

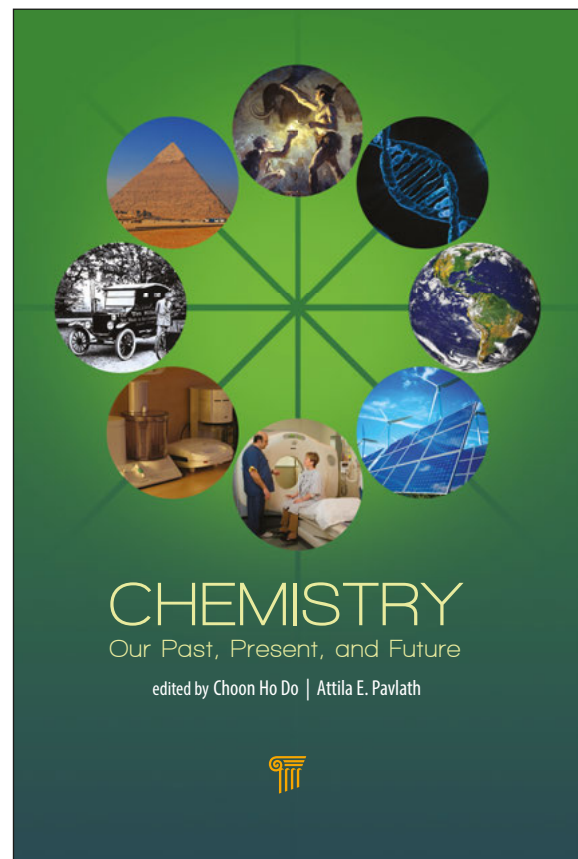
Chemistry: Our Past, Present, and Future

CRC Press 2017, ISBN 9789814774086

Reviewed by Richard J Sundberg

This is a multi-authored book edited by Choon Ho Do and Attila E. Pavlath, who have served as presidents of their respective national chemical societies and been active in promoting public interest in chemistry and chemical education. The book is organized into three sections: Chemistry Inherited from the Universe; Contributions of Chemistry; and Chemistry and Activities. Chapter 1 by Sunney I. Chan and Andrew P. Yeh is a broad overview of the origin of molecules, their organization into life forms and the crucial role of DNA, RNA, and protein in life processes. The central point is that chemistry, the understanding of substances at the molecular level, has provided deeper insight and enabled science-based progress. In Chapter 2, Mary V. Orna describes the origins of substances such as gunpowder, salt, dyes, metals, and glass. This chapter also provides examples of chemicals used in medicine. In Chapter 3, Dr. Pavlath emphasizes the role of chemically-modified materials—such as metals, alloys, textiles, glass, and ceramics—have had in changing daily life over the course of human history.

The second section of the book addresses specific areas of chemical impact in agriculture, nutrition, energy, medicine, transportation, and communication. For example, in Chapter 6, James Wei describes the chemical aspects of energy use including petroleum refining, combustion processes, pollution control, biomass conversion, and nuclear energy. In Chapter 7, Veronica Nemeth considers chemical aspects of clinical assays and imaging in diagnosis. In Chapter 8, Etrika and Dorottya Godor adopt a more anecdotal approach than most of the other chapters in discussing pain management, steroidal anti-inflammatories, psychotherapeutic agents, contraceptives, and insulin. This approach gives more emphasis to the circumstance of discovery than most of the other chapters. Chemist Carl Djerassi gets slightly less than top billing in the contraceptive section, not because his contribution was less critical, but because he did not need to step so far out of existing boundaries as the four “stars” (Margaret Sanger, George Pincus, Katherine McCormick and John Rock) of the chapter. Chapter 9 by Young Ha Kim describes implantable medical devices and regenerative medicine. In Chapter 10, James Wei discusses the materials used for vehicles, roads, and fuels in ground transportation. In Chapter 11, Dr. Pavlath considers materials used



for communication. Examples include batteries, vacuum tubes, transistors, computer chips, liquid crystal displays, optical fibers, compact disks, ink, and photographic film. If I had edited this book, I would have split this section into two parts emphasizing the more biological (Chaps. 4, 5, 7, 8, 9) and physical aspects (Chaps. 6, 10, 11), and in particular bringing together the closely related chapters on energy and transportation.

In Chapters 12 and 13, at the beginning of the third section, the editors discuss the future. Dr. Pavlath's chapter addresses perceived needs for improvement in chemical education and the public's appreciation of chemistry. The pronoun “we” is used frequently in this chapter, meaning professional chemists, as Dr. Pavlath urges his colleagues to address the problems he has noted. In Chapter 13, Dr. Do seeks to identify ways in which chemistry might be used to achieve advances and sustainability in the future. Among the topics are artificial photosynthesis, renewable energy sources, and new materials. Climate change, in particular CO₂ management, is addressed. The conversion of deserts to livable environments by massive water redistribution is considered. The final chapter looks at Africa,

the part of the world that has received the smallest share of the benefits extolled in the rest of the book. It envisions improved education, research, and “green” chemistry as means of progress.

So far as I could tell, this book is factually solid, although I noted two curious time warps. On page 115, the wrong Isaac Newton (1642-1727) is said to have been the first US Commissioner of Agriculture, beginning in 1862. On page 390, the Wright brothers first flight is dated as Dec 17, 1953, exactly 50 years off the mark.

There is no mistaking that this book is “pro-chemistry.” That is its avowed purpose. On page 375 Dr. Pavlath estimates that the benefits of chemistry outweighs its problems by 100:1. This is probably conservative, if the units are human life-years multiplied by some quality factor. Some of the problems get brief mention. Automobile emission control by catalytic converters is described on pages 152-154 and on 321-322. But there is no mention of the 50-year battle by geochemists and environmental chemists against the offending tetraethyllead. On page 370 the success of chemists in finding substitutes for ozone-destroying chlorofluorocarbons is described, but not the role of atmospheric chemists

in predicting and verifying the problem.

What will readers get from this book? The dust jacket includes professionals, teachers, students, and the general public as potential readers. For professional chemists the book will be a relatively easy read and a reminder of the chemical aspects of many everyday activities. Teachers and students can appreciate the broad scope of chemistry but will not find close connections between the beneficial results and the fundamental chemistry they are addressing. It is hard for me to judge the situation for the general public. Professional chemists have a broad technical language that is relatively unfamiliar to the public. This book makes an effort to keep the message understandable, but general readers will probably encounter some unfamiliar language.

<https://www.crcpress.com/Chemistry-Our-Past-Present-and-Future/Do-Pavlath/p/book/9789814774086>

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