Lubricant Base Oil and Wax Processing

Avilino Sequeira, Jr.
Marcel Dekker, Inc., New York, 304 pp., $115

Much of what is known about lubricant base stock and wax processing, a critical area in petroleum refining, is proprietary and closely guarded. The last major works covering lubricant refining processes in detail are by Vladimir Kalichevsky from "Modern Methods of Refining Lubricating Oils" (Reinhold Publishing Co., 1938) and "Petroleum Refining with Chemicals" (Elsevier Publishing Co., 1956). I have never been able to find a copy of either of these books for sale and was long ago reduced to spending an afternoon by a photocopier with both books in hand to get the information I wanted. The publication of "Lubricant Base Oil and Wax Processing" helps fill a long-standing need.

The natural audience of the book includes technical and management personnel involved with operation, design, troubleshooting, and investment evaluation of lubricant base stock production processes. The book should be considered as specialist reading for those with a particular interest in this subject. A moderate level of expertise and understanding of the importance of different lubricant properties is assumed in the discussion of product qualities.

The bulk of the material presented is a review of the major process flows and operating variables of production processes along with their economics. Brief descriptions on wax base stock and re-refining processes for spent lubricants recovery are also included.

Due to the secrecy involved with details of lubricants manufacture, the bulk of material is qualitative rather than quantitative. Within that restriction, the author has taken pains to explain the major variables, effects, and objectives of each option for the different stage in lubricant base oil production. Of special value is the list of references and readings identified for each major subject. These alone merit the full price of the book. If you are involved with lubricant base oil processing, this book is a must.

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Internet and the Law: Legal Fundamentals for the Internet User

Raymond A. Kurz
Government Institutes, 4 Research Place, Rockville, MD, 264 pp., $75, indexed

The Internet's explosive growth in the past few years has left many people with questions about legal issues regarding intellectual property rights. Until this book appeared, I didn't know of any comprehensive source of information to help cyberspace surfers avoid hassles and, possibly, legal expenses.

"Internet and the Law," targeted to on-line novices, provides an in-depth discussion of the basic principles pertaining to laws of copyright, trademarks, trade secrets, patents, and licensing. In addition, it outlines a variety of scenarios average users might encounter on their journey along the information superhighway, and covers the legal implications of publishing on the web. Also discussed are steps one can take to avoid inadvertent infringement of copyrights and trademarks.

Although "Internet and the Law" contains a subject index, it lacks a list of additional sources of information, which could have been quite useful. Overall, however, Mr. Kurz has done an excellent job of gathering information and presenting it clearly. For anyone currently involved in or considering producing content for the Internet, this book should remain a ready reference for some time to come.

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Batch Distillation: Simulation, Optimal Design and Control

Urmila M. Diwekar
Taylor & Francis, Washington, DC, 211 pp., $62.95, indexed

The recent increase in the production of high value-added, low-volume specialty chemicals and biochemicals has generated renewed interest in batch processing technologies, particularly batch distillation. Because most chemical engineering texts on distillation or mass transfer spend little time on batch distillation, this small, but thorough, text fills a void. This book and its companion software, MultiBatchDS, are professional necessities for chemical engineers involved in the design or operation of specialty chemical processes.

"Batch Distillation" covers basic modes of operation, numerical solution of column dynamics, simplified models for feasible regions of operation, optimization techniques, optimal control problems, and complex systems such as azeotropes and complex columns.

Each chapter derives the equations necessary to describe the model under discussion and then provides one or more complete numerical examples. The bonus in this book is that most chapters contain a table that breaks down the model(s) into: assumptions (thank you, Dr. Diwekar), composition calculation equations, flow rate equations, heat

duty calculations, and thermodynamic models.

This tabular format is extremely useful when trying to compare different models to decide which one is appropriate or when trying to decide if a necessary assumption is compatible with a chosen model. The table reduces mathematically elaborate descriptions to easily digestible pieces that can be reviewed in the body of the chapter, where the discussions are clear and concise.

