



Introduction to Chemicals from Biomass

This book in the Wiley *Renewable Resources* series addresses the topical issue of biomass utilization against the backdrop of increases in the consumption and costs of raw materials, as well as worldwide efforts on climate protection. The editors have tackled this very complex topic in 198 pages featuring contributions by a variety of authors, with the aim of providing readers with an introduction to the opportunities offered by biomass utilization and the potential of “biorefineries”. The main focus of the volume is on current topics such as the concept of biorefineries, the chemical composition and the economic potential of biomass, green technologies, biomass chemicals, biomaterials, and the production of biofuels.

The editors have succeeded in producing a work that should be of interest to readers new to the subject and those already familiar with it. However, the title does not necessarily lead the reader to expect a treatment of green chemical technologies (Chapter 3)—a subject that is, of course, much broader than biomass alone. It would have been preferable to give a more detailed description of chemical and biotechnological processes for manufacturing chemicals, the coupling of these processes, and their potential for industrial use.

Beginning with the challenges of sustainable development and of ensuring the availability of renewable raw materials, the first chapter is devoted to biorefineries, a topic that is currently under intensive discussion in academia, industry, and politics. The differences between biorefineries and oil refineries, and in documenting the historical development of biorefineries are successfully defined. The concepts behind today’s third-generation biorefineries are also clearly described. Chapter 1 concludes with a critical examination of the potential of raw materials, processes, and products of biorefineries, as well as size issues.

Chapter 2 is devoted to the very important topic of plant compounds and their extraction and uses. Oils, carbohydrates, lignin, proteins, and secondary plant compounds are discussed as potential raw materials for biorefineries, and their likely applications are identified in a concise but clear manner, although with the one shortcoming that the depth of treatment of different classes of materials varies considerably. Finally, there is a short overview of the future contribution of biochemical engineering to the utilization of biomass in biorefineries.

Chapter 3 deals with a subject which, while important, is not strictly essential for an introduction to biomass utilization. Green chemistry and

engineering could equally well have been dealt with in an introductory chapter. Here, however, the topic of alternative solvents is accorded great significance by describing various solvents such as supercritical and ionic fluids. In contrast, the coupling of chemical and biotechnological processes, which would ideally employ the same solvent—water—is not examined in detail here. Nor is there any treatment of the various options for energy input by means of microwaves or ultrasound, which by their nature are not restricted to biomass processes. The really important topics of chemo- and biocatalysis, which present an especially large challenge in biomass utilization, and have great potential, are only treated in outline.

With the aid of flow sheets, Chapter 4 describes possibilities for manufacturing a great variety of platform chemicals and chemical end products from oils, carbohydrates, lignocellulosics, and proteins. Here the interested reader would probably have wished for a more detailed analysis, although the extensive bibliography offers valuable suggestions for further reading.

In Chapter 5, the authors provide the reader with an excellent overview of the subject of biomaterials. The potential uses of fibers, cellulose, starch, and lignin are described in depth. Current topics such as wood–plastic composites and biodegradable polymers are also addressed.

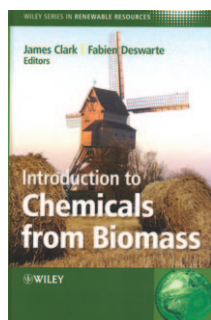
Chapter 6 is devoted to the important, but—if one relied on the book’s title—not immediately obvious topic of biofuels. The reader can expect an introduction to topics such as physical processing and the biotechnological, chemical, and thermochemical synthesis of fuels from biomass. Topics such as co-utilization and cascade utilization, which are of especially great significance in the context of biorefineries, are only treated marginally.

Despite these various imbalances, the authors succeed commendably in showing the scope and diversity of the subject and providing an initial insight into biomass utilization and its associated topics—including the ramifications for industry—without the reader losing the thread. The good overview of biorefinery concepts, chemicals, materials, and biomass fuels will appeal to a broad readership from industry, academia, and politics. The book is also a welcome introduction for students and lecturers intending to study the subject of biomass.

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