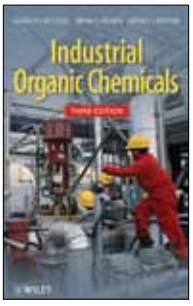
Books

Industrial Organic Chemicals, 3rd Edition



Harold A. Witcoff, Bryan G. Reuben, and Jeffrey S. Plotkin, John Wiley & Sons, Hoboken, NJ, $150, 848 pages, Nov. 2012, ISBN: 978-0-470537-43-5

The petroleum and natural gas industries provide 95% of the 500 billion lb of organic chemicals produced in the world each year. Products as diverse as gasoline, plastics, detergents, fibers, pesticides, tires, shampoo, and sunscreens are based on seven raw materials derived from petroleum and natural gas.

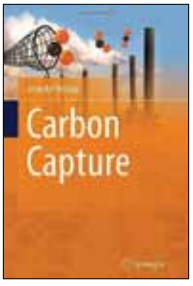
This expanded third edition examines why each of these chemical building blocks — ethylene, propylene, C_4 olefins (butenes and butadiene), benzene, toluene, the xylenes, and methane — is preferred over another in various manufacturing or environmental contexts, and delves into their individual chemistry, derivatives, method of manufacture, uses, and economic significance.

The new edition was prompted in part by the shifts in the world's chemistry industry away from the U.S., Western Europe, and Japan, and the emergence of the Middle East and Asia-Pacific regions as major players. The book details the impact of globalization on the worldwide transportation of chemicals, the technological advances in polymerization and catalysis, chemicals for electronics, and the implications of the recent boom in shale gas and shale oil — which has altered long-term predictions of resource depletion in the U.S. and other countries. The book also covers recent commercial and market factors that have affected the chemicals industry.

The book presents its information with concepts of sustainability and climate change in mind, covering green chemistry and renewables, including research into processes (such as electricity generation) that produce less or no carbon dioxide.

The authors also offer perspective on how the industry has evolved, along with the technological, societal, and economic changes that have brought it to its present position.

Carbon Capture



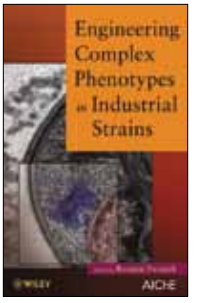
Jennifer Wilcox, Springer, New York, NY, $80, 335 pages, Mar. 2012, ISBN: 978-1-461422-15-0

The burning of fossil fuels meets more than 85% of the world's energy needs, but brings with it the associated problem of CO_2 emissions. The scientific community agrees that the solution for mitigating CO_2 emissions lies in a portfolio of strategies, including carbon capture and storage (CCS).

This book provides the skillset necessary to meet the challenges involved in reducing CO_2 emissions. The discussion incorporates concepts of thermodynamics, combustion, kinetics, mass transfer, material properties, and the relationship between the chemistry and process of carbon capture technologies. The book's core chapters address absorption, adsorption, and membrane separation processes for CO_2 capture; the chemical physics associated with a particular material that binds CO_2, and the unit operations of the corresponding process, are also detailed. Readers will learn about the limitations of traditional gas separation technologies for CO_2 capture, and how these processes may be scaled up.

The book will benefit industrial personnel working with carbon capture technologies and gas separation processes, as well as engineers involved in carbon capture and students examining separation processes for carbon capture.

Engineering Complex Phenotypes in Industrial Strains



Ranjan Patniak, Ed., John Wiley & Sons, Hoboken, NJ, $100, 288 pages, Nov. 2012, ISBN: 978-0-470610-75-6

Complex phenotypes are traits in a microbe that require multiple genetic changes in the organism's DNA to be modulated simultaneously in order to achieve full expression of the traits. This book presents methods for engineering such complex traits in industrial microbial strains.

Setting forth strategies for engineering biocatalysts ranging from *E. coli* and *Streptomyces* to yeast and microalgae, this book explains the latest developments in engineering industrial microbes for the production of bulk chemicals and biofuels from renewable biomass, while incorporating green technologies. The authors — pioneers and international experts in the field — first guide readers through the tools and technologies available for engineering and characterizing a complex pheonotype in an industrial strain. The book then applies these techniques in case studies that show readers how to engineer the complex traits and phenotypes needed for several biocatalysts and bioprocesses. Examples include a clavulanic acid strain improvement program; metabolic engineering of recombinant *E. coli* for the production of 3-hydroxypropionate; complex systems engineering for an unsequenced microalga; and meiotic recombination-based genome shuffling of *Saccharomyces cerevisiae* and *Scheffersomyces stipitis* for increased inhibitor tolerance to lignocellulosic substrate toxicity. These case studies emphasize the many disciplines (metabolic engineering, screening, fermentation, etc.) that underlie the engineering of biocatalysts.

This book should be valuable to engineers, biochemists, and students who seek to understand the science and practice of engineering biocatalysts for industrial applications.