Chemistry Reactions In Aqueous Solutions


Considerable attention has been focussed on non-aqueous chemistry in the last decade and this situation has arisen no doubt from a realization of the vast application of this branch of chemistry. Within this field much energetic work has been channelled into the determination of the coordination chemistry of transition metals in these solvent systems. Elaborate experimental techniques have been developed to discover, in particular, the magnetic and spectral properties of complex compounds, and the theoretical background of such systems has been expanded to corroborate, as far as possible, the experimental results. This text has, however, a different bias from many books currently available on this branch of chemistry, and is designed to be a survey of known facts on many of the non-aqueous solvents currently in use mainly in the field of halogen chemistry, together with a discussion of these facts in the light of the most recently accepted principles. As such, it is hoped to close a gap in the literature of which many workers and advanced students in this field will be aware. The treatment is meant to be selective rather than completely comprehensive and must inevitably reflect some of the special interests of the author. This textbook outlines the principles that govern chemical reactions and continuously illustrates their usefulness in practical applications. The authors (U. of Connecticut) explain reactions in aqueous solutions, the ideal gas law, electron arrangements, rate of reaction, acid-base solutions, and basic organic chemistry. The seventh edition employs a two-column format for examples, adds colorful flowcharts, and combines the chapters on complex ion and precipitation equilibria. The use of water as a medium for promoting organic reactions has been rather neglected in the development of organic synthesis, despite the fact that it is the solvent in which almost all biochemical processes take place. Chemists have only recently started to appreciate the enormous potential water has to offer in the development of new synthetic reactions and strategies, where it can offer benefits in both unique chemistry and reduced environmental impact. In this new book, the editor, well known for his contribution to the development of water as a useful medium in synthetic organic chemistry, has assembled an international team of authors, themselves at the forefront of research into the use of the unique properties of water carrying out organic transformations, to provide a timely and concise overview of current research. By focusing on the use of water in synthetic organic chemistry, and with the concern for the use of solvents in organic chemistry, professional chemists, particularly those involved in industrial research and development, will find this book an essential guide to the current state of the art, and a useful starting point in their own research. Academic chemists, including postgraduate and advanced undergraduate students, will find this book an invaluable guide to this exciting and fast-developing area of chemical research. This book is one of a series designed specifically to keep chemists in all walks of life up to date with the latest developments in the field of modern organic chemistry. Comments and opinions from readers have been carefully considered and have resulted in many significant changes in the text, which is presented in a format that emphasizes the practical application of organic chemistry in the areas of industrial research and development. This book will be an invaluable addition to the library of any chemist with a strong interest in the use of water as a medium for promoting organic reactions.
The Aqueous Chemistry of Oxides is a single-volume text that encapsulates all of the critical issues associated with how oxide materials interact with aqueous solutions. It serves as a central reference for academics working with oxides in the contexts of geology, various types of inorganic chemistry, and materials science. The text also has utility for professionals working with industrial applications in which oxides are either prepared or must perform in aqueous environments. The volume is organized into five key sections. Part One features two introductory chapters, intended to introduce the mutual interests of engineers, geologists, and physical and chemical scientists in the field of inorganic chemistry, and provides the essential and fundamental principles that are critical to understanding most of the major reactions between water and oxides. Part Three deals with the synthesis of oxide materials in aqueous media. Part Four deals with oxide-water reactions and their environmental and technological impacts, and Part Five is devoted to other types of relevant reactions. The Aqueous Chemistry of Oxides is the first comprehensive summary of all of the critical aspects of chemical reactions between oxides and water in a single volume. As such, it ties together a wide range of existing books and literature into a central location that provides a key reference for understanding and accessing a broad range of more specialized topics. The book contains over 300 figures and tables.

The purpose of this book is to prepare these students to take a course in general chemistry confidently and enjoyably by giving them a thorough understanding of the most fundamental principles of chemistry: the atomic theory, periodicity, bonding and interparticle forces, chemical notation and nomenclature, chemical calculations, and the nature of chemical reactions in aqueous solutions. Arising no doubt from its pre-eminence as a natural liquid, water has always been considered by chemists as the original solvent in which very varied chemical reactions can take place, both for preparational and for analytical purposes. This explains the very long-standing interest shown in the study of aqueous solutions. In this context, it must be stressed that the theory of Arrhenius and Ostwald (1887-1894) on electrolytic dissociation, was originally devised solely for solutions in water and that the first concept of acidity resulting from this is linked to the use of this solvent. The more recent development of numerous physico-chemical measurement methods has made it possible an increase of knowledge in this area up to an extremely advanced degree of systematization. Thus today we have available both a very large amount of experimental data, together with very refined methods of deduction and of quantitative treatment of chemical reactions in solution which enable us to make the fullest use of this data. Nevertheless, it appears quite evident at present that there are numerous chemical processes which cannot take place in water, and that its use as a solvent imposes two introduction limitations. In order to overcome these limitations, it was natural that interest should be attracted to solvents other than water and that the new possibilities thus opened up should be explored. Most fields of science, applied science, engineering, and technology deal with solutions in water. This volume is a comprehensive treatment of the aqueous solution chemistry of all the elements. The information on each element is centered around an E-P diagram which is a novel aid to understanding. The contents are especially pertinent to agriculture, analytical chemistry, biochemistry, biology, biomedical science and engineering, chemical engineering, geochemistry, inorganic chemistry, environmental science and engineering, food science, materials science, mining engineering, metallurgy, nuclear science and engineering, nutrition, plant science, safety, and toxicology. An understanding of the complex nature of chemical reactions in aqueous solutions is the key to solving practical problems, and the complex nature of the field has far-reaching implications for the development of new and improved products and processes. This complex subject has been simplified by the authors with down-to-earth presentations of molecular theory. Using the potential distribution theorem (PDT) as the basis, the text provides a discussion of practical theories in conjunction with simulation results. The authors discuss the field in a concise and simple manner, illustrating the text with useful models of solution thermodynamics and numerous exercises. Modern quasi-chemical theories that permit statistical thermodynamic properties to be studied on the basis of electronic structure calculations are given extended development, as is the testing of these theoretical results with ab initio molecular dynamics simulations. The book is intended for students taking up research problems of molecular science in chemistry, chemical engineering, biochemistry, pharmaceutical chemistry, nanotechnology and biotechnology. The energy barriers for SN2 ligand exchange reactions between the chloride anion and para-substituted benzyl chlorides were investigated both in water solution and in the gas phase by using quantum chemical simulations at the DFT and Hartree-Fock levels. The question addressed was the effect of the solvent (water) and of the substituent on the barrier height. By not going to the lab. in order to experiment your reactions, you can decide whether the reaction is faster and productive in the gas phase or in aqueous solution. This book will give more insight about obtaining faster and productive reactions to all scientists, students, and workers on the related places. The Aqueous Chemistry of Oxides is a single-volume text that encapsulates all of the critical issues associated with how oxide materials interact with aqueous solutions. It serves as a central reference for academics working with oxides in the contexts of geology, various types of inorganic chemistry, and materials science. 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