

# Book Review

GADI ROTHENBERG

**Catalysis – Concepts and Green Applications****Wiley-VCH 2008**

279 pages; price 55 euro (hardback)

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Catalysis is “green” science by definition since it helps to save energy via opening “cheap” reaction pathways and minimizes unwanted and dangerous waste. These benefits emerging from catalysis research since old Berzelius’ times and ever growing until these days are appraised and illustrated with a number of convincing examples in Gadi Rothenberg’s book. This handy textbook wraps up all main topics of catalysis in 6 concise chapters, each followed by a section of exercises. In addition, an accompanying website serves the reader with further materials and a searchable references list. To summarize: this book written for PhD students and newcomers to the field really fills a gap on the shelves in our libraries and may assist even the professional researcher on his desk looking for quick orientation and overview.

The book starts showing the close interrelationship between Homogeneous Catalysis, Heterogeneous Catalysis and Biocatalysis and sustainable development. In a nice subchapter the reader is taught how to analyze the true “eco-friendliness” of a process without neglecting the “hidden costs” of the evaluated process (exemplified here with the hydrogen fuel cell). The second chapter refers to kinetic phenomena as the second pillar of catalytic science besides materials. For chemists this matter is sometimes rather dry stuff and tough to go through. However, guided by the fleet-footed pen of Gadi Rothenberg and reinforced by a number of perspicuous exercises the reader quickly masters the heights of Langmuir-Hinshelwood kinetics, steady-state approximations, Michaelis-Menten kinetics, consecutive and parallel first order reactions, and a number of related subjects. After this, the classic disciplines of homogeneous, heterogeneous, and biocatalysis are featured in three consecutive chapters, clearly subdivided and illustrated with a number of relevant industrial examples. Fortunately, the author doesn’t leave us with an enumeration of all the processes well known from other textbooks but adds a

chapter to demonstrate how efficiently “computational chemistry” nowadays can assist bench chemists in the sophisticated design of novel catalyst systems which exhibit special properties needed for specific applications.

Though I hate carping – as a neutral reviewer I cannot escape from mentioning a few deficits and errors which should be healed in the next print runs of the book: References 11–20 are quoted on page 178 but have correspondents only in Table 4.1, not in the text (page 129). While the term *Ziegler-Natta-Catalysis* is correct – this important polyolefin process (quoted in ref. 18, page 178) is brought about by *Ziegler Catalysts* only. The Fischer-Tropsch process does not catalyse the conversion of coal to syngas (as wrongly stated on page 127) but starts from any CO/H<sub>2</sub> source – even gasified biomass – to transform it to hydrocarbons. It is this flexibility which brought the process back to economic feasibility in spite of its drawback converting valuable hydrogen into waste water. Hydroformylation (mentioned in passing on pages 77 and 159), not the SHOP process (highlighted on page 97) is still the most important large-scale application of homogeneous catalysis. It was originally observed as an unwanted side-reaction of the FT-process and worked out 1938/9 by Otto Roelen, a scholar of Franz Fischer. Regarding the chapter on homogeneous catalysis I find that a little credit should be given also to the merits of J. Halpern and G. Wilke whose contributions to asymmetric catalysis helped that nature lost a monopoly. Finally, the whole field of Nanocatalysis boils down to one single quotation on page 129 while major findings which recently emerged from this young and promising research area, namely the Headwaters NanoKinetix H<sub>2</sub>O<sub>2</sub> process and the size-selective Fischer-Tropsch catalyst found by Kuipers and de Jong, are completely ignored. Organometallic Framework Systems (“Mofs”), the rising star in catalysis should also be included in the next print run of this excellent book which – despite of some minor deficits – I can unreservedly recommend.

**Helmut Bönemann**Max-Planck-Institut für Kohlenforschung  
Mülheim, Germany