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Book reviews

Encyclopedic dictionary of named processes in chemical technology

Alan E. Comyns 2nd edn.
CRC Press, Boca Raton, 1999
303 pages. £66.99
ISBN 0-8493-1205-1

It is easy to confuse two processes or to fail to realize that a process has more than one name. Increasingly, older processes are misunderstood or forgotten altogether. To give just one example, there is considerable confusion about the term 'Buna' for synthetic rubber. In his recent book, *Mauve*, the journalist Simon Garfield states that Buna is an abbreviation of its main components, butadiene and natrium (seemingly unaware that natrium is actually sodium). Had he consulted this dictionary, Garfield would have discovered that sodium was a catalyst rather than a constituent (though the dictionary should make it clearer that sodium was soon dropped as the catalyst).

A particular strength of Comyns' book is the historical information it provides. The long-vanished Leblanc process is covered in some detail, and also associated processes such as the Deacon and Weldon processes. The author is also good at explaining the various nuances of a term, as in the case of Buna, which has been the name of several synthetic rubbers and an East German 'combinat' (now part of Dow). One senses that here is an author who loves chemical processes and their quirky names. There are also bibliographical references for most entries, although these do not appear to have been updated for the second edition. In fairness, the new version does contain 244 new processes. The product index at the back is another useful feature. Looking under butadiene, I see there are entries on the processes associated with Ostromislenski, Lebedev and Reppe, as well as the aldol process. The latter shows its value, for I doubt if I would have thought of looking under aldol. The high quality of this book is demonstrated by the cross-reference to aldol under 'four step', the now obscure name given to this process by IG Farben in the 1920s ('Vierstufenverfahren' in German).

As the entry on Reppe demonstrates, applied organometallic chemistry is well represented, with entries on alfin, Mond (nickel), novolen, OXO, Wacker and Ziegler. I was, however, surprised that neither the Wilkinson process nor the Wilke process were included. The occasional corporate entries (IG Farben, Sasol) provide handy cross-references, but this feature could have been extended at a time when companies change hands and their names with bewildering frequency. Perhaps this is asking for too much, but brief biographies of chemists mentioned in the entries would be a bonus. The author does mention that K. Bayer of the Bayer (alumina) process had nothing to do with the Bayer dye firm, but it would be nice to know more about some of the more obscure chemists immortalized in process names.

There are a few problems. The Winkler sulfuric acid process is listed in the product index, but is missing from the main text, possibly because a copy-editor thought it duplicated the entry on the Winkler fluidized bed process. In the product index under iron, a cross-reference is given to steelmaking, but under steel it says 'see iron and steel'. It was only by accident that I discovered the entry on steelmaking in the main text. Incidentally, metallurgical processes are comprehensively covered in this dictionary, though I made a fruitless search for Gilchrist–Thomas. When I finally read the steelmaking entry, it told me the process was located under Thomas. These are minor blemishes in a superb (and highly enjoyable!) reference work, which is clearly printed, nicely laid out, and equipped with a sturdy cover and stout binding. Highly recommended.

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World records in chemistry

H.-J. Quadbeck-Seeger (ed.), R. Faust, G. Knaus and U. Siemeling
Wiley–VCH, Weinheim, 1999
xvi + 361 pages. £22.50
ISBN 3-527-29574-7

Let me begin with a disclaimer. In writing this review I must own up to having some serious conflicts of interest. I have known Ulrich Siemeling for several years. Not too serious, you say? Well, I can make things worse by telling you that Rüdiger Faust has been a colleague and drinking partner at UCL for a little over 2 years. So the review you are about to read is guaranteed to be skewed, if for no other reason than the fact that I'd like Rudy to

buy me a few drinks in the UCL bar. That being out of the way, here we go.

World Records in Chemistry is a profoundly frivolous idea, which has been turned into a fascinating and highly entertaining book. This 350-page volume will please, amongst others, the Chemistry Nerds out there (I write this review on the 37th anniversary of Giulio Natta's synthesis of polypropylene under low pressure conditions) who just love arcane statistics, those who love delving randomly into the nooks and crannies of chemistry past and present, and those who need material with which to spice up their lectures to undergraduates.

