
BOOK REVIEW



Martin Bajus

Hydrocarbon Technology - Chemical Processes in Organic Technology and Petrochemistry

Issued by Slovak University of Technology Bratislava,
in SPEKTRUM-STU, 2019, 1. Edition, 608 pages
e-textbook, price 6 EUR
85-205-2019
ISBN 978-80-227-4897-1

At the beginning of 2019 a new e-textbook on Chemical Processes in Organic Technology and Petrochemistry in the series „Hydrocarbon Technology“, published by the Spektrum – STU at Slovak University of Technology, Faculty of Chemical and Food Technology in Bratislava appeared on the book market. The author of the e-text book is Professor Martin Bajus, a Slovak leading expert in refinery, petrochemical, energy, and recycling technologies. You can get the e-book from bookseller Malé Centrum.

The series „Hydrocarbon technology“ includes four volumes covering following aspects of the technology involved in the oil refinery, petrochemical industry and organic technology:

- Organic technology and petrochemistry; also on CD support (2002),
- Petrochemistry (2017),
- Chemical processes in organic technology and petrochemistry (2019),
- Energetic materials and technologies.

The series is designed for the students and teaching staff at Slovak University of technology, in the Faculty Chemical and Food Technology. The text is the basis for some courses for other it is only supplementary. In all chapters the processes are represented by simplified flow schemes. For clarity these generally do not include process control systems, and valves and pumps are omitted in most cases. It is expected that students after having read the e-textbook, will be able think in “conceptual process design”. The series is designed for the engineers and technicians who will be operating the refineries at the beginning of the 21st century. By the time, solution will necessarily have been found for a member of problems increasingly severe product specifications and, more especially, environmental protection.

The development of the field of hydrocarbon technology has proceeded through a set of remarkable technological advances over nearly two decades. While one of the Twelve Principles of Green Chemistry is devoted to ensuring that all feedstocks for both materials and energy are renewable rather than depleting, it is actually the case that the pursuit of the bio-based energy and material economy will rely on all of the principles of Green Chemistry and Green Engineering. Through the adoption of these design frameworks as a holistic rather system rather than individual criteria, biofuels and biomaterials will be sustainable both for planet as well as for profits.

This e-textbook provides an important review of main processes and technologies that are essential to the future success of clean fuels, biofuels, eco-friendly petrochemicals, elimination of CO₂, reducing methane emissions and using of nanomaterials and the editor and author are to be commended for constructing this high quality collection.

The third volume of the “Hydrocarbon Technology” collection deals with chemical processes for petroleum fractions as produced by separation operations. In addition to scientific disciplines, the control of separation processes also involves the choice of technique (distillation, catalytic distillation, extractive distillation, extraction, adsorption, absorption, percolation, crystallization, etc.) and the choice of technology (mixer-settlers types of columns, centrifuges, membranes, etc.). Separation processes would therefore see to play leading role in the future of the hydrocarbon technology. The relevant investments are usually lower than for chemical processes.

Chemical processes have three objectives:

- Improve product quality so as to meet the requirements for the corresponding end use (heat/engines, burners);
- Convert crude oil fractions that cannot directly find an outlet into products better adapted to the market;
- Protect natural environment during product manufacturing and utilization.

Following an introduction which shows the growing importance of chemical processes in organic technology and petrochemistry, this e-textbook presents the fundamentals of the chemical mechanisms at the basis of chemical processes. These disciplines are thermodynamic, chemical kinetics, reactor calculation, and industrial catalyst.

Then the major chemical processes are discussed. The first group of chemical processes is designed to improve the quality of light fractions: catalytic reforming and isomerization. The second group involves the conversion of distillates: catalytic cracking and hydrocracking, along with their related units: alkylation, oligomerization and etherification. The third includes processes for converting residues: visbreaking, coking and hydroconversion with related hydrogen production unit. Lastly, chemical processes which deal with reducing air and water pollution: sweetening of white products and hydrotreating to eliminate sulfur and nitrogen compounds, sour gas treatments to remove hydrogen sulfide, desulfurization of heavy fuel oil combustion off gases and treatments to remove and treatment of process water.

In each of the chapters mentioned above have endeavoured to present both the basis needed to understand the chemical reactions put into practice as well as the technical and economic data required to gauge the impact of processes on refinery operation and on the technology of organic chemical industry.

Obviously, not all process variations can be presented in this e-book. The sole objective here is to give the reader a grasp of the complex world of oil, natural gas, organic chemicals industry product conversion techniques and their role in the chemical industry. Then, at a later date, specialized literature can be approached to get a more thorough understanding of hydrocarbon technology.

I believe that the e-book Hydrocarbon Technology – Chemical Processes in Organic Technology and Petrochemistry will be a welcome study material both for the students of the Faculty of Chemical and Food Technology, STU, but also for other students studying for higher education in the Slovak Republic. As a teacher with long-time practical experience I can recommend this e-textbook as a study material to all students that study chemical technology or similar field of science.

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