

However, CO₂ emission intensity of the Indian steel industry is high compared to the global average. The chapter highlights that this sector has a high energy-saving potential vis-à-vis best available techniques. The chapter concludes that by 2030, the emission intensity of steel production will reduce only by about 8% in the BAU scenario. In LC scenario, the emission intensity will stagnate after 2020 owing to limited technology options.

The third chapter focuses on the 'aluminium' sector and highlights that the Indian aluminium industry is among the lowest users of electricity in aluminium smelters in the world. By adopting pre-baked anode technology it also has one of the lowest perfluorocarbon emissions in the world. But because of very low efficiency of coal-based captive power production, carbon intensity in this sector is well above the global average. The reduction in emission intensity between 2008–2009 and 2020–2021 will be about 17% for BAU and about 40% for LC scenario for the aluminium sector. However, beyond 2020–2021, the intensity will stagnate in both cases.

'Cement' is the focus of the fourth chapter. It is pointed out that the Indian cement industry is probably the most energy-efficient in the world today. While the market share of blended cement (which is less energy and emission intensive than ordinary Portland cement) is high in India, the percentage of blending material in cement is still lower than what is possible, which can be useful in further decreasing the emissions. In the BAU scenario, the authors expect a reduction in specific energy consumption and CO₂ emission by 25% by 2030, largely on account of blended cement and greater blending proportion, whereas in the LC scenario this reduction is expected to be 35%.

The fifth chapter is devoted to the 'fertilizer' industry. The author points out that the Indian fertilizer industry is energy-efficient owing to the best practices adopted in gas-based plants. Some of the Indian gas-based plants are the best in the world. However, at present, 22% of India's urea production is from less-efficient heavier feedstock and the way forward is to move to natural gas. The emission intensity of urea products in MT CO₂-e/tonne is expected to reduce from 0.7 in 2008–2009 to 0.56 and 0.43 in 2030–2031 under BAU and LC scenarios respectively.

The focus of the sixth chapter is on 'paper and pulp' industry. The chapter highlights that the sector will always lag behind global best performance in energy and emission intensities, which is because of its inability to profitably scale down the best practices. Indian mills are small and likely to remain so in the future. Inconsistency in the nature and quality of raw materials, and the fact that Indian mills are multi-product in nature, pose further limitations. The emission intensity of paper and pulp industry in MT CO₂-e/tonne is expected to marginally reduce from 3.0 in 2008–2009 to 2.1 and 1.6 in 2030–31 under BAU and LC scenarios respectively.

The additional section on 'low carbon growth' summarizes the carbon emission scenario and throws some important points on natural resource requirements in future. The section highlights that the total GHG emissions from the six sectors in 2030–2031 is likely to be 3.6 times and 3.0 times the 2008–2009 emissions in BAU and LC scenario respectively. It is also interesting to observe from this section that the freshwater withdrawal in 2008–2009 by the six sectors was equivalent to the daily freshwater needs of about 1.1 billion people, i.e. the entire drinking and cooking needs of the country. Further, the freshwater requirement is expected to increase by 40% by 2030–2031 under BAU scenario. Even the effect of LC scenario will be minimal on the reduction in freshwater requirement. Further, from now up to 2030–2031, an estimated 1 m ha of additional land will be required for mines and to set up plants for the six sectors in the BAU scenario and the land requirement will be 30% higher than BAU for LC scenario.

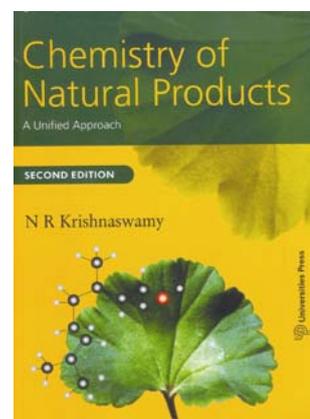
This book has many positive points. It is an excellent guidebook for practitioners, bureaucrats, policy-makers and politicians to devise strategies to reduce carbon emission intensity from the six sectors covered in the book. What the book clearly shows is that there are relatively easy options to reduce emissions in the short term in the BAU scenario. Therefore, even in the current situation, with the use of technology now being adopted by new plants across sectors, the emission intensity of the GDP from these sectors together can easily be reduced to achieve the target of 20–25% reduction by 2020. Nevertheless, what is needed is to speed-up the pace of implementation of the different policy and regulatory

changes already announced by the government, which will push the process a little faster. But the worry is that what we do today will constraint and seriously limit any options for real emission reduction beyond 2020. On the negative side, the book is heavily number-centric and statistics-based. In other words, the description of methodological approaches and modelling behind various trends and figures and suggested measures is minimal or often missing in the book. This makes it unattractive for students and inappropriate to be used as a textbook.

Overall, the author's effort in covering the subject is commendable. It will provide the right direction for many such books to be written in future focusing on other sectors as well.

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Chemistry of Natural Products: A Unified Approach. N. R. Krishnaswamy. Universities Press (India) Private Limited, 3-6-747/1/A and 3-6-754/1, Himayatnagar, Hyderabad 500 029. 2010. xiv + 418 pp. Price: Rs 475.

