BASIC REACTION KINETICS AND MECHANISMS

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PREFACE

This book is based on a course of lectures given at Liverpool Polytechnic to both full-time and part-time chemistry students. In the experience of the author, many students find final-year kinetics difficult unless they have thoroughly grasped the basic principles of the subject in the first year of study. This book requires no previous knowledge of kinetics, but gives a more detailed account than that found in general physical chemistry textbooks. The purpose of this book is to give the reader a sound understanding of the fundamentals of the subject without dealing with the derivation of rate equations for typical complex reactions. The student is, however, introduced to a number of topics that will be dealt with more comprehensively in the final year of an Honours Chemistry course. With this in mind, the book should prove suitable for chemistry students in all years of Honours courses. It is particularly applicable to the first and second years of B.Sc. Honours Degrees, and for B.Sc. Ordinary Degree, Higher National Certificate, Higher National Diploma and Grad.R.I.C. Part 1 Chemistry courses. The book should also prove adequate for all the kinetics covered on B.Sc. combined science, biology, pharmacy and biochemistry courses.

The first four chapters cover the basic kinetic laws, the factors that control reaction rates and the classical methods used to measure reaction rates. These chapters cover the introduction to most kinetics courses. The basic theories of reaction rates are covered in chapters 5, 6 and 8, and a number of topics are introduced in a simple way. In chapter 7, the subject of atomic and free-radical reactions is treated comprehensively, since the author has found that the study of chain reactions has proved interesting and stimulating to many students; this area of kinetics has of course been a fruitful field of research for a number of years. The book concludes with a study of catalysed reactions, photochemical reactions and the development of new techniques for the study of fast reactions.

A number of worked examples are given throughout the book to illustrate the methods and relationships outlined. The reader is advised to test his knowledge of the subject on the kinetics problems that appear at the end of most chapters. For the diligent student, a list of key references, review articles and other textbooks for further reading are suggested at the end of each chapter.

Throughout the text, and for all the worked examples or test problems,

the single system of SI units has been used. A selection of the units encountered most frequently in the book and a brief guide to the modern method of expression for physico-chemical quantities is given in an appendix.

The author wishes to express his appreciation to the students to whom he has taught kinetics at Liverpool Polytechnic and latterly at Lanchester Polytechnic, Coventry for their interest and keenness in the subject. I would also like to thank my wife for her continued help in preparing the manuscript and checking the text.

Some of the problems have been taken from past examination papers, and in this respect, I wish to thank the Universities of Brunel, Edinburgh, Hull, Lancaster, Liverpool, Manchester, Salford and Southampton for permission to publish.

H. E. Avery