

Environmental Chemistry

Microscale Laboratory Experiments

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 Springer

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Foreword

Environmental Chemistry: Fundamentals and Microscale

When I was about eight years old, the beautiful wetland home was destroyed and was replaced by a large office park. Upset I was, said to me, "If you care about something, you can make a difference." This event perhaps more than anything else caused me to become concerned about our environment, our world, through the power of chemistry. In addition to anything else, this is also the lesson of these excellent textbooks: Fundamentals and Microscale Experiments. It is the knowledge contained in these textbooks that allows all of us as scientists to understand environmental functions on a molecular level and how to identify problems and the environment that need to be addressed. But these textbooks also give us the fundamental basis for ensuring that those problems are solved. The Principles of Green Chemistry that emphasize avoiding hazardous chemistry.

For much of the history of the environmental movement, scientists have sought to identify and quantify environmental problems.

Preface

Modern science is not straightforward. Intricate relationships exist in the understanding of virtually every scientific issue and phenomenon. No single person could master a large portion of the knowledge that exists due to a lack of individual capacity, but rather to the explosion of knowledge.

Environmental Science—and more specifically, Environmental Chemistry—immersed in such a scenario. In this regard, a book written by several authors with different backgrounds and interests appeared to be an appropriate project to pursue. Undergraduate textbooks run the risk of lacking smoothness and coherence in their concepts. The present project involved many meetings and cross-checks, and it is why we perceive this finished task as valuable, and we hope that it provides a clear and fair treatment of the various subjects.

The book is written with sophomore or junior college students in mind (most students in their second or third year). However, issues are often presented in a way that even students—and even graduate students—can find subjects of interest. The book consists of a theoretical section (12 chapters) and a companion experimental section (24 experiments) in two separate volumes. A brief description now follows for each chapter and experiment appear in parentheses).

The beginning of the theoretical section comprises a general intro-

21, JI (from an experiment by Viktor Obendrauf); 22–24, CD. The various experiments are given in the book's website at www.springer.com suggested in the *additional related projects* section of each experiment.

The possibilities for accidents or personal injury while performing the experiments are minimal. However, owing to the incalculable number of variables involved with experiments in separate places with different materials and reagents, we cannot accept responsibility for unlikely events. In the same vein, we cannot accept responsibility for accidents while performing the *additional related projects* described above.

The books contain a total of 240 questions, problems, and exercises at the end of each chapter and in the text. They also contain more than 150 figures, 70 tables, and 13 appendices. About 50% of these references are related to educational environmental chemistry. *Additional related projects* are suggested in the experimental section of each chapter.

Further technical notes are in order:

- (a) Even though the IUPAC (International Union for Pure and Applied Chemistry) symbol e^- (for the electron) without its negative charge as superscript is recommended for didactic purposes since, in our experience, students are less likely to make errors in redox equations when they *actually* see the minus sign of the electron, we use e for simplicity.
- (b) Physical states are written here as subscripts just below the parentheses for aqueous species. A few years ago, such physical states started to be written as superscripts rather than subscripts; however, we use the traditional convention here. Following the usage set forth by perhaps the most referenced book in chemistry, *Chemistry* (Stumm and Morgan), we adhere in this text to the traditional convention. This is understood as such, even when they appear without the corresponding superscript. This undoubtedly improves the readability of a large number of reactions, especially in Chapter 4, where it would be cumbersome to write their physical states.
- (c) Some chapters and subjects lend themselves more naturally to worked examples (see the worked examples).
- (d) All the experiments refer to specific chapters from the theoretical background of the experiment's title.
- (e) Equations and figures in the worked examples are not numbered.

Preface

Mohan Singh in *Microscale Chemistry*. In addition, all the authors contributed to the chapters as well.

Work on the books greatly benefited from comments and suggestions from many colleagues. We thank the following: Universidad Nacional Autonoma de Mexico—Universidad Autonoma Metropolitana, Avila (Ecole Nationale Superiure de Chimie de Paris, France – Universidad Autonoma de Morelos, Mexico), Pedro F. Zarate-Del Valle (Universite Pierre et Marie Curie, Guadalajara, Mexico), Sergio Gomez-Salazar (Syracuse University, Mexico), Martin Adolfo Garcia-Sanchez (ITESO – Guadalajara), and the Iberoamericana) also helped reading some portions.

Andrea Silva-Beard gave the books the final administrative “push.” Noriega provided the magic touch to the use of language throughout in most of the manuscript. Aida Serrano, Patricia Hernandez-Espinoza, and Velasco revised some parts of the books. Juan Perez-Hernandez coordinated the authors together for meetings, and Elizabeth Garcia-Pintor tested the manuscript. Benavides, Adriana Canales-Goerne, Gabriela Castañeda-Delgado, and the team transformed many of our rough sketches into understandable figures. The idea first conceived by Carmen María Tort-Oviedo (Universidad Iberoamericana).

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end. Our environment is undoubtedly part of a greater, transcendent reality. We dedicate the present books *ad maiorem Dei gloriam*.

(Note: Names of the authors appear below followed by the institutions they represent by their present affiliations).

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