

Preface

Chemists are well aware that it is urgent to develop sustainable processes and to design new chemical entities that improve the efficiency and the environmental impact of chemical transformations. Carbohydrates are the most abundant class of natural compounds: they offer unique structures for multiple transformations into a variety of industrial products based on their multifunctionality and stereochemical diversity. Chemistry using carbohydrates, unprotected or functionalized, continues to be a challenging field of investigation. Because of the complexity of sugars, the issues of regio- and stereoselectivity are among the most difficult to monitor. The low solubility of carbohydrates in several solvents is often a handicap, but sometimes an opportunity. In this volume, entitled “Carbohydrates and Sustainable Development, Part 2 – A Mine for Functional Molecules and Materials,” several aspects of the chemistry of carbohydrates are discussed. Green processes involving their conversion into industrial products for cosmetics are illustrated by straightforward transformations using clean solvents and nontoxic catalysis. Other contributions focus on multistep sequences toward elaborated products, starting from these inexpensive and readily available materials. A survey on the state of the art of ionic liquids derived from sugars is also presented. Synthetic polymers can now be made based on carbohydrate building blocks. The potential of these biocompatible and biodegradable macromolecular materials to replace the polluting petroleum-based polymers is also discussed. Bioconversions toward rather complex molecules of biological relevance have made a breakthrough. In all chapters, evidence is given that sugars and polysaccharides are indeed “a mine for functional molecules and materials.”

This volume, together with the first volume entitled “Carbohydrates and Sustainable Development, Part 1 – Renewable Resources for Chemistry and Biotechnology,” demonstrates that a variety of industrial products can be accessed using renewable and low-cost biomass. Both volumes are based on selected papers presented at “Carbohydrates as Organic Raw Materials V – Building a Sustainable Future” (CORM V), held in Lisbon in January 2009. The conference was chaired by Amélia Pilar Rauter (University of Lisboa) and Yves Queneau (University of Lyon, INSA Lyon), in collaboration with Frieder W. Lichtenthaler (Technische

Universität Darmstadt) as Honorary Chairman. The CORM meetings were started by Lichtenthaler in 1990. Both volumes highlight the importance of carbohydrates for sustainable processes as abundant, renewable, and low-cost materials and show how sugars contribute significantly to the indispensable new processes for tomorrow's chemistry. With the chemical and biochemical transformations of readily available carbohydrates, we are on the way toward a more sustainable future.

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Amélia P. Rauter, University of Lisbon
Yves Queneau, University of Lyon

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Rauter, A.P.; Vogel, P.; Queneau, Y. (Eds.)

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