The text discusses the errors and perils associated with numerical models solved by computers, but does not belabor the problems to the point of boredom. In cases where the subject matter can require volumes to discuss in depth, e.g., solution of stiff equations, Dr. Diwekar wisely considers those aspects most relevant to distillation problems and then lists references for further reading. This helps keep the reader focused on distillation as opposed to numerical analysis.

One of the few failings of "Batch Distillation" is the chapter on optimal control problems, which doesn't provide enough information. Some theory is presented, but complete numerical examples are lacking. This is offset by MultiBatchDS, which enables one to quickly set up an optimization problem and explore the effects of changing process requirements.

The educational version of MultiBatchDS is available through CACHE Corp. for $90 for the first year and $50 per year thereafter. (http://www.che.utexas.edu/cache/) A commercial version is available from BPRC (http://www.bprc@bprc.com/). The User Manual is a well written and light on theory.

Most of the difference between the educational and commercial versions lies in the complexity of problems that can be modeled. The educational version is meant to teach the principles of batch distillation and provide an understanding of various numerical solution algorithms.

It avoids thermodynamic complexity by limiting vapors to ideal fluids and liquids to UNIFAC models with no enthalpy equations. This is a reasonable compromise for educational purposes. The educational version is also limited to 103 common chemicals. Still, it is very useful for comparing speed and accuracy of different solution techniques. The user gets a real feel for what is being stated in the text about numerical methods.

The software is a true Windows 95/ Windows NT program and runs best on Pentium machines but will function on a 486 box. It relies on Windows 95 style menu selections and dialog boxes to specify the column components and operating conditions. It has some intelligence built in so users can't specify incompatible options. Inappropriate selections are dimmed in the various menus and windows. For keyword aficionados, a text input file can be created and run to bypass the menu inputs. Answers are the same either way.

The commercial version of the program allows thermodynamic complexity by providing a choice of seven equations-of-state for the vapor phase and 11 choices for modeling the liquid phase, including equations-of-state and fugacity coefficient models. Little is said about the models so users will have to decide based on their experience/knowledge which is appropriate for their systems. Users can also input their own thermodynamic data for compounds not found in the database. An extra-cost add-on package, MultiBatchDS/Datalink, connects a user to commercially available or in-house thermodynamic data.

In a program that borders on elegant, it was disappointing to see that chemical compounds had to be selected by number (from a hard copy) instead of by name or formula. Perhaps the next upgrade will remedy this. Another minor disappointment was the plots that are rendered. The user can choose X- and Y-axes

from several options, but font sizes, colors, etc. are fixed by the software and can't be altered. Also, the title is fixed based on the modeling procedure and seemed rather imposing to this reviewer. Finally, the curves are identified by component number instead of name. All of these shortcomings can, however, be remedied by copying and pasting the tabular output data into Excel or other graphing package and creating custom plots.

Both the book and the software are excellent products, but to get the maximum value from them they should be used in combination with one another. As educational tools, they may be too daunting for undergraduates, but they could fit well into graduate courses on applied mathematics or distillation. If I were a manager in a specialty chemical company, this package would be *de rigueur* for all chemical process engineers working for me.

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Boiler Operations Questions and Answers

P. Chattopadhyay
McGraw Hill, New York, 627 pp.,
$65 indexed

More than 3,000 questions are posed and answered in a Q&A format in this volume, which also contains 140 solved numerical problems, case studies about problems involving water treatment and combustion, and a list of books and periodicals for further reading. Its 35 chapters deal with subjects such as corrosion of waterside heating surfaces; scaling of the fireside of heating surfaces; carryover, scale, and sludge; dearation and deoxygenation; steam contamination and its control; preventing deposit formation in boilers; water treatment and dimineralization; hydrodynamics of closed hydraulic systems; and the characteristics of steam-water flow.