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MACRO AND SEMIMICRO QUALITATIVE INORGANIC ANALYSIS

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A TEXT-BOOK OF

MACRO AND SEMIMICRO QUALITATIVE INORGANIC ANALYSIS

BY

ARTHUR I. VOGEL, D.Sc.(Lond.), D.I.C., F.R.I.C

Head of Chemistry Department, Woolwich Polytechnic: Sometime Beit Scientific Research Fellow of the Imperial College

FOURTH EDITION

LONGMANS, GREEN AND CO

LONDON · NEW YORK · TORONTO

LONGMANS, GREEN AND CO LTD
6 & 7 CLIFFORD STREET LONDON W 1
BOSTON HOUSE STRAND STREET CAPE TOWN
531 LITTLE COLLINS STREET MELBOURNE

LONGMANS, GREEN AND CO INC
55 FIFTH AVENUE NEW YORK 3

LONGMANS, GREEN AND CO
20 CRANFIELD ROAD TORONTO 16

ORIENT LONGMANS LTD
CALCUTTA BOMBAY MADRAS
DELHI VIJAYAWADA DACCA

First Published under the title 'A Text-book of Qualitative Chemical Analysis' . . 1937
Second Edition 1941
New Impressions . . . . 1942 (*twice*)
Reissue with Appendix 1943
New Impression 1944
Third Edition under the title 'A Text-book of Qualitative Chemical Analysis including Semimicro Qualitative Analysis'. . 1945
New Impressions 1946, 1947 (*twice*), 1948, 1951, 1952
Fourth Edition under the title 'A Text-book of Macro and Semimicro Qualitative Inorganic Analysis' 1954
New Impression (with minor corrections) 1955

Translated into Spanish and published by Editorial Kapelusz, Buenos Aires, in April 1953

MADE AND PRINTED IN GREAT BRITAIN BY
WILLIAM CLOWES AND SONS, LIMITED, LONDON AND BECCLES

PREFACE TO THE FOURTH EDITION

THE text has been exhaustively revised, considerably enlarged and completely reset in the present edition. The opportunity has been taken of rearranging certain sections and chapters which, it is hoped, will enhance the value of the book: thus the technique of semimicro analysis is now incorporated in Chapter II (Experimental Technique of Qualitative Inorganic Analysis). The author's aim has continued to be to provide a text-book of macro and semimicro qualitative inorganic analysis at moderate cost which can be employed by the student continuously throughout his study of the subject. There is some duplication in the chapters devoted to the needs of the elementary student, but it is felt that this method of treatment will assist to lay a firm and sound foundation from the very outset and also retain the individuality of Chapters V and VI. The numerous new tests and procedures have been thoroughly tested in the laboratory.

The following changes and new features in the present edition may be mentioned:

1. The Brönsted–Lowry treatment of acids and bases (I, 5).

2. An extended treatment of activity coefficients and their applications (I, 11 and I, 15).

3. An extended treatment of the determination of *p*H (I, 38 and I, 39).

4. Treatment of hydrolysis from the standpoint of the proton theory of acids and bases (I, 42).

5. The description of semimicro apparatus and semimicro analytical operations (II, 3) has been revised in the light of experience in the laboratory during the last eight years. (Since both hand and electric semimicro centrifuges are now comparatively inexpensive, the description of the pressure-filter tube method of filtration has been omitted.)

6. All the group separation tables on the semimicro scale as well as many on the macro scale have been revised; some tables are new. The separation of Group IIA (copper group) and IIB (arsenic group) by the potassium hydroxide method has been included: this procedure has much to commend it

and merits wider application than it has had in the past.

The precipitation of Group IV (calcium group) *after* evaporation of the filtrate from Group IIIB (zinc group) to dryness and elimination of all ammonium salts has been adopted as standard practice. {The latter is based upon the work of A. Scheinkman (1931) and of van Nieuwenburg and G. Dulfer (1938); it seems to be insufficiently realised that high concentrations of ammonium salts hinder the complete precipitation of Group IV (calcium group) by ammonium carbonate solution.}

7. The zirconyl nitrate method for the separation of phosphate. {This is based upon the researches of D. J. Cole (1952) in the laboratory of Dr. A. J. Lindsey at the Sir John Cass College; it is superior to most other "phosphate separations" and has therefore been given at the appropriate points in the text.}

8. The reactions of palladous compounds (IX, 7).

9. A short chapter on inorganic paper chromatography. {This account is based largely upon the researches at the Chemical Research Laboratory, Department of Scientific and Industrial Research, Teddington; the writer desires to acknowledge his indebtedness to Dr. F. H. Burstall and Mr. R. A. Wells for their kind help in supplying photographs of paper chromatograms and also certain experimental details.}

The book will be found suitable for students preparing for the General and Honours (Special) B.Sc. degree of the Universities, for other University Examinations of equivalent standard, and for the Associateship of the Royal Institute of Chemistry; also for the General Certificate of Education at Advanced Level, the Preliminary Scientific Examination of the Pharmaceutical Society, for the Ordinary and Higher National Certificates in Chemistry, the various Scholarship Examinations, and for general laboratory use. It is hoped, also, that the volume will be useful to practising analytical chemists.

The author wishes to record his indebtedness to Dr. A. Claassen of Eindhoven for numerous suggestions; to Mr. C. Kyte, B.Sc., for checking the new tests and procedures; to Dr. J. Leicester for the experimental work upon inorganic paper chromatography; to Messrs. W. T. Cresswell, B.Sc., and C. M. Ellis, B.Sc., and Drs. G. H. Jeffery and J. Leicester for reading the galley proofs and for helpful suggestions; and finally to Dr. G. H. Jeffery for his help and advice upon numerous occasions.

The writer would be glad to hear from teachers, analytical chemists and others of any errors which may have escaped his notice; any suggestions whereby the book can be improved will be welcomed.

A. I. VOGEL

Woolwich Polytechnic,
London, S.E.18
September 1953

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