

**Organic Chemistry Principles and Industrial Practice**; edited by M. M. Green, H. A. Wittcoff; Wiley-VCH: Weinheim, 2003; 321 pp, softback, ISBN 3-527-30289-1

For many scholars of chemistry, the often-overwhelming yet necessary attention to the details of theory distances the subject from any industrial utility. This book addresses this fact by identifying chemical processes of key industrial importance and then in a retrogressive manner, applying principles of organic chemistry to describe the process. From the very start the authors highlight their intention not to provide a comprehensive view of the chemical industry. Instead, they emphasise selected principles of organic chemistry that relate to interesting aspects of the chemical industry. Polymer chemistry forms a significant part of this book. This is not surprising, as polymers constitute more than 50% of the output of the chemical industry.

First impressions are positive. The extensive commentary is complemented by the sparing use of simple yet effective diagrams. Each chapter contains a succinct summary and a number of 'study guide problems'. The authors have an interesting writing style. Paragraphs are often written as 'tales or stories of discovery' and section headings are often presented as questions, which give the book a distinctly interactive feeling. A recurring theme throughout the book is how a substantial portion of the important developments in organic chemistry are driven by commercial needs.

The book is divided into 10 chapters. Chapter 1 describes how petroleum is converted into industrially useful materials. The discussion is well structured, describing what constitutes 'petroleum', the refining techniques of steam and catalytic cracking and the production of the first petrochemical, isopropanol for use in the preparation of Chordite. The second chapter deals with the production of polyethylene and polypropylene. Basic thermodynamic principles of polymerisations are discussed with an interesting dialogue on the antagonistic effects of enthalpy and entropy. Expectedly, there is some considerable discussion on Ziegler-Natta catalysis. A considerable portion of chapter 3 is reserved for the industrial

synthesis of isopropyl benzene, a precursor used in both polycarbonate and epoxy resins. Chapter 4 focuses on the various routes to epichlorohydrin. Chapters 5, 6 and 7 are concerned with Nylon, Methyl Methacrylate and natural rubbers, respectively, while chapter 8 discusses the industrial chemistry of ethylene, propylene and acrylonitrile. The penultimate chapter offers an insight into the evolution of the industry. Acetaldehyde was chosen as an excellent victim of 'shutdown economics' whereby two of its down stream products, acetic acid and *n*-butanol, were synthesised via more economical routes. Chapter 10 is titled '*Doing Well by Doing Good*' and describes how an industry-wide drive to remove acetylene, phosgene and chlorine has led to safety, environmental and economic benefits.

Overall, I feel that this book works quite well. A wealth of organic chemistry is described from carefully selected industrial processes. Important reactions such as the aldol condensation, Beckmann rearrangement, Friedel-Crafts, and Cannizzaro reactions are discussed. A broad range of chemical principles is broached including tautomerism, elimination reactions, transition metal catalysis, resonance stabilisation, zeolytic chemistry and protecting group chemistry. I was quite impressed at the thoughtful selection of industrial processes that astutely and effectively exemplify key organic principles. For example, the nature of reactivity is highlighted during the synthesis of polycarbonates whereby bisphenol A successfully reacts with phosgene under aqueous conditions.

I have a few criticisms of the book. It is somewhat disappointing that the authors have focused almost solely on polymers. The content would have been more balanced if some examples from the pharmaceutical industry were included. Despite this, I recommend the book to any undergraduate interested in both pure and industrial chemistry. I also strongly recommend this book to tutors and lecturers who will find a plethora of excellent examples that may help to augment lecture series.

**Daire Osborne**, Merck Sharp & Dohme (Ireland) Ltd.