AN INTRODUCTION TO CRYSTAL CHEMISTRY
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CRYSTAL CHEMISTRY

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SECOND EDITION

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To

my wife
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PREFACE

In the years which have elapsed since the first edition of this work was published in 1939 X-ray diffraction has become firmly established as the most powerful tool at our disposal for the study of the solid state. Twenty-five years ago enough structures were known for the general principles of crystal architecture to be understood; to-day the number of known structures has been multiplied many times and these principles have taken their rightful place as an integral part of modern structural chemistry. Even so, it is only at an advanced level that the integration is as yet complete, and it is in any case not only the chemist to whom the study of solids is of interest: the physicist, the metallurgist, the mineralogist and many others must equally be concerned with the relationship between properties of matter and atomic arrangement. For this reason there still remains a need for a presentation of the fundamental principles of crystal chemistry at an elementary level, with the minimum of descriptive detail, and it is this need which the present work seeks to satisfy. Although the new edition has been completely rewritten, and although the structures described have been reinterpreted in terms of more modern ideas of chemical bonding, an attempt has nevertheless been made to avoid undue expansion and to preserve the essentially elementary character of the original. Only those structures have been described which seem best suited to illustrate the principles here advanced, and these principles have been presented in a manner which demands little specialized crystallographic knowledge on the part of the reader.

The value of diagrams as a means of illustrating structural principles needs no emphasis. Much care has therefore been devoted to the preparation of the many figures, all of which have been specially drawn, and it is a pleasure to express my thanks to the artists of the Cambridge University Press for the skill with which they have executed this work. References to original literature have been omitted as no longer appropriate now that the needs of the more advanced student are so admirably met by other works, some of which are cited in the bibliography.

The greater part of the task of preparing this edition was undertaken during a period of leave of absence from Cambridge University generously granted to me by the General Board of the University, the
Preface

Faculty Board of Geography and Geology, and the Governing Body of St Catharine’s College. Part of the time was spent at the National Bureau of Standards in Washington, and it is a pleasure to express my thanks to Dr I. C. Schoonover, Mr H. S. Peiser and their many colleagues for all that they did to make my visit a most stimulating and memorable experience. I am equally indebted to Professor H. G. F. Winkler for his hospitality and for the facilities he placed at my disposal during the months which I spent at his laboratory in the University of Marburg.

No reader of this book can fail to recognize how much I owe to others who have written in this field. To the authors of the works quoted in the bibliography, and not least to the selfless editors of the reference works, I express my warm thanks. I am also indebted to many friends (too numerous to mention individually) whose counsels I sought and whose opinions and advice, so generously given, have largely determined the scope and character of what I have written.

Finally, but above all, I am indebted to my wife, but for whose encouragement this book might never have been written. From the day we first discussed the project (at sea off the coast of California) I have been sustained by her interest and support and by her acceptance, with characteristic cheerfulness, of the sacrifices involved. As a token of what I owe to her inspiration this work is dedicated to her with love.

R. C. E.

September 1963