In the last two decades, interest in natural products chemistry has declined due to the strategic shift in major pharmaceutical companies towards combinatorial chemistry as the primary source of hits and leads. Interestingly, this decline coincided with the drying up of the pipeline of the 'first-in-class' drugs for unmet medical needs. These issues have been

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well articulated in the last few years and the reversal of interest in natural products-driven drug discovery (medicinal plants, microbial and marine biodiversity) is in the offing. However, this successful rekindling of research activity will require quality books, monographs and critical reviews. The book under review (a second edition) is one such addition in this direction, providing easy-to-read material on natural products chemistry of plant, microbial and marine organisms. The previous volume of the book was published in 1999. The book is divided into eight chapters: Introduction, Structure, Stereochemistry, Reactions and rearrangements, Synthesis, Biosynthetic pathway, Biological significance of secondary metabolites and Problems. Each subhead of a particular chapter is accompanied by a suggested list of original publications or reviews. The last chapter of the book provides problem-solving exercises for new students and researchers.

Following the Introduction emphasizing the chemistry of natural products, the second chapter on 'Structure' provides an overview of the structural diversity of natural products. The selection of these representative natural products (strychnine, nepitrin, pedalin, colchicine, longifoline, b-amyirin, wedelolactone, protoaphin, tylophorine, heliangine, delphisine, tubocurarine, sclerophytins, mangferin and conessine) is quite appropriate in terms of the historical perspective of this field, the diversity of structural scaffolds and just how many pharmacophores are hidden in the structure of natural products. The way their structural elucidations have been described is interesting and will be revealing to even 'expert' practitioners of this science. Subsections 2.2–2.12 are informative, with a few molecules discussed in great detail. The author has shown how different approaches, from so-called classical to modern, sometime failed to arrive at the correct structure and, as demonstrated in this chapter, judicious mix of two different techniques was at times critical. This chapter should be a reminder to those who think that the structural elucidation of natural products has become trivial!

The chapter on 'Stereochemistry' is well presented with careful selection of examples of determination of the absolute stereochemistry (e.g. morphine, quinine, emetine, germacrolides, rotenoids, abietic acid, sphingosine, menthol and indole alkaloids). The next chapter, 'Reactions

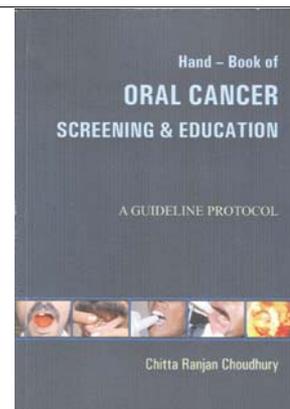
and rearrangements' is dedicated to some unusual and remarkable reactions discovered during the chemistry of a few privileged natural products; the examples of transannular reactions and carbon-carbon rearrangements are nicely described. The next chapter on 'Synthesis' includes some landmark total syntheses in reasonable detail. The chapter on 'Biosynthesis' describes how a common metabolic pathway with simple starting materials produces a diverse set of structurally complex compounds in the same plant. This knowledge and understanding of biosynthetic pathways in the living cells is extremely useful (although surprisingly missing from the chemistry teaching courses in most Indian universities) for understanding the relationship between the form and function of compounds of natural products origin. Some key biosynthetic pathways for the polyketides, terpenoids and benzyloisoquinoline class of compounds are discussed in this chapter.

The last scientific chapter is the most important and refreshing, where several case-studies of the chemical ecology in action are described. The examples of the remarkable roles of 'small but smart' natural products in species-species interactions (plant-plant, plant-insect, plant-vertebrate, plant-microbe, insect-animal, insect-insect, etc.) are interesting and revealing. In my view, the true secrets of the structure and function of the small-molecule natural products will be unravelled through the chemical ecology studies, which will also bring rationale in bioprospecting and new drug discovery. In the last chapter on 'Problems', the author has assembled some interesting questions related to the structure, chemistry and synthesis of natural products, which will undoubtedly be useful.

In summary, the author has done a remarkable job in updating and formulating this book, which will be an addition to the new generation of reading material on natural products chemistry. Of course, there has been a significant amount of new research on natural products published in the last 10 years, which is missing in this book. Hopefully, it will be included in the next edition.

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Hand-Book of Oral Cancer Screening and Education: A Guideline Protocol. Chitta Ranjan Choudhury. Nitte University, Mangalore, in association with Bournemouth University, England and Royal Society for Promotion of Health, UK. 2010. xxxv + 116 pp. Price not mentioned.

This book by C. R. Choudhury, an accomplished doctor, teacher, scientist and a public health enthusiast, is a true reflection of his abilities. Tobacco chewing is a problem unique to South East Asia and has been well-covered in the book. Tobacco and areca nut chewing leads to certain oral lesions such as verrucous lesions, submucous fibrosis, leukoplakia, etc. that are highly prevalent in this part of the world. The book is an exquisite collection of high-quality pictures and lucid illustrations.



Beedi smoking associated Median Rhomboid Glossitis (MRG).

The author has explained a complex problem in simple language. An entire section on educating the readers to come to consult cessation specialist is a great effort. Wide coverage of microscopic features and basic research will be of use to the oral pathologist. In summary, this book is highly educative and worth reading.

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