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FOREWORD

The Soil Science Society of America (SSSA) is dedicated to excellence in the acquisition of new knowledge, in the training of scientists, in the education of citizens, and in the applications of knowledge to challenges facing society. In addition, our scientific and professional society facilitates the teaching, research, and outreach programs that contribute to the long-term sustainability of food and fiber production systems and promote informed and wise stewardship of soil, water, and air resources. This mission is in no small part achieved through timely publication of books, monographs, journals, and other scholarship communicating current scientific knowledge in the diverse disciplines in soil science.

Chemical Processes in Soils represents a comprehensive and contemporary review of chemical behavior and reactions in soils. The authors have approached each topic with a focus on mineral solubility, surface exchange, and microbial processes influencing the availability and environmental fate of plant nutrients, heavy metals, and other elements. Several chapters are dedicated to the important role of soil organic matter, humic substances, and biogeochemical reactions in soils.

Understanding basic chemical and biological processes in soils is essential to sustaining agricultural productivity while protecting our vital natural resources. This thorough volume on soil chemical and biological processes will be a valuable asset to students, practitioners, educators, and researchers in soil, ecological, environmental, earth, and agricultural sciences.

JOHN HAVLIN
President
Soil Science Society of America

PREFACE

Chemical Processes in Soils provides an authoritative review of the principles governing some of the most important chemical reactions and behavior in soils. This volume is the result of serving on the editorial committee of the Soil Science Society of America Book Series 5, *Methods of Soil Analysis. Part 3. Chemical Methods*. In editing that book, we received several recommendations and proposals of book chapters to be included in the book on soil analysis. Many of those titles were not within the scope of a book on methods of analysis, but were in the area of soil chemistry. Some of those titles were selected to cover, in detail, the state of knowledge in the specific area of soil chemistry, with emphasis on the reactions, theories, and concepts involved. The authors were allowed considerable latitude in developing their chapters, resulting in both panoramic treatment of topics and detailed coverage of specific reactions.

This volume contains 15 chapters written by authorities in their fields. Soil organic matter is one the most complex and reactive fractions of soils. A major chapter on the chemistry of soil organic matter covers carbon in the environment, the genesis and fractionation of soil organic matter, isolation of humic substances, and considerations of their structural composition, soil saccharides, and soil peptides. The details of the reactions involved and the techniques and methods used are described. Other chapters explore in detail the chemistry of phosphorus, potassium, sulfur, and micronutrients in soils. Other important topics include the kinetics and mechanisms involved in biogeochemical processes, cation exchange reactions, soil acidity, chemistry of redox processes, equations and models describing adsorption processes, sorption and desorption rates for neutral organic compounds, metal complexation by soil humic substances, speciation of metals in soils, chemistry of speciation of trace elements in soil solution, and the chemistry of salt-affected soils. The literature accumulated in each of the topics is extensive, and exhaustive coverage of the literature was not always possible. Therefore, the editors and authors apologize for omission of any important work.

It is hoped that each chapter would serve as an independent source of information for scientists involved in teaching and research. References are listed at the end of each chapter that might help the reader in expanding the scope of interest.

We express our appreciation to the authors and the organization that they represent for cooperation and support. We acknowledge the assistance of the Headquarters staff, especially Lisa Al-Amoodi, for advice and assistance in editing and preparing the manuscripts for publication. We acknowledge Vasilios Petros (Bill) Evangelou and Ronald E. Phillips, co-authors of Chapter 7, whose deaths occurred while this book was in progress. The assistance of D. L. Sparks in proofreading and indexing Chapter 7 is gratefully acknowledged.

M. A. TABATABAI, co-editor
*Department of Agronomy
Crop, Soil, and Environmental Sciences
Iowa State University
Ames, Iowa, USA*

D. L. SPARKS, co-editor
*Dep. of Plant and Soil Sciences
University of Delaware
Newark, DE, USA*