

## BOOK REVIEWS

**Reactions and Movement of Organic Chemicals in Soils**, edited by B. L. Sawhney and K. Brown. SSSA Special Publication Number 22, Soil Science Society of America, Inc., Agronomy Society of America, Inc., Madison Wisconsin, 1989. 474 pages, softbound (ISBN 0-89118-788-X).

This book is a special publication of the Soil Science Society of America and is based on a symposium sponsored by that society and the American Society of Agronomy. It contains 18 chapters written by 38 contributors, some of whom are recognized leaders in their fields. The book covers a wide spectrum of topics related to the fate and movement of organic chemicals in soils and ground water. Current approaches to the study of the interactions of organic chemicals once they reach the soil environment are well covered in this volume. It is, thus, a must for people interested in the behavior of organic chemicals in soils and waters. A wealth of data, mechanistic hypotheses, and models are presented, but, as is common for such compendiums, the chapters differ in scope and quality.

Chapter 1, by C. T. Chiou, is an excellent review of the partition hypothesis of uptake of non-ionic organic compounds by soil organic matter. Inasmuch as this hypothesis is not universally accepted, the chapter would have benefited by a more balanced presentation of alternative approaches to this important topic. In Chapter 2, J. J. Hassett and W. L. Banwart discuss the sorption of nonpolar organics by soils and sediments. Although this concise review is very informative, the chapter could have been more detailed, considering the wealth of data available on the subject, and could have pointed out the limitations of the partition hypotheses presented in Chapter 1. Chapter 3, by J. J. Pignatello, on the dynamics of the sorption of organic chemicals is well written and comprehensive, combining a presentation of relevant experimental data with a balanced theoretical treatment and reviews the practical implications of sorption dynamics. A few gaps exist, however, in the description of some of the presented theories.

Of particular interest to the readers of this journal is Chapter 4 on the interactions of clay minerals with organic molecules. R. C. Zielke and coauthors present some interesting work on surface reactions catalyzed by clays, but the chapter is rather short and covers only a small portion of the work published in this field. The photochemistry of organic contaminants at soil surfaces is adequately covered in the short review (Chapter 5) by G. C. Miller and coauthors. The opaque nature of the soil medium limits, in many cases, the importance of photochemistry in soils, but this pathway may have an important role in the disappearance of some organic chemicals from soils.

E. P. Kuhn and J. M. Suflita comprehensively review in Chapter 6 the anaerobic microbial dehalogenation of the pesticides in soils and ground water, and provide detailed examples of the various microbially mediated reactions and tabulate transformation data for many compounds. In Chapter 7, D. E. Glotfelty and C. J. Schomburg present the basics of the vaporization of pesticides in soils, their phase distribution, and their transport processes in the vapor phase. The effects of tillage and management practices on volatilization and the experimental methods for measuring pesticide volatilization are also discussed.

A short review of the sorption, biodegradation, and bioremediation of chlorophenols in soils is given by S. A. Boyd

and coauthors in Chapter 8. Hydrolytic reactions, probably the most ubiquitous transformations organic chemicals undergo in the environment, are discussed by N. L. Wolfe and coauthors in Chapter 9. Considering the importance of this topic, this review is far too cursory. An excellent discussion of the kinetics of biodegradation of organic compounds in soils is presented by M. Alexander and K. M. Scow in Chapter 10. Both the qualitative and quantitative aspects of the subject are covered, but more experimental data could have been given in support of the models developed for the various kinetic patterns of biodegradation.

Another excellent contribution is that by W. A. Jury and M. Ghodrati in Chapter 11, dealing with transport modeling. The authors discuss the status of modeling organic chemical transport from the perspective of the model assumptions and their implications. Results of field trials pointing out the difficulties still remaining in formulating predictive models are presented. Chapter 12, by J. B. Weber and C. T. Miller, does not do justice to the subject matter implied by the chapter title, but they did compile an impressive amount of sorption data for organic chemicals and classified these chemicals according to the shape of their adsorption isotherms. A sketchy discussion on the behavior of aquatic herbicides in sediments is given in Chapter 13 by K. H. Reinert. This topic warrants a more extensive treatment than it received here.

D. C. Bouchard and coauthors (Chapter 14) present an interesting and well-written discussion of the effect of various colloidal, immiscible, and dissolved species on the transport of other species. Models describing the movement of volatile organic chemicals in soils are well presented by N. J. Hutzler and coauthors in Chapter 15. Experimental results that demonstrate the effect of various environmental conditions on the transport of volatile organic compounds are given. T. C. Harmon and coauthors present an outstanding treatment of the transport of organic compounds in groundwater under non-equilibrium conditions (Chapter 16). R. F. Carsel's contribution (Chapter 17) is meant to discuss hydrological processes that affect the movement of organic chemicals in soils. Although this chapter is very short, it manages to cover some topics that were more appropriately treated in other chapters, leaving some relevant topics, untreated.

The final chapter, by B. L. Sawhney, is a well-written contribution that brings to bear many of the principles discussed in previous chapters in a real-world situation, the pollution by organics originating from landfills and hazardous waste disposal sites. This subject is, however, important enough to have warranted more than just one chapter.

The book is generally well edited, although in the first printing several tables were misplaced or were missing. It provides an excellent overview of the varied topics relevant to the fate and transport of organic chemicals, and we strongly recommend this book to scientists concerned with soil and groundwater pollution by organic chemicals and to students interested in this field.

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**Lateritic Bauxites**, by Gy. Bardossy and G. J. J. Aleva, Elsevier, Amsterdam, 1990, 624 pp., US\$151.25, Dfl. 295.00.

*Lateritic Bauxites* is the companion text to *Karst Bauxites: Bauxite Deposits on Carbonate Rocks* by G. Bardossy and

also published by Elsevier in their *Developments in Economic Geology Series*. This volume, as the title states, is concerned with lateritic bauxites, which constitute well over 80% of the demonstrated developed economic bauxite resources and about 88% of the total world bauxite resources. These percentages will most likely increase in the future as new deposits are developed.

Both authors are eminently qualified and experienced in this subject, and it is this practical experience that they are sharing with us. The book combines both the scientific and the industrial approaches. The first six chapters are largely concerned with the scientific, the following two mainly with the practical. The last chapter is a distillation of the authors' conclusions on the subject. Chapters 1 and 2 are brief and introductory. Chapter 3 reviews the historical developments of ideas on laterites, including lateritic weathering of which lateritic bauxites are a part. Chapter 4 reviews the world distributions and classifications of bauxite resources and briefly indicates attempts at their relative valuation. Chapter 5 is concerned with the main characteristics of lateritic bauxites including mineralogy. Bauxitization processes are discussed in Chapter 6. Chapter 7, by far the longest, is an objective and standardized description of lateritic bauxites districts. It

includes information on their geographic locations, size, profile, maps, lithological sections, vertical chemical and mineralogical compositions, resources, ownership, etc. Chapter 8 reviews bauxite process technologies, their relationship to composition and physical properties of bauxites, and total world bauxite resources mining in order of countries and continents. As indicated above, Chapter 9 summarizes the authors' conclusions on both the scientific and applied aspects of the subject.

The text is well written and contains abundant tables and illustrations, maps, diagrams, graphs, and photographs. These are particularly important in the description of the individual bauxite deposits, which are grouped into bauxite provinces, sub-provinces, and regions. These groupings highlight the relationships between the individual deposits, including the effects of lithology, geology, and geochemistry.

Altogether, *Lateritic Bauxites* is an excellent reference text for both the specialist in bauxite resources and others who may simply have a general interest in bauxite resources. It is also a useful addition to the bookshelves of geologists.

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