der chemischen Reagenzien auf Reinheit," presented here in translation, does not depart essentially in its method of treatment from the previous one. Since the first edition of the work appeared, numerous articles have come into prominence as reagents, however, and new uses have been found for chemicals long part of the laboratory equipment, so that, besides the introduction of entirely new subjects,* additions and changes have also been made in the text of the earlier edition. Frequently, too, these changes have materially raised the standard of purity. Coincident with this improvement is the inclusion among the references of important new contributions upon the uses and methods of testing reagent chemicals.

There have also been made several deletions: Acid Oxalic Sublimed, Indigotin, Kassner's Mixture, and a few of the less impor-

* As subjects not heretofore treated in the work but introduced for the first time in this edition, may be mentioned the following:

Alphanaphthylamine, Ammonium Chromate, Ammonium Molybdate Solution, Ammonium Persulphate, Benzidine for Blood Test, Bismuth and Potassium Iodide Solution, Carbon Tetrachloride, Carmine-Fibrin, Chromium Trioxide for Carbon Determination, Cobalt Nitrate, Free from Nickel, Cobalt Oxide, Copper Hydroxide, Copper Oxide-Asbestos, Devarda's Metal, Dicyandiamidine Sulphate, Dimethylglyoxime, Dimethylparaphenylenediamine Hydrochloride, Ferric Oxide, Glass Wool, Hydrazine Sulphate, Indigo Carmine, Indigo Solutions, Lead Peroxide Granulated, Magnesia Mixture, Magnesite, Manganese Metaphosphate Solution, Methyl Red, Platinized Pumice Stone, Poirrier's Blue C4B, Potassium Persulphate, Quartz Sand, Sea Sand, Silver-Asbestos, Sodium-Cobaltic Nitrite Solution, Tetramethylparaphenylenediamine Hydrochloride, Yellow Oxide of Mercury.

tant dilutions of the acids have been deleted. Gallein, Dry, has taken the place of Gallein, Liquid. The tables of equivalents of standard solutions have been replaced, in response to a suggestion, by a table giving approximate strengths and brief directions for the preparation of solutions for reagent purposes, compiled from published writings.

In adapting the standards to the needs of American chemists, furthermore, it has been necessary in several cases to deviate from the German standard in the translation. Instances of such changes are the tests for tartaric acid in citric acid and in succinic acid, for silicofluoride in ammonium fluoride, for hydriodic acid in hydrobromic acid, etc.; more or less complete revision is to be found in the texts of Acid Hydrochloric, Acid Nitric, etc.

Another feature introduced in this translation is the parenthetical statement appended to each test giving in terms of percentage the minimum amount of the impurity which would be recognized by the test.* In many cases where gravimetric or volumetric determinations are made, these percentage figures are, of course, exact. In other cases, however, the qualitative tests had in a certain sense to be given a quantitative value, which had to be determined by experiments: Known quantities of an impurity were put into the chemical or its solution, and gradually added to until the given qualitative test for that impurity showed a reaction.

The figures thus obtained for qualitative tests are by no means to be considered final, as they depend to an extent on delicacy of manipulation; on the interpretation of such terms as "faint," "slight," "cloudy," etc.; and also on the absence of other impurities, the presence of which might conceivably alter them. Yet, taken by and large, they will give a more definite idea of the chemicals that conform to the tests laid down; and, furthermore, they will and do sometimes in most striking fashion show the delicacy or lack of it of some of the tests. Thus they carry a two-fold pos-

* When impurities are tested for not singly but as classes—as for instance "heavy metals," "aldehydes," etc.,—a definite percentage statement becomes obviously impossible. Also, when the text confines the test with H_2S for heavy metals to either alkaline or acid solution, the statement as to the absence of heavy metals relates necessarily to their absence in the prescribed solution only.

sibility—that of pointing the way to improvements in both chemicals and tests.

While these are being worked out, however, the parenthetical percentage statements will, in the meantime, prove of use to the analyst when he selects reagents for particular purposes, estimates the relative value of tests, or makes allowances and corrections in his findings or in those of his assistants or students.

THE TRANSLATOR.

NEW YORK,
April 15, 1914.

TRANSLATOR'S NOTE

For the sake of brevity, expressions throughout the book are sometimes used without full qualification. The following is then to be their interpretation:

Atomic Weights, Quantitative Calculations, etc., are based on the table of International Atomic Weights for 1913 in which $O=16$.

Specific Gravities are given at $+15^{\circ}$ C. compared with water at $+15^{\circ}$ C. When a specific gravity is given with only two decimal places, it is understood that a variation in the third decimal is permissible.

Unweighable Residue or words to that effect apply to residues weighing 0.0005 gm. or less. In residue determinations when filtration is employed, ashless filters are to be used in collecting residues for ignition.

Solutions of chemicals to be tested, in the absence of specific directions for their preparation, are made from 1 gm. diluted to 20 c.c. or proportionately.

Parts by Weight are to be understood when the term "parts" is used or implied. For instance, the expression 1 : 20 means 1 gm. in 20 gm.

Volumetric Determinations can of course be made with other solutions than the potassium hydroxide and hydrochloric acid solutions generally selected, provided they be equivalent. In such substitution, however, due regard must be given to the suitability of the indicator.

The **Boiling-point** of a substance is affected by variation in atmospheric pressure, and this fact must be taken into account when the boiling-point is employed as a test of purity.