Effective Groundwater Model Calibration: With Analysis of Data, Sensitivities, Predictions, and Uncertainty, C. Mary, Hill, R. Claire, Tiedeman. John Wiley & Sons Inc., Hoboken, NJ (2007). 471 pp., Price: US$ 89.95, ISBN: 0-471-77636-X

In this book, the authors present "...a set of methods and guidelines that can help produce more accurate transparent mathematical models. The models can represent groundwater flow and transport and other natural engineered systems." This book, the authors hope, will improve how data and models are used.

The authors note "Despite its apparent utility, in many fields, such as groundwater hydrology, the methods described in this book are not routinely used, and calibration using only trial-and-error methods is more common." The authors "...hope this text will encourage modelers to use, and resource managers to demand, the more transparent and defensible models that result from using the types of methods and ideas described in this book."

The authors state that "This book is intended for use in undergraduate and graduate classes, and is also appropriate for use as a reference book and for self-study. Minimal expertise in statistics and mathematics is required for all except a few advanced, optional topics. Knowledge of groundwater principles is needed to understand some parts of the exercises and some of the examples..."

"The primary topics of this book are (1) methods for sensitivity analysis, data assessment, model calibration, and uncertainty analysis developed on the basis of inverse modeling theory; and (2) guidelines for the effective application of these methods."

"Chapter 2 presents an overview of (1) three computer codes for inverse modeling that are used throughout the book, (2) a hypothetical groundwater management problem to which the methods are applied, and (3) exercises that use this groundwater management problem to clearly demonstrate the methods. Chapters 3–5 present methods for measuring model fit, initial model sensitivity analysis, and parameter estimation." "Chapters 6–8 present methods for evaluating model fit, parameter estimates, data needs, and prediction sensitivity and uncertainty." "Chapter 9 presents methods for calibrating transient and transport models, and for recalibrating and reevaluating existing models when new data become available." Exercises are given at the end of Chapters 3–9 to demonstrate the methods discussed in those chapters.

"Chapters 10–14 present 14 guidelines that address using the methods presented in Chapters 3–9 to analyze, simulate, calibrate, and evaluate models of complex systems." "Chapter 15 addresses the use and testing of models and guidelines."

"Most of the methods presented and referred to in the guidelines are based on linear or nonlinear regression theory." "Besides the methods and guidelines, this book emphasizes the importance of how results are presented."

"Four additional aspects of the book are the exercises, answers, software, and PowerPoint files available for teaching." A web site address is given; it includes instructions for doing the exercises and using the files directly and/or using public-domain interface and visualization capabilities. PowerPoint files designed for teaching material in the book are provided on the above-mentioned web site.

The book ends with the following four appendices: (A) objective function issues; (B) calculation details of the modified Gauss–Newton method; (C) two important properties of linear regression and the effects of nonlinearity; (D) selected statistical tables.

Gary F. Bennett *
*The University of Toledo,
Department of Chemical and Environmental Engineering,
Mail Stop 305, Toledo, OH 43606-3390, United States*

* Tel.: +1 419 531 1322; fax: +1 419 530 8086.
E-mail address: gbennett@eng.utoledo.edu

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HPLC: A Practical User's Guide, M.A. McMaster. , 2nd ed., Wiley–Interscience/John Wiley & Sons Inc., Hoboken, NJ (2007). 261 pp., US$ 74.95, ISBN: 0-471-75401-3

High-pressure liquid–solid chromatography (HPLC) is rapidly becoming the method of choice for separation and analysis in many fields, since anything that can be dissolved can be separated on some type of HPLC column.

The author's goal in writing this book was to fill a need for analysts both beginning and experienced who use or wish to use HPLC. In this book, McMaster shares his practical knowledge gained through his own work.