The records claimed in the book range from the quite obvious but always surprising (the longest characterized alkane — C(390)!; the largest synthetic ring — 288 atoms!; the longest bond — 620 Å in the van der Waals molecule He(2); the most toxic molecule — the marine polypeptide, maitotoxin; the sweetest molecule — sucronic acid; etc.), to the quite arcane (the smelliest compound — not surprisingly, a thiol; the highest oxidation state — U(82+), seen by mass spectrometry; the reaction with the most components — seven, not counting the solvent, in Ugi's synthesis of a thiazolidine). On a less serious level, those of us who imagine that the Meerwein–Pondorff–Verley reaction has the longest (and most ridiculous) name will find that the Lobry–de-Bruyn–von-Ekenstein reaction beats it by three letters. But the Buchner–Curtius–Schlotterbeck reaction goes one letter further still. We also discover that a paper in *Phys. Rev*. had 271 co-authors, beating by far Woodward's synthesis of erythromycin, which had a mere 49. The book is by no means limited to academic chemistry. Extensive sections devoted to industrial, environmental and pharmaceutical chemistry put commodity chemicals firmly in their place and rather nicely put into perspective the role of chemistry in the world at large. Each record is neatly discussed and explained, with a series of related examples and detailed references to the literature. Thus, non-specialists will find that they can learn quite a lot along the way. Surprisingly, to my mind, the authors appear to have been too modest to claim any records for themselves.

In addition to the records, the authors have tabulated the Nobel Prizes awarded in chemistry and physics. They have also ingeniously come up with a 'Perpetual Calendar' for chemists, noting key chemical events that occurred on every day in the calendar. One of the highlights for me must be August 10th, the anniversary of the hairdresser Karl Ludwig Nessler's introduction of his process for giving 'permanent waves'. This is a section that they ought to expand. High time, also, that they got to work on a desk calendar for next year. Just think of the sales, especially if some of the pages were 'scratch-and-sniff' …

Purists may quibble here and there with some of the records (is di-helium a 'real' molecule?) and, no doubt, some records may already be out of date — the industrial sections are probably the most vulnerable — while the competitive spirit that obliges academics to out-nerd each other with ever more obscure firsts (the first molecule with 16 chiral centres synthesized on a Tuesday) may spur some profoundly insecure individuals to try to get their name into this remarkable compendium. Who cares? This is a very amusing book from which anyone can learn something. Its rapid-fire style makes it ideal dipping material, readable almost at random and, for the academic chemist, it will raise intriguing questions about the limits that define our work. It also makes you wonder what sorts of minds managed to come up with so many crazy categories.

In summary then, I exhort you to buy a copy for yourself. Buy it for a friend for their birthday and buy another couple of copies as Christmas presents. You won't be disappointed. (And now, Rudy, I think you owe me a beer!)

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Large (C ≥24) polycyclic aromatic hydrocarbons: chemistry and analysis (Chemical analysis monograph series, vol. 158)

John C. Fetzer
Wiley–Interscience, New York, 2000
xvi + 288 pages. £90
ISBN 0-471-36354-5

The publishers should withdraw this book for revision and reprinting. There are more structures in the text with pentavalent carbon atoms than there are without them, and the text has clearly not been properly proofread or edited. This might be considered a pedantic point, except that the subject of the text is polycyclic aromatic compounds and the properties of these substances can be most readily inferred by examining the number and position of the double bonds. This can be illustrated by application of the Robinson–Clar sextet theory, in which one finds the number of aromatic sextets in a Kekulé structure, the stability of the compound being assumed to increase with the number of complete sextets. Thus phenanthrene, with two complete sextets, is expected to be more stable than anthracene, with one. Further, one can predict that the central rings of both compounds will be the most reactive, in phenanthrene because it is not part of an aromatic sextet and in anthracene because reaction at the 9,10 positions gives two sextets. To carry out this analysis for the structures in the text one has to redraw them. The problem with the structures appears to have arisen when the figures were made for the body of the text, since those on the spectra are generally correct.

The book begins with an introductory chapter on the