WORKED EXAMPLES IN X-RAY ANALYSIS

By the same authors:

PRACTICAL X-RAY SPECTROMETRY, Second Edition

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WORKED EXAMPLES IN X-RAY ANALYSIS

R. JENKINS and J. L. de VRIES

SECOND EDITION

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Preface to the First Edition

The purpose of this book is to provide the reader with a series of worked examples in X-ray spectrometry and X-ray diffractometry, in such a way that each example can be treated either as a posed question, i.e. one to which the reader must himself provide an answer, or as a guide to the method of treating a similar problem. The latter, of course, also provides a check on the answer produced by the reader. Although much basic theory can be derived by study of this work the first intention of the book is not to provide a source of basic theoretical knowledge in X-ray analysis. It is hoped that the book will be utilized more as a guide line in the tackling of theoretical and practical problems and as a means of establishing whether or not the reader is able to work out for himself a certain type of problem. For example, the series of examples on counting statistics has been chosen in such a way that after working through and understanding these, the reader should be able to handle most of the calculations that he is likely to come up against in this area.

Our own experience of most of the textbooks in this field is that although detailed explanation is given of the reason why a typical problem occurs and what can be done to overcome it, the reader is often unable to judge whether or not he is really able to apply this newly found knowledge to one of his own problems.

We look upon this book, therefore, as a supplement to existing work in the field rather than an independent source of information directly usable by a complete newcomer. The work as such covers both X-ray spectrometry and X-ray powder diffraction and some basic theory in both techniques is required before the problems can be attempted. All of the nec-

essary theory in X-ray spectrometry will be found in our previous volume on "Practical X-Ray Spectrometry"¹⁾ and a similar volume on "Practical X-Ray Diffractometry" is currently in preparation. Since the publication of the present work is likely to precede "Practical X-Ray Diffractometry" by a considerable time margin we would recommend the excellent books by Klug and Alexander²⁾ and Parrish³⁾ as good alternatives.

All of the worked examples have been divided into five major sections dealing with Spectra, Instrumentation, Counting Statistics, Quantitative Analysis and Miscellaneous. Within each of the five sections examples of three types will be found i.e. either of a general nature or dealing specifically with X-ray spectrometry or X-ray diffractometry. It is thus the intention that examples falling within the general category be used either for spectrometry or for diffractometry. Generally speaking, within a given definition (e.g. quantitative analysis/X-ray spectrometry) the difficulty of the examples increases with the number of the question. The exception to this is the miscellaneous section which, as its title would suggest, contains a number of examples of an undefined nature considered necessary to give a more equal coverage of typical practical problems.

In order to aid the reader in establishing how difficult an example is likely to prove, we have chosen to give each example a "difficulty index" denoted by A, B or C. A indicates a simple problem that should give little difficulty even to a relative newcomer to the field. B indicates a more difficult problem which requires a fair degree of theoretical knowledge but even so, should not present too much difficulty to somebody working in the field. C on the other hand indicates quite a difficult problem, many of these being in the form of unexpected results from well established experiments, requiring explanation rather than mathematical derivation.

Most of the worked examples cited in this book are based on problems which we ourselves have come up against and most of them have been utilized in some form or another in one of our own schools or symposia.

Some of the examples have been designed and checked by assistants in our laboratories and we are particularly grateful to Mr Böinck, Mr Hertroys and Mr Koekenbier for their help in this direction. We would also like to thank Janine de Brouwer for her considerable patience in the typing of the manuscript.

1970

R. J.
J. L. de V.

Preface to the Second Edition

The positive response to the first edition of Worked Examples in X-Ray Analysis has prompted us to produce a revised and updated version of the original manuscript. In this new edition, we have replaced ten or so of the original questions with new or substantially revised versions of the originals. In doing so, we hope to have updated the original text such that it again reflects current problem areas in analytical x-ray spectrometry and diffraction. We have used the same general format as in the first edition and have retained the 'difficulty index' nomenclature since this has apparently been found useful.

We hope that the new edition will prove as popular as the first edition, and as before we would welcome recommendations or suggestions for further improvement.

New Jersey and Eindhoven, 1977

R. J.
J. L. de V.