He has divided this book into three parts. Part 1, entitled "HPLC Primer," has the following three chapters that the author feels should allow the analyst to get his/her system operating. The three chapters in this chapter are as follows:

(1) Advantages and disadvantages of HPLC.
(2) Selecting an HPLC system.
(3) Running your chromatograph.
   Part 2 shows the analyst how to make the best use of common columns and how to keep them running. This section, entitled "HPLC Optimization," has the following chapters:
(4) Separation models.
(5) Column preparation.
(6) Column aging, diagnosis, and healing.
(7) Partition chromatography modification.
(8) "Nonpartition" chromatography.
(9) Hardware specifics.
(10) Troubleshooting and optimization.
   The last major section discusses HPLC utilization and real-world applications. McMaster discusses systematic methods development, both manual and automated, and

the logic behind many of the separations that others have made. Also reviewed are the interfaces of HPLC systems to computers and robotic work stations. This section, entitled "HPLC Utilization," has six chapters titled as follows:

(11) Preparative chromatography.
(12) Sample preparation and methods development.
(13) Application logics: separations overview.
(14) Automation.
(15) Recent advances in LC/MS separations.
(16) New directions in HPLC.

The book ends with seven appendices titled as follows:

(A) Personal separations guide.
(B) FAQs for HPLC systems and columns.
(C) Tables of solvents and volatile buffers.
(D) Glossary of HPLC terms.
(E) HPLC troubleshooting quick reference.
(F) HPLC laboratory experiments.
(G) Selected reference list.

A CD-ROM with the author's PowerPoint presentation entitled "A Practical Course in HPLC" is included with the book.

Gary F. Bennett *
The University of Toledo,
Department of Chemical and Environmental Engineering,
Mail Stop 305, Toledo, OH 43606-3390, United States

* Tel.: +1 419 531 1322; fax: +1 419 530 8086.
E-mail address: gbennett@eng.utoledo.edu

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Applied Thin-Layer Chromatography: Best Practice and Avoidance of Mistakes, 2nd ed., H.-D. Elke. Wiley-VCH, Verlag GmbH & Co., KgaA, Weinheim, Germany (2007). 330 pp., US$ 165.00, ISBN: 978-3-527-31553-6

Thin-layer chromatography is a powerful, fast and inexpensive analytical method for the analysis of pharmaceuticals, food and environmental samples. Developed more than 30 years ago, it has proven its utility in laboratory analysis.

This book, which has been translated from German, appears to be an excellent practical guide to the utilization of this useful analytical procedure. The author notes that she has paid special attention to possible sources of error. Theoretical aspects are not emphasized in order to focus on the current state of technology and the scope of modern TLC. The author also notes that TLC is used if:

- the substances are nonvolatile or of low volatility,
- the substances are strongly polar, of medium polarity, nonpolar or ionic,
- a large number of samples must be analyzed simultaneously, cost-effectively, and within a limited period of time,
- the samples to be analyzed would damage or destroy the columns of LC (liquid chromatography) or GC (gas chromatography),
- the solvents used would attack the sorbents in LC column packings,
- the substances in the material being analyzed cannot be detected by the methods of LC or GC or only with great difficulty,
- after the chromatography, all the components of the sample have to be detectable (remain at the start or migrate with the front),
- the components of a mixture of substances after separation have to be detected individually or have to be subjected to various detections methods one after the other (e.g. in drug screening), and
- no source of electricity is available.

Hahn–Deinstrop notes that TLC is used for analysis of: pharmaceuticals and drugs; clinical chemistry, forensic chemistry and biochemistry; cosmetology; food analysis; environmental analysis; and analysis of inorganic substances and electrolytic technology.

The book is divided into the following chapters:

1. Introduction
2. Precoated layers
3. Before the TLC development process
4. Solvent systems, developing chambers and development
5. Evaluation without derivatization
6. Derivatization
7. Evaluation after derivatization
8. Documentation
9. GMP/GLP-conforming operations in TLC
10. Effects of stress
11. Special methods in TLC
12. Appendix

Never having used this technique myself, I am not able to write a comprehensive analysis of the text's material. However, as an editor, I was impressed by the author's techniques used to convey information:

- Inclusion in Chapter 1 of a comprehensive literature review, listing books in German, in English and in Chinese. In addition to books, the author also has compiled a list of relevant journals both in English and in German.
- Clearly identified practical tips.
- Use of cartoon characterizations to make her point.
- Photographs and sketches of equipment.
- 102 color photographs of results of TLC analysis.