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Environ. Chem. **2013**, *10*, 437
http://dx.doi.org/10.1071/ENv10n5_BR

Book review

The Atmospheric Chemist's Companion: Numerical Data for Use in the Atmospheric Sciences

By Peter Warneck and Jonathan Williams
Springer, 2012, 436 pp.
ISBN 978-94-007-2274-3, e-ISBN 978-94-007-2275-0

The book is, as the authors put it, a comprehensive reference book of atmospheric chemistry and physics for the atmospheric community. It is de facto an encyclopedia of numerical values used in atmospheric chemistry. There are ten chapters. The book starts with a brief introductory chapter on fundamental quantities and units in the context of atmospheric chemistry. Two chapters (Chapters 2 and 3) are on the fundamental data of the Earth and the atmosphere; two chapters (Chapters 4 and 5) are on abundance, emission and other data on chemical species in the gas-phase and aerosol phase respectively; three chapters (Chapters 6, 7 and 8) are on data for three major categories of atmospheric reactions in the atmosphere (i.e. photolysis reactions, gas-phase reactions and aqueous-phase reactions); Chapter 9 is on data pertinent to the upper atmosphere. The ending chapter is a concise summary of measurement techniques for atmospheric trace gases and aerosols.

Two internationally known researchers in atmospheric chemistry, the authors know what both modellers and experimentalists alike need when it comes to numerical data for interpreting and understanding their study systems in the atmosphere or for occasions of communicating atmospheric chemistry to the public. As an example, I was to give a 10-min mini-lecture to a group of prospective students and their parents on the open house day of our university. I have decided on my topic, 'Where does $PM_{2.5}$ come from?' This book provides handy authoritative reference data for me to quickly draw figures from. Although I have local data from my own research, the data provided in the book on rural and continental locations (Table 5.2) serve as a good reference point to illustrate the degree of pollution.

The authors did an excellent job in achieving their aim of assembling, in one handy volume, frequently needed fundamental data and observational data on the structure and the chemical composition of Earth's atmosphere. It is befitting that the book was named the ASLI (the Atmospheric Science Librarians International) Choice Award winner for 2012 in the reference category for '…its well-organized assembly of frequently needed numerical data and measurement techniques' (http://www.aslionline.org/wp/2012-asli-choice-awards-winners/).

This book is unique among the many books available on the topic of atmospheric chemistry, which are either textbooks or monographs. The uniqueness is in several aspects. It is most comprehensive in collection of data, ranging from fundamental physical numbers for the Earth to molecule-level data such as rates and thermodynamic equilibriums for atmospheric reactions and concentrations of trace gases and minute aerosol constituents. Data tables are accompanied, where necessary, with comments that provide a brief description of data context such as associated processes or measurement techniques. The comments enrich information content of the data and help readers choose appropriate numbers in case of multiple measurements available. The book provides unprecedentedly detailed chemical compositions of both the gas-phase and aerosol-phase matter existing in various atmospheric environments, in particular, organic components of the tropospheric aerosol. As a researcher with a special interest in organic aerosol chemistry, I am delightedly surprised to see for the first time that the quantitative data of gas–particle distribution are tabulated in a book for certain better-studied semi-volatile organic compounds (i.e. *n*-alkanes and polycyclic aromatic hydrocarbons). This is just one example of the level of fine details the authors have attended to.

The data are mostly arranged in the form of annotated tables, with explanatory text kept to a minimum. The authors have intentionally left out figures, with only four figures in the entire book. This could deter beginners from using this book and occasional readers from fully utilising the wealth of information contained therein. A figure is worth a thousand words – they can reveal insights into processes or spatial relationships behind complex data sets. With the many data tables contained in the main part of the book, the absence of a list of tables is an inconvenience. A future edition might consider including a list of tables that would greatly facilitate readers in locating data they are looking for. The E-book version could even include a list of tables with interactive links and a site map for easier searching.

Warneck and Williams have compiled a comprehensive reference book for both experienced researchers and beginning graduate students in atmospheric science. This book is a welcome addition to atmospheric scientists' bookshelves.

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