Fluid Flow for the Practicing Chemical Engineer

James P. Abulencia and Louis Theodore, John Wiley & Sons, Hoboken, NJ, 600 pages, $110, July 2009, ISBN: 978-0-470-31763-1

Fluid flow and fluid mechanics have been covered in many books, but only a handful deal specifically with fluid flow in chemical engineering operations. This book is one of those.

The book's first section estab-

identifying the chemical being researched.

A bigger drawback of this book is its title. "Chemical Incompatibilities" hints that the book contains information about hazardous chemical interactions, but it may also suggest that it addresses other types of incompatibilities — such as those that might arise in chemical formulations, two-phase mixtures, and so on. To demonstrate the potential confusion, a Google search on "reactive chemicals" does not identify this book.

An excellent companion to "The Wiley Guide to Chemical Incompatibilities" is the NOAA Chemical Reactivity Worksheet, available as a free download at http://response.restoration.noaa.gov/chemaids/react.html. Although not as comprehensive as the Wiley book, the Worksheet provides data on hazardous chemical interactions of individual chemicals and pairs of chemicals, while assisting the user in preparing a chemical interaction matrix in support of process design and hazard analysis.

Another useful resource is the AIChE/CCPS book "Essential Practices for Managing Chemical Reactivity Hazards" (www.aiche.org/Publications/).

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Precision Crystallization: Theory and Practice of Controlling Crystal Size

Ingo H. Leubner, CRC Press, Boca Raton, FL, 216 pages, $200, Sept. 2009, ISBN: 978-1-439-80674-6

Crystalline materials make up an estimated 80% of chemical and pharmaceutical products. Yet few resources have been available to offer chemists and product engineers practical guidance on achieving precision control of crystal size and size distribution — an important factor in product applications.

This volume presents the tools to control crystal nucleation — the key to controlling crystal size and size distribution for batch and continuous crystallizations.

Based on the author's balanced nucleation and growth (BNG) model, the book demonstrates how the results of the nucleation process are quantitatively related to practical experimental control values — such as reactant addition rate, crystal solubility, temperature, residence time, and the effect of ripening agents (crystal supersizing) and crystal growth restrainers (crystal nanosizing) during nucleation.

The author shows how the BNG theory predicts previously unknown phenomena, and how it corrects erroneous perceptions of the importance of reaction volume on the outcome of crystal nucleation. Going beyond classical nucleation theories (which often rely on guesswork), the BNG model gives precise guidance to chemical engineers, chemists and other scientists working in research, quality control, product development, production processes, pilot plant operations, and manufacturing.

The concepts in the book have been applied to the precipitation of inorganic materials such as silver halides in the photographic industry, and to organic systems such as latexes, dyes, and pigments. Other applications are for crystalline materials used as pharmaceuticals, catalysts, and imaging systems for separations and surface modifications.

The book contains information that has not been previously available, and offers a unique opportunity for the reader to learn up-to-date principles for precision controlled precipitation.

Chemorheology of Polymers: From Fundamental Principles to Reactive Processing

Peter J. Halley and Graeme A. George, Cambridge University Press, New York, NY, 454 pages, $150, June 2009, ISBN: 978-0-521-80719-7

Plastics are the most diverse materials in use today, and the increasing reliance on high-performance plastics demands new ways of manufacturing polymers. One way of doing this is through reactive processing, the dynamics of which place new demands on characterization, systems monitoring, and control of the complete manufacturing process.

The volume is a comprehensive resource for researchers and practitioners working in reactive polymers and processing. The book's extended introduction is devoted to the chemistry and physics of thermoplastics, thermosets and reactive polymers. Polymer characterization tools related to reactive polymer systems are then discussed in detail, with emphasis on techniques that can be adapted to real-time process monitoring.

The core of the book focuses on the understanding and modeling of the flow behavior of reactive polymers (chemorheology) — a complex subject, as it involves the changing chemistry, rheology and physical properties of reactive polymers and the interplay among these properties.

This book differs from many other texts on reactive polymers due to its breadth of coverage. It offers a complete review of the practical industrial processes used for polymers, and provides insight into current chemorheological models and tools used to describe and control each process.

The book should be useful to advanced students and researchers, as well as industrial practitioners wishing to move into the field of reactive polymer systems.