

HANDBOOK OF TECHNICAL GAS-ANALYSIS

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Handbook of Technical Gas-Analysis by Clemens Winkler & Georg Lunge

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CLEMENS WINKLER & GEORG LUNGE

**HANDBOOK OF
TECHNICAL
GAS-ANALYSIS**

HANDBOOK
OF
TECHNICAL GAS-ANALYSIS.

BY
CLEMENS WINKLER, Ph.D.,
PROFESSOR OF CHEMISTRY AT THE FREIBERG MINING ACADEMY.

SECOND ENGLISH EDITION.

Translated from the Third, greatly enlarged German Edition,
with some additions,

BY
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TRANSLATOR'S PREFACE TO THE FIRST EDITION.

EVERY ONE who has to make gas-analyses for technical purposes is aware that Professor CLEMENS WINKLER is the founder of technical gas-analysis as a distinct branch of analytical Chemistry. A few such processes were, of course, previously known and practised; but Winkler was the first to draw attention to the importance of this subject, to invent suitable apparatus, and to elaborate a complete system of qualitative and quantitative technical gas-analysis*, containing a vast number of new observations and methods, along with a very complete description of the work already done in the same direction by others.

The field first opened out by Winkler has been very successfully cultivated by other chemists; and it is now quite usual, at any rate in Germany, to perform technical gas-analyses, not merely in chemical works, but for testing the efficiency of steam-boiler furnaces and such purposes. In England some of these processes have also been introduced; but they are not as yet known and appreciated to the same extent as abroad. Hence it may not be unwelcome to English chemists to have a translation of a short treatise, just published by Winkler, which is primarily intended for *teaching* purposes—that is, for the use of teachers and students in public laboratories—but which likewise serves as a guide and a handy book to other chemists wishing to make themselves acquainted with the subject. This treatise is not intended, as was its predecessor, to furnish a complete enumeration of all apparatus hitherto proposed for technical gas-analysis, but merely to give representative examples of each kind of apparatus, embracing all the divisions of this branch of Chemistry. It may be confidently said that a person who has mastered the processes and apparatus described in this book will at once

* CL. WINKLER, 'Anleitung zur chemischen Untersuchung der Industrie-Gase,' Freiberg, 1877-79 (2 vols.).

comprehend and manage any other gas-analytical process or apparatus he may meet with or require for his special purpose. The scope of this book does not in any way embrace the methods of gas-analysis practised for purely scientific purposes, for instance, all those in which mercury is employed for confining the gases; but it will, for all that, have great interest for scientific chemists.

The selection which the Author has made from the large mass of material now accumulated was evidently, to a certain extent, dictated by special circumstances. German sources were mainly used by him, as these far more than sufficed for the purpose which he had in view—that of furnishing a sufficient number of illustrations for all parts of his field. The Translator has been under a strong temptation to supplement the book by some other examples of apparatus; but this proved unmanageable, as the present treatise would thus have lost its character, as indicated above, and as then, with greater pretensions, it might perhaps have been more open than it is at present to the objection that the treatment of the subject was not sufficiently exhaustive. The Translator has therefore contented himself with adding a few notes where they seemed to be specially called for, and with describing two apparatus of his own construction which have been found very useful just for industrial purposes, and which seemed to supply a want. All the additions he has made are marked, the text being in other respects a faithful rendering of the German original.

The Translator must acknowledge the most valuable services of Dr. Atkinson in looking over the proofs and improving the style of the translation.

All the apparatus mentioned in this book can be supplied by Messrs. Mawson and Swan, of Newcastle-upon-Tyne, or by any other dealers in chemical apparatus.

It is hoped, then, that English chemists, gas-managers, engineers, factory inspectors, and others interested in technical gas-analysis, will receive this work with favour, and that it will be as widely employed and as useful as Winkler's works have been in his own country.

Zurich, August 1885.

TRANSLATOR'S PREFACE TO THE SECOND ENGLISH EDITION.

THE first edition of the German original of this book appeared in 1884, a second followed in 1892, and a third was published towards the end of 1901. In the meantime the first English edition became exhausted, so that a new issue would have been called for in any case. Professor Winkler kindly consented to allow the Translator to do his work from the proof-sheets of the third German edition, so that this present second English edition corresponds to the third edition of the original.

Although the scope of this work has remained primarily to furnish a help to the *teacher* and the *student* of technical gas-analysis, it has been greatly enlarged, as is proved by the fact that the number of pages has been increased by one-half. It does not even now purport to give a complete enumeration of all processes and apparatus proposed for technical gas-analysis, but it now embraces all the more important of these, including the valuable additions made to that part of technical analysis by Professor Hempel; and it will be found a sufficient guide and help in most cases to the practical and manufacturing chemist, as well as to the student. As before, only methods practically tried and approved by the Author have been recorded in this book.

The Translator has again introduced a few remarks of his own in the text, and has also made some additions describing his own apparatus more fully than is done in the original; but he has taken care to mark everything in such a way that the reader can never be uncertain as regards Professor Winkler's work and the portions added by the Translator.

Zurich, March 1902.

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